WAIMAKARIRI
DISTRICT COUNCIL

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

Truss "As-Built" Designs may be sent to:
buildinginfo@wmk.govt.nz

BC No: 201209

SITE DETAILS:

4 GOLDIE DRIVE

RANGIORA

LEGAL:

LOT 14 DP 553457

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 3118906

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

CONSENT ISSUED BC201209 - Page 2 of 689

Dial Before You Dig

Safety near underground cables and services

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

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

Working near electricity cables

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

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

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

Steps to ensure safe digging

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

Underground electricity cables

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

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

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

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

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

Underground council services

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

Contact MainPower

To report a fault:
0508 60 70 80

For electricity emergencies:
0508 60 70 80

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

CONSENT ISSUED BC201209 - Page 3 of 689

THINGS YOU SHOULD KNOW ABOUT...

Noisy Heat Pumps

AS THE DISTRICT GROWS WE'RE SEEING MORE HOMES BEING BUILT ON SMALLER SECTIONS.

Smaller sections mean that you need to pay closer attention to products which both eliminate and produce noise.

While a heat pump is not assessed under the Building Consent application, and therefore not checked or signed off under any building inspection, some models produce noise which is deemed excessive under the District Plan.

The onus is upon the individual / landlord to ensure that it complies with your local council's District Plan rules.

BELOW ARE QUESTIONS TO ASK YOURSELF BEFORE INSTALLING A HEAT PUMP:

- **Does your heat pump comply with the permitted noise levels allowed by the Waimakariri District Council?** i.e. Does the noise produced from your heat pump measure less than 50dBA during the day and less than 40dBA at other times? You may not be allowed to use it if complaints are received.
- **Where are you mounting the unit?** The level of noise produced by your heat pump will depend upon the size, the location and how it has been fixed /mounted.

It is common sense that heat pumps will produce some noise as they do contain a compressor and fan. However what is regarded as 'acceptable noise' is a personal and subjective opinion.

Please note that if the unit makes a constant penetrating monotone engine noise similar to generators or water heater pumps, then those types of noise may cause significant issues for neighbours who will render the noise 'unreasonable'. Such noise may not even be exceeding the noise levels but will potentially still be rated as 'unreasonable'.

Most noise issues occur when the outdoor unit is located too close to the neighbouring boundary or not raised off the ground.

Noise specifications will be found in the sales brochure, and you are advised to check these prior to purchase and installation.

If you are having a heat pump installed, make sure the installer is trade qualified to install air conditioning units and heat pumps. The installer should be a member of IRHACE.

Have your heat pump installed by a qualified installer.

MORE INFORMATION Visit waimakariri.govt.nz for more information, or contact Customer Services on 0800 965 468 (0800WMKGOV)

190215017430 / MARCH 2019

DWELLING & OTHER WORKS - NOT COMMERCIAL

SECTION 1

Statutory Forms

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

Note: A BUILDING LOCATION CERTIFICATE (BLC) is REQUIRED 2 Working Days BEFORE the PrePour Inspection to verify the setout of the Finished Floor Level. The builder is required to tie back this FFL to a known LINZ Survey Mark (revised in January 2018). Please check with your surveyor that referenced Benchmark Datum heights are correct.
Min FFL of 27.54m LVD

-- 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 shall be sent to buildinginfo@wmk.govt.nz

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

Jordan A Joyce C/- VIP Design Limited 158 Maces Road Christchurch 8062	No.	BC201209
	Issue date	15 January 2021
	Overseer	Michael Molloy

Project

Description	1100 New (& prebuilt) House, Unit, Bach, Crib, Town Houses BC - New or Relocated Dwelling, New Detached Dwelling, 01 Standard Building Consent(20 W Processing Days)
Intended Life	Indefinite (50+)
Intended Use	Residential Dwelling
Estimated Value	$400000.00
Location	4 Goldie Drive RANGIORA
Legal Description	LOT 14 DP 553457 0.065500 Ha
Valuation No.	2166000110

This inspection sheet and all the approved plans and specifications relating to this building consent are to be available on site during construction. If the documentation required for a particular inspection is not available, this will mean automatic failure of the building inspection and will necessitate re booking the inspection at the applicant's expense.

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.

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.

BC201209
Compacted Hardfill - pre DPM -
Foundation / Floor Slab -
First Floor Framing -
Structure Pre Roof Pre Wrap -
Building Wrap & Sill Tape -
SA- Shelf angles -
Mid Height Veneer -
Sheet Cladding Exterior Early Installation -
AAC-AAC Panel Part Installed - Please also check the cavity battens for the Plywood cladding to the North elevation Sh A3.01
Pre Plaster & Flashings -
Drains -
Preline & Plumbing -
Prestopping -
Wet Area Tanking -
Final -

WAIMAKARIRI DISTRICT COUNCIL

Form 5

Building consent BC201209

Section 51, Building Act 2004

The building

Street address of building: 4 Goldie Drive RANGIORA

Legal description of land where building is located: LOT 14 DP 553457 0.065500 Ha

Valuation number: 2166000110

Building name:

Location of building within site/block number:

Level/unit number: 1

The owner

Name of owner: Jordan A Joyce

Contact person: Jordan Andrew Joyce

Mailing address: 77 Fullers Road RD 1 Kaiapoi 7691

Street address/registered office:

Phone number: Landline: Mobile: 0221281259

Daytime: After hours:

Facsimile number:

Email address: joycebuilt@outlook.co.nz

Website:

First point of contact for communications with the council/building consent authority:
VIP Design Limited

Building work

The following building work is authorised by this building consent:

2 STOREY DWELLING WITH ATTACHED GARAGE UNDERLYING 29 PENTECOST ROAD RANGIORA LOT 14

Primary Specified Intended Use: Housing - Detached dwellings

Description of Intended Use: Residential Dwelling

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 and carried out in accordance with the attached schedule (list) of inspection types. It is advisable to request bookings at least two full working days in advance of the required inspection date. It is the owner's responsibility to ensure all necessary inspections are carried out. Please contact the building consent authority if you are unsure what requires inspection - do not cover or enclose any building work without prior inspection.
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.

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

Critical Floor Level: The owner/applicant/agent will need to supply a Building Location Certificate for this Lot two (2) working days prior to the Pre-Pour inspection. The certificate shall confirm that the building is wholly contained within the Lot/s to which it relates and meets the District Plan requirements for critical finished floor levels (Min FFL 27.54m AMSL LVD).

Comply with the endorsements on the plan.

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

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.

Licenced 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.

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

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

The installer shall provide the building consent authority a PS3 for the installation of the AAC exterior cladding system prior to issue of Code Compliance Certificate

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

Project Information Memorandum (PIM)

Consented Plans

Consented Specifications

Inspection List

Form 6 Application for Code Compliance

Shirley Cresswell
Building Unit Administrator

On behalf of: Waimakariri District Council
Date: 15 January 2021

Waimakariri District Council
215 High Street
Private Bag 1005
Rangiora 7440, New Zealand
Phone 0800 965 468

BUILDING UNIT

Code Compliance Certificate Application

Under *The Building Act 2004, Section 92*

Please submit the Application for Code Compliance Certificate, when work has been completed, by emailing to: **ccc@wmk.govt.nz**

BC No. _____ Issued by: _____

The Building

1. Site address: _____
   (Street / Road / Township)
2. Legal description of the land where the building is located:
   Lot: _____ DP: _____ Valuation Number: _____
3. Building Name (if applicable): _____
4. Location of building within site: _____
   (Only applicable to multi-development sites)

The Owner - All details must be the legal owner's

PLEASE NOTE - *By entering your name in the box below you are giving your authority for this Code Compliance Certificate application to proceed under Section 92 of the Building Act 2004.*

5. Owner's name: _____
   (Company or organisation name if applicable)
6. Contact person: _____
7. Mailing address: _____
8. Street address / Registered office: _____
9. Mobile: _____ Landline: _____ Email: _____

The Agent - Only required when the application is being made on behalf of the owner

PLEASE NOTE - *Authorisation is required from the owner of the property*

10. Agent's name: _____
    (Company or organisation name if applicable)
11. Contact person: _____
12. Mailing address: _____
13. Street address / Registered office: _____
14. Mobile: _____ Landline: _____ Email: _____

Agent authorisation

(To be authorised by Owner)

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

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

Name (Owner): _____ Date: _____

Application

15. I request that you issue a Code Compliance Certificate for this work under *section 95 of the Building Act 2004.*

16. The Code Compliance Certificate should be sent to: ☐ Owner ☐ Agent

17. I wish to receive my certificate in the following format:

PLEASE NOTE - *If hard copy, please confirm if you wish to pick it up from the Council or have it posted.*

Hard copy: ☐ (post) OR ☐ (pick-up) OR ☐ Email

18. The following field must be completed when submitting the Code Compliance Certificate application:

All building work carried out under the Building Consent specified in this form was completed on: _____

Restricted building work

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

The Licensed Building Practitioner(s) who carried out or supervised the restricted building work is/are as follows:

Licence class	Name	Licensed building practitioner number (or registration number if treated as being licensed under section 291 of the Building Act 2004)
Foundations		
Carpentry		
Exterior Plasterer		
Bricklayer		
Blocklayer		
Roofer		

Key personnel

Builder

Name: Reg. No.:

Address:

Phone No.: Email:

Designer(s)

Name: Reg. No.:

Address:

Phone No.: Email:

Certifying drainlayer

Name: Reg. No.:

Address:

Phone No.: Email:

Certifying plumber

Name: Reg. No.:

Address:

Phone No.: Email:

Certifying gasfitter

Name: Reg. No.:

Address:

Phone No.: Email:

Registered electrician

Name: Reg. No.:

Address:

Phone No.: Email:

Structural engineer

Name: Reg. No.:

Address:

Phone No.: Email:

Specified systems

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. Tick appropriate specified systems below:

- ☐ **There are no specified systems in the building**
- ☐ SS1 Automatic systems for fire suppression
- ☐ SS2 Emergency warning systems
- ☐ SS3/1 Automatic door
- ☐ SS3/2 Access controlled doors
- ☐ SS3/3 Interfaced fire or smoke doors or windows
- ☐ SS4 Emergency lighting systems
- ☐ SS5 Escape route pressurisation systems
- ☐ SS6 Riser mains
- ☐ SS7 Automatic back-flow prevention
- ☐ SS8/1 Passenger carrying lifts
- ☐ SS8/2 Service lifts
- ☐ SS8/3 Escalator and moving walks
- ☐ SS9 Mechanical ventilation or air conditioning systems
- ☐ SS10 Building maintenance units
- ☐ SS11 Laboratory fume cupboards
- ☐ SS12/1 Audio loops
- ☐ SS12/2 FM Radio and infrared beam transmission systems
- ☐ SS13/1 Mechanical smoke control
- ☐ SS13/2 Natural smoke control
- ☐ SS13/3 Smoke curtains
- ☐ SS14/1 Emergency power systems
- ☐ S14/2 Signs for SS1-13
- ☐ SS15/1 Spoken information to facilitate evacuation
- ☐ SS15/2 Final exits
- ☐ SS15/3 Fire separations
- ☐ SS15/4 Signs for facilitating evacuation
- ☐ SS15/5 Smoke separations
- ☐ SS16 Cable cars

Attachments

The following documents are attached to this application:
(Where applicable)

- ☐ Certificates that relate to the energy work
  (e.g. gas and electricity)
- ☐ Evidence that the specified systems are capable of performing to the performance standards set out in the building consent
- ☐ Proof of potability of drinking water from private well, and/or rain water catchment, supply
  (Refer to New Zealand Drinking Water Standards 2005)
- ☐ Memoranda (records of building work) from licensed building practitioner(s) stating what restricted building work they carried out or supervised
- ☐ Other documents from personnel that carried out the work

Terms of trade

I/We understand that:

Fees associated with the Building Consent shall be paid for i.e. development contributions, amendments, additional inspections, and extensions prior to the issue of Code Compliance Certificate.

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.

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.

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, the 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

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. Bookings are subject to demand and availability of inspectors, **please be advised that it is not always possible to carry out an inspection within 48 hours.**

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.

All inspections including re-inspections are subjected to a separate charge, even if carried out on the same day.

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 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 2. All amendments require new authorisation.

Fees

Please note - All work for the issue of a Code Compliance Certificate will be invoiced and must be paid in full before the Code Compliance Certificate will be issued.

Notice to fix

If a Notice to Fix is issued, it will state the building work that must be carried out and will set a timeframe in which this work must be completed. Once the work listed has been completed a further inspection should be booked by phoning the Council Building Unit on 03 311 8906.

WAIMAKARIRI DISTRICT COUNCIL

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

PRODUCER STATEMENT PIPEWORK TESTING

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:

WAIMAKARIRI DISTRICT COUNCIL
215 High Street, Rangiora
Private Bag 1005, Rangiora 7440
Free Phone 0800 965 468
Email office@wmk.govt.nz
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. 201209

THE BUILDING

1. Site address: Underlying 29 Pentecost Road Rangiora Lot 14 Stage 2
(Street / Road / Township)

2. Legal description of the land where the building is located:
Lot: 50 DP: 547441 Valuation Number: 2166000104

3. Building Name (if applicable): N/A

4. Location of building within site: N/A
(Only applicable to multi-development sites)

5. Number of levels: 1.5 6. Unit/Level No.:

7. Floor area m^2 - Existing: 0 New: 192.91 Total: 234.76

8. Current lawfully established use: N/A
(i.e. use on any previous consent for the existing building)

9. Year building first constructed: N/A
(Only applicable to existing buildings, approximate date is acceptable, eg 1920's)

THE OWNER

10. Owner's name: Jordan Joyce - Jordan Built Limited
(Company or organisation name if applicable)

11. Contact person: Jordan Andrew Joyce

12. Mailing address:

13. Street address / Registered office:

14. Mobile: 0221281259 Landline: Email: joycebuilt@outlook.co.nz

15. The following evidence of ownership is attached to this application:

☐ Copy of Certificate of Title OR ☐ Council to provide (additional charge of $15)
(Current within 1 month of being issued and must include a deposited plan [diagram])

☑ 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: VIP Design Ltd
(Company or Organisation name if applicable)

17. Contact person: Christopher Brown

18. Mailing address: 158 Maces Road

19. Street address / Registered office: 158 Maces Road

20. Mobile: 0273130880 Landline: N/A Email: admin@vipdesign.co.nz

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 with PIM
- ☐ Exemption from the need for B/C (Refer Schedule 1, Part 1, Section 2, BAA13)
- ☐ Building Consent for Above Ground Pool and/or Non-Exempt Small Heated Pool
- ☐ Building Consent for PIM No:
- ☐ Building Consent without PIM (Compliance Check applies)
- ☐ Amendment to Building Consent

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

PLEASE NOTE - If USB 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 (You must be set up and registered for this option)
- ☐ USB: ☐ (post) OR ☐ (pick-up) OR ☐ (courier)
- ☐ Hard copy (on site): ☐ (post) OR ☐ (pick-up) OR ☐ (courier)

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

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) Joyce Built

Contact person: Jordan Joyce

Mailing address: 77 Fullers Road, Woodend

Mobile: 0273130880 Landline: Email: joycebuilt@outlook.co.nz

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

SPECIFY AND PROVIDE WITH APPLICATION

	APPLICANT TO COMPLETE	*OFFICE USE ONLY*
Building Element – Site information		
Completed application form	☑	☑
Set of plans / specifications (1 copy)	☑	☑
Certificate of Title / Sales & Purchase (1 copy)	☑	☑
ONLY FOR SWIMMING POOL: **Building Element – Drawn Information / Specifications / Details**		
Site plan, showing location of pool and existing buildings, location of fence, boundaries and existing waterways	☐	☐
Fence construction. Show the height, gates, self closing device, construction type etc (see "A guide to pool fencing")	☐	☐
Also show how any doors or windows that form part of the fence will comply	☐	☐
Brand and model of pool:	☐	☐
Size of the pool:	☐	☐
Drainage plan. Show discharge point	☐	☐
Producer statement (where applicable)	☐	☐
Installation instructions/manual	☐	☐
Show filling point for pool (tap) and backflow protection	☐	☐

PROJECT

25. Description of work (e.g. dwelling, alteration/addition). If an amendment, please provide a complete description of the nature of the amendment.

1.5 storey residential dwelling with 4 bedrooms, 2 bathrooms and double garage. 2 of the bedrooms and a bathroom are located in an attic space above.

26. Specify the intended use of the building (e.g. residential/show home) Residential

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

If yes provide details N/A

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 N/A
(e.g. Stage 1 of 3)

31. List Building Consents previously issued for this building (if any): N/A
(i.e. is this project being constructed in stages? Is this consent for a relocated or transportable building?)

32. Estimated value (incl GST) $ 400,000
(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: 45895 - Rev.0

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

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)
☑ B1 Structure	B1/AS1/NZS3604 VM1	
☑ B2 Durability	B2/AS1/NZS3604	
☐ C1 - C6 Protection from fire	N/A AS1	
☑ D1 Access routes	D1/AS1	
☐ D2 Mechanical installations for access	N/A	
☑ E1 Surface water	E1/AS1	
☑ E2 External moisture	E2/AS1	
☑ E3 Internal moisture	E3/AS1	
☑ F1 Hazardous agents on site	F1/AS1 VM1	
☐ F2 Hazardous building materials	N/A AS1	
☐ F3 Hazardous substances and processes	N/A	
☐ F4 Safety from falling	N/A	
☑ F5 Construction and demolition hazards	F5/AS1	
☑ F6 Visibility in escape routes	F6/AS1	
☑ F7 Warning systems	F7/AS1	
☐ F8 Signs	N/A	
☐ F9 Means of restricting access to residential pools	N/A	
☑ 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	N/A	
☐ G6 Airborne and impact sound	N/A	
☑ G7 Natural light	G7/AS1	
☑ G8 Artificial light	G8/AS1	
☑ G9 Electricity	G9/AS1	
☐ G10 Piped services	N/A AS1	
☑ G11 Gas as an energy source	G11/AS1	
☑ G12 Water supplies	G12/AS1	
☑ G13 Foul water	G13/AS1 & AS2	
☐ G14 Industrial liquid waste		
☐ G15 Solid waste		
☑ H1 Energy efficiency	H1/AS1/NZS4218	

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)
FOUNDATIONS		
CARPENTRY	Jordan Joyce (Joyce Built)	BP131576
EXTERIOR PLASTERER		
BRICKLAYER		
BLOCKLAYER		
ROOFER		

KEY PERSONNEL

BUILDER

Name:	Jordan Joyce	Reg. No.:	
Address:			
Phone No.:	0221281259	Fax No.:	
Email:	joycebuilt@outlook.co.nz		

DESIGNER(S)

Name:	Christopher Brown / Megan Verity	Reg. No.:	
Address:			
Phone No.:	0273130880	Fax No.:	
Email:	chrisb@vipdesign.co.nz		

CERTIFYING DRAINLAYER

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

CERTIFYING PLUMBER

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

CERTIFYING GASFITTER

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

REGISTERED ELECTRICIAN

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

STRUCTURAL ENGINEER

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

OWNER / AGENT AUTHORISATION

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

Name: Christopher Brown Date: 5/11/2020

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 Christopher Brown 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 Christopher Brown to act as Agent on my behalf for the application for Code Compliance Certificate under Section 92 of the Building Act 2004.

Name (Owner): Jordan Joyce Date: 5/11/2020

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 (current 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 (current 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 5 for a schedule confirming the building work will comply with the Building Code

APPLICATION FORM (One copy)

OFFICE USE ONLY These have been provided:

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

DESIGN BASIS (To be completed by the designer)

Please list the following basis for the building design:

✔ Wind zone	High
✔ Earthquake zone	2
✔ Snow zone/altitude	N4 : 1kPa
☐ 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)

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

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

- [x] Elevations of all external walls showing claddings
- [x] Doors and windows showing opening sections
- [ ] Show location of solar panels — [x]
- [x] Accurate ground levels existing and proposed
- [ ] Subfloor ventilation for timber floors
- [x] 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)

- [x] Roof lines, overhangs, floor levels, ground levels
- [x] Major vertical dimensions
- [x] 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
- [x] Stairs, handrails and balustrade showing pitch and head clearances
- [x] Structural connections, posts to footings, beams to posts, trusses or beams to walls
- [x] Component fixing information is to be provided for all structural and framing components
- [x] Foundation and footing details and reinforcing. Show height from finished floor to ground level
- [ ] Pile details for timber floors — [x]
- [x] Floor bracing details
- [x] Timber grade and treatment
- [x] Damp proof membranes, building papers and insulation systems/materials
- [x] Flashing details and documents
- [x] Roof penetrations
- [x] Shower floor details and wall to shower base junction detail
- [x] Sealing to wet area fixtures
- [x] Water splash prevention
- [x] 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.

- [x] 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 — [x]
- [x] The specification can be written on the drawings as long as all materials are fully covered

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

OFFICE USE ONLY
These have been provided:

- ☐ 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

GEOTECHNICAL REPORT

- ☑ Unique report reference number provided, if applicable ☑

OFFICE USE ONLY

Further information required? ☐ Yes ☑ No

Date of acceptance: 06/11/2020 Officer: Diana Firth

OFFICE USE ONLY

Amount paid: $ 1635 Date: Officer:

☐ Fee paid on application ☑ Deposit invoice sent

Date payment processed: Receipt Officer:

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) Compliance Check:
Where a PIM is not sought, a Compliance 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

Under the Building Act 2004 s53, s55 s402 Council are authorised to collect levies for the MBIE (Building Levy Order 2005) and BRANZ (Building Research Levy Act 1969). Levies are only payable on building works where the construction value exceeds a prescribed amount.

Building Act 2004 – http://www.legislation.govt.nz/act/public/2004/0072/latest/whole.html
Building Levy Order 2005 – http://www.legislation.govt.nz/regulation/public/2005/0033/latest/whole.html#DLM313989
Building Research Levy Act 1969 - http://www.legislation.govt.nz/act/public/1969/0023/latest/whole.html

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.

All inspections including re-inspections are subjected to a separate charge, even if carried out on the same day.

RESOURCE CONSENT

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

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

CODE COMPLIANCE CERTIFICATE

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

*Fees apply

AGENCY

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

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

JOYCE BUILT LIMITED *(5202581) Registered*

Last updated on 04 Nov 2020

To maintain this company log on here

View previous names

Company Summary | Addresses | Directors (1) | Shareholdings (1) | Documents (11) | PPSR Search | NZBN

Company number:	5202581
NZBN:	9429041226490
Incorporation Date:	12 May 2014
Company Status:	Registered
Entity type:	NZ Limited Company
Constitution filed:	No
AR filing month:	November , last filed on 04 Nov 2020
Ultimate holding company	No
Company addresses:	**Registered Office** JOYCE & CO, Unit 4, 33 Mandeville Street, Riccarton, Christchurch, 8011 , New Zealand **Address for service** JOYCE & CO, Unit 4, 33 Mandeville Street, Riccarton, Christchurch, 8011 , New Zealand View all addresses
Directors	Showing 1 of 1 directors Jordan Andrew JOYCE 77 Fullers Road, Rd 1, Kaiapoi, 7691 , New Zealand
Company record link:	http://app.companiesoffice.govt.nz/co/5202581

Additional NZBN Information

Trading Name(s):

Phone Number(s):

Email Address(es):

Website(s):

Industry Classification(s): E329110 Fence construction – except agricultural

View all NZBN details

Generated on Friday, 06 November 2020 09:35:49 NZDT

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**935223**
Land Registration District	**Canterbury**
Date Issued	23 July 2020

Prior References
856490

Estate	Fee Simple
Area	1.8637 hectares more or less
Legal Description	Lot 50 Deposited Plan 547441

Registered Owners
Oakville Estate Limited

Interests

11127449.2 Mortgage to ASB Bank Limited - 5.6.2018 at 1:06 pm

Subject to a right (in gross) to convey electricity over part marked A on DP 547441 in favour of Mainpower New Zealand Limited created by Easement Instrument 11383509.10 - 7.6.2019 at 4:30 pm

The easements created by Easement Instrument 11383509.10 are subject to Section 243 (a) Resource Management Act 1991

11383509.14 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 7.6.2019 at 4:30 pm

Land Covenant in Covenant Instrument 11796954.2 - 23.7.2020 at 3:23 pm (Limited as to duration)

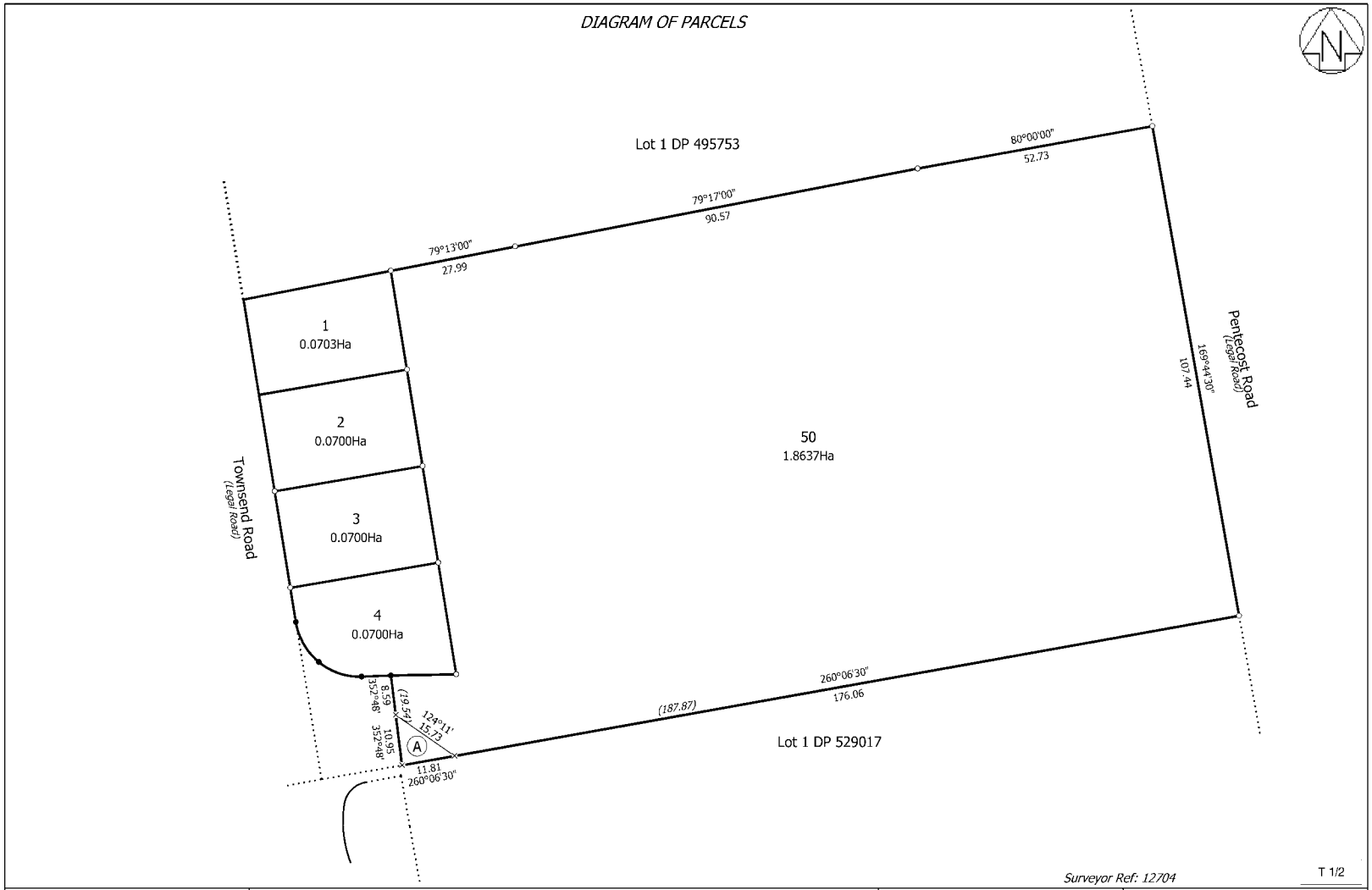
11796954.3 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 23.7.2020 at 3:23 pm

11796954.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 23.7.2020 at 3:23 pm

Transaction Id: 61708321
Client Reference: scresswell001

Search Copy Dated 17/09/20 9:27 am, Page 2 of 2
Register Only

DIAGRAM OF PARCELS



Surveyor Ref: 12704

T 1/2

Land District: Canterbury Digitally Generated Plan Generated on: 12/06/2020 5:07pm Page 3 of 4	Lots 1 - 4 and Lot 50 Being a Subdivision of lot 14 DP 529017	Surveyor: Craig William Hurford Firm: Survus Contracting Ltd	Title Plan LT 547441 Approved on: 12/06/2020

ADLS | REINZ

Tenth Edition 2019 (2)

AGREEMENT FOR SALE AND PURCHASE OF REAL ESTATE

This form is approved by the Real Estate Institute of New Zealand Incorporated and by Auckland District Law Society Incorporated.

DATE: 1 September 2020

VENDOR: Oakville Estate Limited as Trustee of the Oakville Estate Trust

PURCHASER: Jordan Joyce **and/or nominee**

The vendor is registered under the GST Act in respect of the transaction evidenced by this agreement and/or will be so registered at settlement: **Yes/~~No~~**

PROPERTY

Address: Lot 14, 29 Pentecost Road, Rangiora

Estate: **FREEHOLD** ~~**LEASEHOLD**~~ ~~**STRATUM IN FREEHOLD**~~ ~~**STRATUM IN LEASEHOLD**~~ ~~**CROSS-LEASE (FREEHOLD)**~~ ~~**CROSS-LEASE (LEASEHOLD)**~~

If none of the above are deleted, the estate being sold is the first option of freehold.

Legal Description:

Area (more or less):	***Lot/Flat/Unit:***	***Record of Title (unique identifier):***
655m2 subject to final survey	Lot 14 on the proposed plan of subdivision attached being a subdivision of Lot 50 Deposited Plan 547441 contained in Record of Title 935223. A new title will issue for Lot 14.	

PAYMENT OF PURCHASE PRICE

Purchase price: $ 220,000.00

~~**Plus GST (if any) OR**~~ **Inclusive of GST** (if any)

If neither is deleted, the purchase price includes GST (if any).

GST date (refer clause 13.0):

Deposit (refer clause 2.0): $ 10% of the purchase price payable to the vendor's solicitor's trust account upon confirmation of Further Term 20 to be held as stakeholder pending issue of the new Title

Balance of purchase price to be paid or satisfied as follows:

~~(1) By payment in cleared funds on the settlement date which is~~

OR

(2) In the manner described in the Further Terms of Sale.

Interest rate for late settlement: 12 **% p.a.**

CONDITIONS (refer clause 9.0) See Further Terms Attached

~~**Finance required (subclause 9.1):**~~	~~**Yes/No**~~	**OIA consent required (subclause 9.6):**	~~**Yes/No**~~
~~**Finance date:**~~		**OIA date (subclause 9.8):**	
~~**LIM required (subclause 9.3):**~~	~~**Yes/No**~~	**Land Act consent required (subclause 9.7):**	~~**Yes/No**~~
~~**Building report required (subclause 9.4):**~~	~~**Yes/No**~~	**Land Act date (subclause 9.8):**	
~~**Toxicology report required (subclause 9.5):**~~	~~**Yes/No**~~		

TENANCIES ~~**Yes/No**~~

Name of Tenant(s):

Particulars of any tenancies are set out in Schedule 3 or another schedule attached to this agreement by the parties.

SALE BY: Private Treaty

Licensed Real Estate Agent under Real Estate Agents Act 2008

It is agreed that the vendor sells and the purchaser purchases the property, and the chattels listed in Schedule 2, on the terms set out above and in the General Terms of Sale and any Further Terms of Sale.

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JCP AL SS

GENERAL TERMS OF SALE

1.0 Definitions, time for performance, notices, and interpretation

1.1 Definitions

(1) Unless the context requires a different interpretation, words and phrases not otherwise defined have the same meanings ascribed to those words and phrases in the Goods and Services Tax Act 1985, the Property Law Act 2007, the Resource Management Act 1991 or the Unit Titles Act 2010.

(2) "Accessory unit", "owner", "principal unit", "unit", and "unit plan" have the meanings ascribed to those terms in the Unit Titles Act.

(3) "Agreement" means this document including the front page, these General Terms of Sale, any Further Terms of Sale, and any schedules and attachments.

(4) "Associated person", "conveyancer", "offshore RLWT person", "residential land purchase amount", "RLWT", "RLWT certificate of exemption" and "RLWT rules" have the meanings ascribed to those terms in the Income Tax Act 2007.

(5) "Building", "building consent", "code compliance certificate", "commercial on-seller", "compliance schedule" and "household unit" have the meanings ascribed to those terms in the Building Act.

(6) "Building Act" means the Building Act 1991 and/or the Building Act 2004.

(7) "Building warrant of fitness" means a building warrant of fitness supplied to a territorial authority under the Building Act.

(8) "Cleared funds" means:

(a) An electronic transfer of funds that has been made strictly in accordance with the requirements set out in the PLS Guidelines; or

(b) A bank cheque, but only in the circumstances permitted by the PLS Guidelines and only if it has been paid strictly in accordance with the requirements set out in the PLS Guidelines.

(9) "Commissioner" has the meaning ascribed to that term in the Tax Administration Act 1994.

(10) "Default GST" means any additional GST, penalty (civil or otherwise), interest, or other sum imposed on the vendor (or where the vendor is or was a member of a GST group its representative member) under the GST Act or the Tax Administration Act 1994 by reason of non-payment of any GST payable in respect of the supply made under this agreement but does not include any such sum levied against the vendor (or where the vendor is or was a member of a GST group its representative member) by reason of a default or delay by the vendor after payment of the GST to the vendor by the purchaser.

(11) "Electronic Instrument" has the same meaning as ascribed to that term in the Land Transfer Act 2017.

(12) "Going concern", "goods", "principal place of residence", "recipient", "registered person", "registration number", "supply", "taxable activity" and "taxable supply" have the meanings ascribed to those terms in the GST Act.

(13) "GST" means Goods and Services Tax arising pursuant to the Goods and Services Tax Act 1985 and "GST Act" means the Goods and Services Tax Act 1985.

(14) "Landonline Workspace" means an electronic workspace facility approved by the Registrar-General of Land pursuant to the provisions of the Land Transfer Act 2017.

(15) "Leases" means any tenancy agreement, agreement to lease (if applicable), lease, sublease, or licence to occupy in respect of the property, and includes any receipt or other evidence of payment of any bond and any formal or informal document or letter evidencing any variation, renewal, extension, review, or assignment.

(16) "LIM" means a land information memorandum issued pursuant to the Local Government Official Information and Meetings Act 1987.

(17) "LINZ" means Land Information New Zealand.

(18) "Local authority" means a territorial authority or a regional council.

(19) "OIA consent" means consent to purchase the property under the Overseas Investment Act 2005.

(20) "PLS Guidelines" means the most recent edition, as at the date of this agreement, of the Property Transactions and E-Dealing Practice Guidelines prepared by the Property Law Section of the New Zealand Law Society.

(21) "Proceedings" means any application to any court or tribunal or any referral or submission to mediation, adjudication or arbitration or any other dispute resolution procedure.

(22) "Property" means the property described in this agreement.

(23) "Purchase price" means the total purchase price stated in this agreement which the purchaser has agreed to pay the vendor for the property and the chattels included in the sale.

(24) "Regional council" means a regional council within the meaning of the Local Government Act 2002.

(25) "Remote settlement" means settlement of the sale and purchase of the property by way of the purchaser's lawyer paying the moneys due and payable on the settlement date directly into the trust account of the vendor's lawyer, in consideration of the vendor agreeing to meet the vendor's obligations under subclause 3.8(2), pursuant to the protocol for remote settlement recommended in the PLS Guidelines.

(26) "Residential (but not otherwise sensitive) land" has the meaning ascribed to that term in the Overseas Investment Act 2005.

(27) "Rules" means body corporate operational rules under the Unit Titles Act.

(28) "Secure web document exchange" means an electronic messaging service enabling messages and electronic documents to be posted by one party to a secure website to be viewed by the other party immediately after posting.

(29) "Settlement" means (unless otherwise agreed by the parties in writing) the moment in time when the vendor and purchaser have fulfilled their obligations under subclause 3.8.

(30) "Settlement date" means the date specified as such in this agreement.

(31) "Settlement statement" means a statement showing the purchase price, plus any GST payable by the purchaser in addition to the purchase price, less any deposit or other payments or allowances to be credited to the purchaser, together with apportionments of all incomings and outgoings apportioned at the settlement date.

(32) "Tax information" and "tax statement" have the meanings ascribed to those terms in the Land Transfer Act 2017.

(33) "Territorial authority" means a territorial authority within the meaning of the Local Government Act 2002.

(34) "Title" includes where appropriate a record of title within the meaning of the Land Transfer Act 2017.

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(35) "Unit title" means a unit title under the Unit Titles Act.
(36) "Unit Titles Act" means the Unit Titles Act 2010.
(37) "Working day" means any day of the week other than:
(a) Saturday, Sunday, Waitangi Day, Good Friday, Easter Monday, Anzac Day, the Sovereign's Birthday, and Labour Day;
(b) if Waitangi Day or Anzac Day falls on a Saturday or Sunday, the following Monday;
(c) a day in the period commencing on the 24th day of December in any year and ending on the 5th day of January (or in the case of subclause 9.3(2) the 15th day of January) in the following year, both days inclusive; and
(d) the day observed as the anniversary of any province in which the property is situated.
A working day shall be deemed to commence at 9.00 am and to terminate at 5.00 pm.

1.2 Unless a contrary intention appears on the front page or elsewhere in this agreement:
(1) the interest rate for late settlement is equivalent to the interest rate charged by the Inland Revenue Department on unpaid tax under the Tax Administration Act 1994 during the period for which the interest rate for late settlement is payable, plus 5% per annum; and
(2) a party is in default if it did not do what it has contracted to do to enable settlement to occur, regardless of the cause of such failure.

1.3 Time for Performance
(1) Where the day nominated for settlement or the fulfilment of a condition is not a working day, then the settlement date or the date for fulfilment of the condition shall be the last working day before the day so nominated.
(2) Any act done pursuant to this agreement by a party, including service of notices, after 5.00 pm on a working day, or on a day that is not a working day, shall be deemed to have been done at 9.00 am on the next succeeding working day.
(3) Where two or more acts done pursuant to this agreement, including service of notices, are deemed to have been done at the same time, they shall take effect in the order in which they would have taken effect but for subclause 1.3(2).

1.4 Notices
The following apply to all notices between the parties relevant to this agreement, whether authorised by this agreement or by the general law:
(1) All notices must be served in writing.
(2) Any notice under section 28 of the Property Law Act 2007, where the purchaser is in possession of the property, must be served in accordance with section 353 of that Act.
(3) All other notices, unless otherwise required by the Property Law Act 2007, must be served by one of the following means:
(a) on the party as authorised by sections 354 to 361 of the Property Law Act 2007, or
(b) on the party or on the party's lawyer:
(i) by personal delivery; or
(ii) by posting by ordinary mail; or
(iii) by email; or
(iv) in the case of the party's lawyer only, by sending by document exchange or, if both parties' lawyers have agreed to subscribe to the same secure web document exchange for this agreement, by secure web document exchange.
(4) In respect of the means of service specified in subclause 1.4(3)(b), a notice is deemed to have been served:
(a) in the case of personal delivery, when received by the party or at the lawyer's office;
(b) in the case of posting by ordinary mail, on the third working day following the date of posting to the address for service notified in writing by the party or to the postal address of the lawyer's office;
(c) in the case of email:
(i) when sent to the email address provided for the party or the party's lawyer on the back page; or
(ii) any other email address notified subsequently in writing by the party or the party's lawyer (which shall supersede the email address on the back page); or
(iii) if no such email address is provided on the back page or notified subsequently in writing, the office email address of the party's lawyer's firm appearing on the firm's letterhead or website;
(d) in the case of sending by document exchange, on the second working day following the date of sending to the document exchange number of the lawyer's office;
(e) in the case of sending by secure web document exchange, on the first working day following the date of sending to the secure web document exchange.
(5) Any period of notice required to be given under this agreement shall be computed by excluding the day of service.

1.5 Interpretation
(1) If there is more than one vendor or purchaser, the liability of the vendors or of the purchasers, as the case may be, is joint and several.
(2) Where the purchaser executes this agreement with provision for a nominee, or as agent for an undisclosed or disclosed but unidentified principal, or on behalf of a company to be formed, the purchaser shall at all times remain liable for all obligations on the part of the purchaser.
(3) If any inserted term (including any Further Terms of Sale) conflicts with the General Terms of Sale the inserted term shall prevail.
(4) Headings are for information only and do not form part of this agreement.
(5) References to statutory provisions shall be construed as references to those provisions as they may be amended or re-enacted or as their application is modified by other provisions from time to time.

2.0 Deposit

2.1 The purchaser shall pay the deposit to the vendor or the vendor's agent immediately upon execution of this agreement by both parties and/or at such other time as is specified in this agreement.

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2.2 If the deposit is not paid on the due date for payment, the vendor may at any time thereafter serve on the purchaser notice requiring payment. If the purchaser fails to pay the deposit on or before the third working day after service of the notice, time being of the essence, the vendor may cancel this agreement by serving notice of cancellation on the purchaser. No notice of cancellation shall be effective if the deposit has been paid before the notice of cancellation is served.

2.3 The deposit shall be in part payment of the purchase price.

2.4 The person to whom the deposit is paid shall hold it as a stakeholder until:

(1) the requisition procedure under clause 6.0 is completed without either party cancelling this agreement; and

(2) where this agreement is entered into subject to any condition(s) expressed in this agreement, each such condition has been fulfilled or waived; and

(3) where the property is a unit title:

(a) a pre-settlement disclosure statement, certified correct by the body corporate, under section 147 of the Unit Titles Act; and

(b) an additional disclosure statement under section 148 of the Unit Titles Act (if requested by the purchaser within the time prescribed in section 148(2)),

have been provided to the purchaser by the vendor within the times prescribed in those sections or otherwise the purchaser has given notice under section 149(2) of the Unit Titles Act to postpone the settlement date until after the disclosure statements have been provided; or

(4) this agreement is:

(a) cancelled pursuant to:

(i) subclause 6.2(3)(c); or

(ii) sections 36 or 37 of the Contract and Commercial Law Act 2017; or

(b) avoided pursuant to subclause 9.10(5); or

(5) where the property is a unit title and the purchaser, having the right to cancel this agreement pursuant to section 151(2) of the Unit Titles Act, has cancelled this agreement pursuant to that section, or has elected not to cancel by giving notice to the vendor, or by completing settlement of the purchase.

2.5 Where the person to whom the deposit is paid is a real estate agent, the period for which the agent must hold the deposit as a stakeholder pursuant to subclause 2.4 shall run concurrently with the period for which the agent must hold the deposit under section 123 of the Real Estate Agents Act 2008, but the agent must hold the deposit for the longer of those two periods, or such lesser period as is agreed between the parties in writing as required by section 123 of the Real Estate Agents Act 2008, but in no event shall the deposit be released prior to the expiry of the requisition period under clause 6.0, unless the requisition period is expressly waived in writing after the effect of the same is explained to the purchaser by the agent or by the purchaser's lawyer or conveyancer.

3.0 Possession and Settlement

Possession

3.1 Unless particulars of a tenancy are included in this agreement, the property is sold with vacant possession and the vendor shall so yield the property on the settlement date.

3.2 If the property is sold with vacant possession, then subject to the rights of any tenants of the property, the vendor shall permit the purchaser or any person authorised by the purchaser in writing, upon reasonable notice:

(1) to enter the property on one occasion prior to the settlement date for the purposes of examining the property, chattels and fixtures which are included in the sale; and

(2) to re-enter the property no later than the day prior to the settlement date to confirm compliance by the vendor with any agreement made by the vendor to carry out any work on the property, the chattels and the fixtures.

3.3 Possession shall be given and taken on the settlement date. Outgoings and incomings in respect of the settlement date are the responsibility of and belong to the vendor.

3.4 On the settlement date, the vendor shall make available to the purchaser keys to all exterior doors that are locked by key, electronic door openers to all doors that are opened electronically, and the keys and/or security codes to any alarms. The vendor does not have to make available keys, electronic door openers, and security codes where the property is tenanted and these are held by the tenant.

Settlement

3.5 The vendor shall prepare, at the vendor's own expense, a settlement statement. The vendor shall tender the settlement statement to the purchaser or the purchaser's lawyer a reasonable time prior to the settlement date.

3.6 The purchaser's lawyer shall:

(1) within a reasonable time prior to the settlement date create a Landonline Workspace for the transaction, notify the vendor's lawyer of the dealing number allocated by LINZ, and prepare in that workspace a transfer instrument in respect of the property; and

(2) prior to settlement:

(a) lodge in that workspace the tax information contained in the transferee's tax statement; and

(b) certify and sign the transfer instrument.

3.7 The vendor's lawyer shall:

(1) within a reasonable time prior to the settlement date prepare in that workspace all other electronic instruments required to confer title on the purchaser in terms of the vendor's obligations under this agreement; and

(2) prior to settlement:

(a) lodge in that workspace the tax information contained in the transferor's tax statement; and

(b) have those instruments and the transfer instrument certified, signed and, where possible, pre-validated.

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3.8 On the settlement date:

(1) the balance of the purchase price, interest and other moneys, if any, shall be paid by the purchaser in cleared funds or otherwise satisfied as provided in this agreement (credit being given for any amount payable by the vendor under subclause 3.12 or 3.13, or for any deduction allowed to the purchaser under subclause 5.2, or for any compensation agreed by the vendor in respect of a claim made by the purchaser pursuant to subclause 10.2(1), or for any interim amount the purchaser is required to pay to a stakeholder pursuant to subclause 10.8);

(2) the vendor's lawyer shall immediately thereafter:

(a) release or procure the release of the transfer instrument and the other instruments mentioned in subclause 3.7(1) so that the purchaser's lawyer can then submit them for registration;

(b) pay to the purchaser's lawyer the LINZ registration fees on all of the instruments mentioned in subclause 3.7(1), unless these fees will be invoiced to the vendor's lawyer by LINZ directly; and

(c) deliver to the purchaser's lawyer any other documents that the vendor must provide to the purchaser on settlement in terms of this agreement, including where this agreement provides for the property to be sold tenanted, all leases relating to the tenancy that are held by the vendor and a notice from the vendor to each tenant advising them of the sale of the property and directing them to pay to the purchaser as landlord, in such manner as the purchaser may prescribe, all rent or other moneys payable under the leases.

3.9 All obligations under subclause 3.8 are interdependent.

3.10 The parties shall complete settlement by way of remote settlement, provided that where payment by bank cheque is permitted under the PLS Guidelines, payment may be made by the personal delivery of a bank cheque to the vendor's lawyer's office, so long as it is accompanied by the undertaking from the purchaser's lawyer required by those Guidelines.

Last-Minute Settlement

3.11 If due to the delay of the purchaser, settlement takes place between 4.00 pm and 5.00 pm on the settlement date ("last-minute settlement"), the purchaser shall pay the vendor:

(1) one day's interest at the interest rate for late settlement on the portion of the purchase price paid in the last-minute settlement; and

(2) if the day following the last-minute settlement is not a working day, an additional day's interest (calculated in the same manner) for each day until, but excluding, the next working day.

Purchaser Default: Late Settlement

3.12 If any portion of the purchase price is not paid upon the due date for payment, then, provided that the vendor provides reasonable evidence of the vendor's ability to perform any obligation the vendor is obliged to perform on that date in consideration for such payment:

(1) the purchaser shall pay to the vendor interest at the interest rate for late settlement on the portion of the purchase price so unpaid for the period from the due date for payment until payment ("the default period"); but nevertheless, this stipulation is without prejudice to any of the vendor's rights or remedies including any right to claim for additional expenses and damages. For the purposes of this subclause, a payment made on a day other than a working day or after the termination of a working day shall be deemed to be made on the next following working day and interest shall be computed accordingly; and

(2) the vendor is not obliged to give the purchaser possession of the property or to pay the purchaser any amount for remaining in possession, unless this agreement relates to a tenanted property, in which case the vendor must elect either to:

(a) account to the purchaser on settlement for incomings in respect of the property which are payable and received during the default period, in which event the purchaser shall be responsible for the outgoings relating to the property during the default period; or

(b) retain such incomings in lieu of receiving interest from the purchaser pursuant to subclause 3.12(1).

(3) If the parties are unable to agree upon any amount payable under this subclause 3.12, either party may make a claim under clause 10.0.

Vendor Default: Late Settlement or Failure to Give Possession

3.13 (1) For the purposes of this subclause 3.13:

(a) the default period means:

(i) in subclause 3.13(2), the period from the settlement date until the date when the vendor is able and willing to provide vacant possession and the purchaser takes possession; and

(ii) in subclause 3.13(3), the period from the date the purchaser takes possession until the date when settlement occurs; and

(iii) in subclause 3.13(5), the period from the settlement date until the date when settlement occurs; and

(b) the vendor shall be deemed to be unwilling to give possession if the vendor does not offer to give possession.

(2) If this agreement provides for vacant possession but the vendor is unable or unwilling to give vacant possession on the settlement date, then, provided that the purchaser provides reasonable evidence of the purchaser's ability to perform the purchaser's obligations under this agreement:

(a) the vendor shall pay the purchaser, at the purchaser's election, either:

(i) compensation for any reasonable costs incurred for temporary accommodation for persons and storage of chattels during the default period; or

(ii) an amount equivalent to interest at the interest rate for late settlement on the entire purchase price during the default period; and

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(b) the purchaser shall pay the vendor an amount equivalent to the interest earned or which would be earned on overnight deposits lodged in the purchaser's lawyer's trust bank account on such portion of the purchase price (including any deposit) as is payable under this agreement on or by the settlement date but remains unpaid during the default period less:

(i) any withholding tax; and

(ii) any bank or legal administration fees and commission charges; and

(iii) any interest payable by the purchaser to the purchaser's lender during the default period in respect of any mortgage or loan taken out by the purchaser in relation to the purchase of the property.

(3) If this agreement provides for vacant possession and the vendor is able and willing to give vacant possession on the settlement date, then, provided the purchaser provides reasonable evidence of the purchaser's ability to perform the purchaser's obligations under this agreement, the purchaser may elect to take possession in which case the vendor shall not be liable to pay any interest or other moneys to the purchaser but the purchaser shall pay the vendor the same amount as that specified in subclause 3.13(2)(b) during the default period. A purchaser in possession under this subclause 3.13(3) is a licensee only.

(4) Notwithstanding the provisions of subclause 3.13(3), the purchaser may elect not to take possession when the purchaser is entitled to take it. If the purchaser elects not to take possession, the provisions of subclause 3.13(2) shall apply as though the vendor were unable or unwilling to give vacant possession on the settlement date.

(5) If this agreement provides for the property to be sold tenanted then, provided that the purchaser provides reasonable evidence of the purchaser's ability to perform the purchaser's obligations under this agreement, the vendor shall on settlement account to the purchaser for incomings which are payable and received in respect of the property during the default period less the outgoings paid by the vendor during that period. Apart from accounting for such incomings, the vendor shall not be liable to pay any other moneys to the purchaser but the purchaser shall pay the vendor the same amount as that specified in subclause 3.13(2)(b) during the default period.

(6) The provisions of this subclause 3.13 shall be without prejudice to any of the purchaser's rights or remedies including any right to claim for any additional expenses and damages suffered by the purchaser.

(7) If the parties are unable to agree upon any amount payable under this subclause 3.13, either party may make a claim under clause 10.0.

Deferment of Settlement and Possession

3.14 If

(1) this is an agreement for the sale by a commercial on-seller of a household unit; and

(2) a code compliance certificate has not been issued by the settlement date in relation to the household unit,

then, unless the parties agree otherwise (in which case the parties shall enter into a written agreement in the form (if any) prescribed by the Building (Forms) Regulations 2004), the settlement date shall be deferred to the fifth working day following the date upon which the vendor has given the purchaser notice that the code compliance certificate has been issued (which notice must be accompanied by a copy of the certificate).

3.15 In every case, if neither party is ready, willing, and able to settle on the settlement date, the settlement date shall be deferred to the third working day following the date upon which one of the parties gives notice it has become ready, willing, and able to settle.

3.16 If

(1) the property is a unit title;

(2) the settlement date is deferred pursuant to either subclause 3.14 or subclause 3.15; and

(3) the vendor considers on reasonable grounds that an extension of time is necessary or desirable in order for the vendor to comply with the warranty by the vendor in subclause 8.2(3),

then the vendor may extend the settlement date:

(a) where there is a deferment of the settlement date pursuant to subclause 3.14, to the tenth working day following the date upon which the vendor gives the purchaser notice that the code compliance certificate has been issued, provided the vendor gives notice of the extension to the purchaser no later than the second working day after such notice; or

(b) where there is a deferment of the settlement date pursuant to subclause 3.15, to the tenth working day following the date upon which one of the parties gives notice that it has become ready, willing, and able to settle, provided the vendor gives notice of the extension to the purchaser no later than the second working day after such notice.

New Title Provision

3.17 (1) Where

(a) the transfer of the property is to be registered against a new title yet to be issued; and

(b) a search copy, as defined in section 60 of the Land Transfer Act 2017, of that title is not obtainable by the tenth working day prior to the settlement date,

then, unless the purchaser elects that settlement shall still take place on the agreed settlement date, the settlement date shall be deferred to the tenth working day following the later of the date on which:

(i) the vendor has given the purchaser notice that a search copy is obtainable; or

(ii) the requisitions procedure under clause 6.0 is complete.

(2) Subclause 3.17(1) shall not apply where it is necessary to register the transfer of the property to enable a plan to be deposited and title to the property to be issued.

4.0 Residential Land Withholding Tax

4.1 If the vendor does not have a conveyancer or the vendor and the purchaser are associated persons, then:

(1) the vendor must provide the purchaser or the purchaser's conveyancer, on or before the second working day before the due date for payment of the first residential land purchase amount payable under this agreement, with:

(a) sufficient information to enable the purchaser or the purchaser's conveyancer to determine to their reasonable satisfaction whether section 54C of the Tax Administration Act 1994 applies to the sale of the property; and

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(b) If the purchaser or the purchaser's conveyancer determines to their reasonable satisfaction that section 54C of the Tax Administration Act 1994 does apply, all of the information required by that section and either an RLWT certificate of exemption in respect of the sale or otherwise such other information that the purchaser or the purchaser's conveyancer may reasonably require to enable the purchaser or the purchaser's conveyancer to determine to their reasonable satisfaction the amount of RLWT that must be withheld from each residential land purchase amount;

(2) the vendor shall be liable to pay any costs reasonably incurred by the purchaser or the purchaser's conveyancer in relation to RLWT, including the cost of obtaining professional advice in determining whether there is a requirement to withhold RLWT and the amount of RLWT that must be withheld, if any; and

(3) any payments payable by the purchaser on account of the purchase price shall be deemed to have been paid to the extent that:

(a) RLWT has been withheld from those payments by the purchaser or the purchaser's conveyancer as required by the RLWT rules; and

(b) any costs payable by the vendor under subclause 4.1(2) have been deducted from those payments by the purchaser or the purchaser's conveyancer.

4.2 If the vendor does not have a conveyancer or the vendor and the purchaser are associated persons and if the vendor fails to provide the information required under subclause 4.1(1), then the purchaser may:

(1) defer the payment of the first residential land purchase amount payable under this agreement (and any residential land purchase amount that may subsequently fall due for payment) until such time as the vendor supplies that information; or

(2) on the due date for payment of that residential land purchase amount, or at any time thereafter if payment has been deferred by the purchaser pursuant to this subclause and the vendor has still not provided that information, treat the sale of the property as if it is being made by an offshore RLWT person where there is a requirement to pay RLWT.

4.3 If pursuant to subclause 4.2 the purchaser treats the sale of the property as if it is being made by an offshore RLWT person where there is a requirement to pay RLWT, the purchaser or the purchaser's conveyancer may:

(1) make a reasonable assessment of the amount of RLWT that the purchaser or the purchaser's conveyancer would be required by the RLWT rules to withhold from any residential land purchase amount if the sale is treated in that manner; and

(2) withhold that amount from any residential land purchase amount and pay it to the Commissioner as RLWT.

4.4 Any amount withheld by the purchaser or the purchaser's conveyancer pursuant to subclause 4.3 shall be treated as RLWT that the purchaser or the purchaser's conveyancer is required by the RLWT rules to withhold.

4.5 The purchaser or the purchaser's conveyancer shall give notice to the vendor a reasonable time before payment of any sum due to be paid on account of the purchase price of:

(1) the costs payable by the vendor under subclause 4.1(2) that the purchaser or the purchaser's conveyancer intends to deduct; and

(2) the amount of RLWT that the purchaser or the purchaser's conveyancer intends to withhold.

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5.0 Risk and Insurance

5.1 The property and chattels shall remain at the risk of the vendor until possession is given and taken.

5.2 If, prior to the giving and taking of possession, the property is destroyed or damaged, and such destruction or damage has not been made good by the settlement date, then the following provisions shall apply:

(1) if the destruction or damage has been sufficient to render the property untenantable and it is untenantable on the settlement date, the purchaser may:

(a) complete the purchase at the purchase price, less a sum equal to any insurance moneys received or receivable by or on behalf of the vendor in respect of such destruction or damage, provided that no reduction shall be made to the purchase price if the vendor's insurance company has agreed to reinstate for the benefit of the purchaser to the extent of the vendor's insurance cover; or

(b) cancel this agreement by serving notice on the vendor in which case the vendor shall return to the purchaser immediately the deposit and any other moneys paid by the purchaser, and neither party shall have any right or claim against the other arising from this agreement or its cancellation;

(2) if the property is not untenantable on the settlement date, the purchaser shall complete the purchase at the purchase price less a sum equal to the amount of the diminution in value of the property which, to the extent that the destruction or damage to the property can be made good, shall be deemed to be equivalent to the reasonable cost of reinstatement or repair;

(3) in the case of a property zoned for rural purposes under an operative District Plan, damage to the property shall be deemed to have rendered the property untenantable where the diminution in value exceeds an amount equal to 20% of the purchase price; and

(4) if the amount of the diminution in value is disputed, the parties shall follow the same procedure as that set out in subclause 10.8 for when an amount of compensation is disputed.

5.3 The purchaser shall not be required to take over any insurance policies held by the vendor.

6.0 Title, boundaries and requisitions

6.1 The vendor shall not be bound to point out the boundaries of the property except that on the sale of a vacant residential lot which is not limited as to parcels the vendor shall ensure that all boundary markers required by the Cadastral Survey Act 2002 and any related rules and regulations to identify the boundaries of the property are present in their correct positions at the settlement date.

6.2 (1) The purchaser is deemed to have accepted the vendor's title except as to objections or requisitions which the purchaser is entitled to make and notice of which the purchaser serves on the vendor on or before the earlier of:

(a) the tenth working day after the date of this agreement; or

(b) the settlement date.

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(2) Where the transfer of the property is to be registered against a new title yet to be issued, the purchaser is deemed to have accepted the title except as to such objections or requisitions which the purchaser is entitled to make and notice of which the purchaser serves on the vendor on or before the fifth working day following the date the vendor has given the purchaser notice that the title has been issued and a search copy of it as defined in section 60 of the Land Transfer Act 2017 is obtainable.

(3) If the vendor is unable or unwilling to remove or comply with any objection or requisition as to title, notice of which has been served on the vendor by the purchaser, then the following provisions will apply:

(a) the vendor shall notify the purchaser ("a vendor's notice") of such inability or unwillingness on or before the fifth working day after the date of service of the purchaser's notice;

(b) if the vendor does not give a vendor's notice the vendor shall be deemed to have accepted the objection or requisition and it shall be a requirement of settlement that such objection or requisition shall be complied with before settlement;

(c) if the purchaser does not on or before the fifth working day after service of a vendor's notice notify the vendor that the purchaser waives the objection or requisition, either the vendor or the purchaser may (notwithstanding any intermediate negotiations) by notice to the other, cancel this agreement.

6.3 In the event of cancellation under subclause 6.2(3), the purchaser shall be entitled to the immediate return of the deposit and any other moneys paid under this agreement by the purchaser and neither party shall have any right or claim against the other arising from this agreement or its cancellation. In particular, the purchaser shall not be entitled to any interest or to the expense of investigating the title or to any compensation whatsoever.

6.4 (1) If the title to the property being sold is a cross-lease title or a unit title and there are:

(a) in the case of a cross-lease title:

(i) alterations to the external dimensions of any leased structure; or

(ii) buildings or structures not intended for common use which are situated on any part of the land that is not subject to a restricted use covenant;

(b) in the case of a unit title, encroachments out of the principal unit or accessory unit title space (as the case may be);

then the purchaser may requisition the title under subclause 6.2 requiring the vendor:

(c) in the case of a cross-lease title, to deposit a new plan depicting the buildings or structures and register a new cross-lease or cross-leases (as the case may be) and any other ancillary dealings in order to convey good title; or

(d) in the case of a unit title, to deposit an amendment to the unit plan, a redevelopment plan or new unit plan (as the case may be) depicting the principal and/or accessory units and register such transfers and any other ancillary dealings in order to convey good title.

(2) The words "alterations to the external dimensions of any leased structure" shall only mean alterations which are attached to the leased structure and enclosed.

6.5 The vendor shall not be liable to pay for or contribute towards the expense of erection or maintenance of any fence between the property and any contiguous land of the vendor but this proviso shall not enure for the benefit of any subsequent purchaser of the contiguous land; and the vendor shall be entitled to require the inclusion of a fencing covenant to this effect in any transfer of the property.

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7.0 Vendor's warranties and undertakings

7.1 The vendor warrants and undertakes that at the date of this agreement the vendor has not:

(1) received any notice or demand and has no knowledge of any requisition or outstanding requirement:

(a) from any local or government authority or other statutory body; or

(b) under the Resource Management Act 1991; or

(c) from any tenant of the property; or

(d) from any other party; or

(2) given any consent or waiver,

which directly or indirectly affects the property and which has not been disclosed in writing to the purchaser.

7.2 The vendor warrants and undertakes that at the date of this agreement the vendor has no knowledge or notice of any fact which might result in proceedings being instituted by or against the vendor or the purchaser in respect of the property.

7.3 The vendor warrants and undertakes that at settlement:

(1) The chattels included in the sale listed in Schedule 2 and all plant, equipment, systems or devices which provide any services or amenities to the property, including, without limitation, security, heating, cooling, or air-conditioning, are delivered to the purchaser in reasonable working order, but in all other respects in their state of repair as at the date of this agreement (fair wear and tear excepted) but failure to do so shall only create a right of compensation.

(2) All electrical and other installations on the property are free of any charge whatsoever and all chattels included in the sale are the unencumbered property of the vendor.

(3) There are no arrears of rates, water rates or charges outstanding on the property and where the property is subject to a targeted rate that has been imposed as a means of repayment of any loan, subsidy or other financial assistance made available by or through the local authority, the amount required to remove the imposition of that targeted rate has been paid.

(4) Where an allowance has been made by the vendor in the settlement statement for incomings receivable, the settlement statement correctly records those allowances including, in particular, the dates up to which the allowances have been made.

(5) Where the vendor has done or caused or permitted to be done on the property any works:

(a) any permit, resource consent, or building consent required by law was obtained; and

(b) to the vendor's knowledge, the works were completed in compliance with those permits or consents; and

(c) where appropriate, a code compliance certificate was issued for those works.

(6) Where under the Building Act, any building on the property sold requires a compliance schedule:

(a) the vendor has fully complied with any requirements specified in any compliance schedule issued by a territorial authority under the Building Act in respect of the building;

(b) the building has a current building warrant of fitness; and

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(c) the vendor is not aware of any reason, that the vendor has not disclosed in writing to the purchaser, which would prevent a building warrant of fitness from being supplied to the territorial authority when the building warrant of fitness is next due.

(7) Since the date of this agreement, the vendor has not given any consent or waiver which directly or indirectly affects the property.

(8) Any notice or demand received by the vendor, which directly or indirectly affects the property, after the date of this agreement:

(a) from any local or government authority or other statutory body; or
(b) under the Resource Management Act 1991; or
(c) from any tenant of the property; or
(d) from any other party,

has been delivered forthwith by the vendor to either the purchaser or the purchaser's lawyer, unless the vendor has paid or complied with such notice or demand. If the vendor fails to so deliver or pay the notice or demand, the vendor shall be liable for any penalty incurred.

7.4 If the property is or includes part only of a building, the warranty and undertaking in subclause 7.3(6) does not apply. Instead the vendor warrants and undertakes at the date of this agreement that, where under the Building Act the building of which the property forms part requires a compliance schedule:

(1) to the vendor's knowledge, there has been full compliance with any requirements specified in any compliance schedule issued by a territorial authority under the Building Act in respect of the building;
(2) the building has a current building warrant of fitness; and
(3) the vendor is not aware of any reason, that the vendor has not disclosed in writing to the purchaser, which would prevent a building warrant of fitness from being supplied to the territorial authority when the building warrant of fitness is next due.

7.5 The vendor warrants and undertakes that on or immediately after settlement:

(1) if the water and wastewater charges are determined by meter, the vendor will have the water meter read and will pay the amount of the charge payable pursuant to that reading; but if the water supplier will not make special readings, the water and wastewater charges shall be apportioned.
(2) Any outgoings included in the settlement statement are paid in accordance with the settlement statement and, where applicable, to the dates shown in the settlement statement, or will be so paid immediately after settlement.
(3) The vendor will give notice of sale in accordance with the Local Government (Rating) Act 2002 to the territorial authority and regional council in whose district the land is situated and will also give notice of the sale to every other authority that makes and levies rates or charges on the land and to the supplier of water.
(4) Where the property is a unit title, the vendor will notify the body corporate in writing of the transfer of the property and the name and address of the purchaser.

8.0 Unit title and cross-lease provisions

Unit Titles

8.1 If the property is a unit title, sections 144 to 153 of the Unit Titles Act require the vendor to provide to the purchaser a pre-contract disclosure statement, a pre-settlement disclosure statement and, if so requested by the purchaser, an additional disclosure statement.

8.2 If the property is a unit title, the vendor warrants and undertakes as follows:

(1) The information in the pre-contract disclosure statement provided to the purchaser was complete and correct.
(2) Apart from regular periodic contributions, no contributions have been levied or proposed by the body corporate that have not been disclosed in writing to the purchaser.
(3) Not less than five working days before the settlement date, the vendor will provide:
(a) a certificate of insurance for all insurances effected by the body corporate under the provisions of section 135 of the Unit Titles Act; and
(b) a pre-settlement disclosure statement from the vendor, certified correct by the body corporate, under section 147 of the Unit Titles Act. Any periodic contributions to the operating account shown in that pre-settlement disclosure statement shall be apportioned. There shall be no apportionment of contributions to any long-term maintenance fund, contingency fund or capital improvement fund.
(4) There are no other amounts owing by the owner under any provision of the Unit Titles Act.
(5) There are no unsatisfied judgments against the body corporate and no proceedings have been instituted against or by the body corporate.
(6) No order or declaration has been made by any Court against the body corporate or the owner under any provision of the Unit Titles Act.
(7) The vendor has no knowledge or notice of any fact which might result in:
(a) the owner or the purchaser incurring any other liability under any provision of the Unit Titles Act; or
(b) any proceedings being instituted by or against the body corporate; or
(c) any order or declaration being sought against the body corporate or the owner under any provision of the Unit Titles Act.
(8) The vendor is not aware of proposals to pass any body corporate resolution relating to its rules nor are there any unregistered changes to the body corporate rules which have not been disclosed in writing to the purchaser.
(9) No lease, licence, easement, or special privilege has been granted by the body corporate in respect of any part of the common property which has not been disclosed in writing to the purchaser.
(10) No resolution has been passed and no application has been made and the vendor has no knowledge of any proposal for:
(a) the transfer of the whole or any part of the common property;
(b) the addition of any land to the common property;
(c) the cancellation of the unit plan; or

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(d) the deposit of an amendment to the unit plan, a redevelopment plan, or a new unit plan in substitution for the existing unit plan,

which has not been disclosed in writing to the purchaser.

(11) As at settlement, all contributions and other moneys payable by the vendor to the body corporate have been paid in full.

8.3 If the property is a unit title and if the vendor does not provide the certificates of insurance and the pre-settlement disclosure statement under section 147 of the Unit Titles Act in accordance with the requirements of subclause 8.2(3), then in addition to the purchaser's rights under sections 149 and 150 of the Unit Titles Act, the purchaser may:

(1) postpone the settlement date until the fifth working day following the date on which that information is provided to the purchaser; or

(2) elect that settlement shall still take place on the settlement date.

8.4 If the property is a unit title, each party specifies that:

(1) any email address of that party's lawyer provided on the back page of this agreement, or notified subsequently in writing by that party's lawyer shall be an address for service for that party for the purposes of section 205(1)(d) of the Unit Titles Act; and

(2) if that party is absent from New Zealand, that party's lawyer shall be that party's agent in New Zealand for the purposes of section 205(2) of the Unit Titles Act.

8.5 If the property is a unit title, any costs owing by the purchaser to the vendor pursuant to section 148(5) of the Unit Titles Act for providing an additional disclosure statement shall be included in the moneys payable by the purchaser on settlement pursuant to subclause 3.8(1). Such costs may be deducted from the deposit if the purchaser becomes entitled to a refund of the deposit upon cancellation or avoidance of this agreement.

8.6 Unauthorised Structures – Cross-Leases and Unit Titles

(1) Where structures (not stated in clause 6.0 to be requisitionable) have been erected on the property without:

(a) in the case of a cross-lease title, any required lessors' consent; or

(b) in the case of a unit title, any required body corporate consent,

the purchaser may demand within the period expiring on the earlier of:

(i) the tenth working day after the date of this agreement; or

(ii) the settlement date,

that the vendor obtain the written consent of the current lessors or the body corporate (as the case may be) to such improvements ("a current consent") and provide the purchaser with a copy of such consent on or before the settlement date.

(2) Should the vendor be unwilling or unable to obtain a current consent, then the procedure set out in subclauses 6.2(3) and 6.3 shall apply, with the purchaser's demand under subclause 8.6(1) being deemed to be an objection and requisition.

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9.0 Conditions and mortgage terms

9.1 Finance condition

(1) If the purchaser has identified that finance is required on the front page of this agreement, this agreement is conditional upon the purchaser arranging finance for such amount as the purchaser may require from a bank or other lending institution of the purchaser's choice on terms and conditions satisfactory to the purchaser in all respects on or before the finance date.

(2) If the purchaser avoids this agreement for failing to arrange finance in terms of subclause 9.1(1), the purchaser must provide a satisfactory explanation of the grounds relied upon by the purchaser, together with supporting evidence, immediately upon request by the vendor.

9.2 Mortgage terms

(1) Any mortgage to be arranged pursuant to a finance condition shall be upon and subject to the terms and conditions currently being required by the lender in respect of loans of a similar nature.

9.3 LIM condition

(1) If the purchaser has indicated on the front page of this agreement that a LIM is required:

(a) that LIM is to be obtained by the purchaser at the purchaser's cost;

(b) the purchaser is to request the LIM on or before the fifth working day after the date of this agreement; and

(c) this agreement is conditional upon the purchaser approving that LIM, provided that such approval must not be unreasonably or arbitrarily withheld.

(2) If, on reasonable grounds, the purchaser does not approve the LIM, the purchaser shall give notice to the vendor ("the purchaser's notice") on or before the fifteenth working day after the date of this agreement stating the particular matters in respect of which approval is withheld and, if those matters are capable of remedy, what the purchaser reasonably requires to be done to remedy those matters. If the purchaser does not give a purchaser's notice the purchaser shall be deemed to have approved the LIM. If through no fault of the purchaser, the LIM is not available on or before the fifteenth working day after the date of this agreement and the vendor does not give an extension when requested, this condition shall not have been fulfilled and the provisions of subclause 9.10(5) shall apply.

(3) The vendor shall give notice to the purchaser ("the vendor's notice") on or before the fifth working day after receipt of the purchaser's notice advising whether or not the vendor is able and willing to comply with the purchaser's notice by the settlement date.

(4) If the vendor does not give a vendor's notice, or if the vendor's notice advises that the vendor is unable or unwilling to comply with the purchaser's notice, and if the purchaser does not, on or before the tenth working day after the date on which the purchaser's notice is given, give notice to the vendor that the purchaser waives the objection to the LIM, this condition shall not have been fulfilled and the provisions of subclause 9.10(5) shall apply.

(5) If the vendor gives a vendor's notice advising that the vendor is able and willing to comply with the purchaser's notice, this condition is deemed to have been fulfilled, and it shall be a requirement of settlement that the purchaser's notice shall be complied with, and also, if the vendor must carry out work on the property, that the vendor shall obtain the approval of the territorial authority to the work done, both before settlement.

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9.4 Building report condition

(1) If the purchaser has indicated on the front page of this agreement that a building report is required, this agreement is conditional upon the purchaser obtaining at the purchaser's cost on or before the fifteenth working day after the date of this agreement a report on the condition of the buildings and any other improvements on the property that is satisfactory to the purchaser, on the basis of an objective assessment.

(2) The report must be prepared in good faith by a suitably-qualified building inspector in accordance with accepted principles and methods and it must be in writing.

(3) Subject to the rights of any tenants of the property, the vendor shall allow the building inspector to inspect the property at all reasonable times upon reasonable notice for the purposes of preparation of the report.

(4) The building inspector may not carry out any invasive testing in the course of inspection without the vendor's prior written consent.

(5) If the purchaser avoids this agreement for non-fulfilment of this condition pursuant to subclause 9.10(5), the purchaser must provide the vendor immediately upon request with a copy of the building inspector's report.

9.5 Toxicology report condition

(1) If the purchaser has indicated on the front page of this agreement that a toxicology report is required, this agreement is conditional upon the purchaser obtaining at the purchaser's cost on or before the fifteenth working day after the date of this agreement, a toxicology report on the property that is satisfactory to the purchaser, on the basis of an objective assessment.

(2) The purpose of the toxicology report shall be to detect whether the property has been contaminated by the preparation, manufacture or use of drugs including, but not limited to, methamphetamine.

(3) The report must be prepared in good faith by a suitably-qualified inspector using accepted principles and methods and it must be in writing.

(4) Subject to the rights of any tenants of the property, the vendor shall allow the inspector to inspect the property at all reasonable times upon reasonable notice for the purposes of carrying out the testing and preparation of the report.

(5) The inspector may not carry out any invasive testing in the course of the inspection without the vendor's prior written consent.

(6) If the purchaser avoids this agreement for non-fulfilment of this condition pursuant to subclause 9.10(5), the purchaser must provide the vendor immediately upon request with a copy of the inspector's report.

9.6 OIA consent condition

(1) If the purchaser has indicated on the front page of this agreement that OIA consent is required, this agreement is conditional upon OIA consent being obtained on or before the OIA date shown on the front page of this agreement on terms and conditions that are satisfactory to the purchaser, acting reasonably, the purchaser being responsible for payment of the application fee.

(2) If the purchaser has indicated on the front page of this agreement that OIA consent is not required, or has failed to indicate whether it is required, then the purchaser warrants that the purchaser does not require OIA consent.

9.7 If this agreement relates to a transaction to which the Land Act 1948 applies, this agreement is conditional upon the vendor obtaining the necessary consent by the Land Act date shown on the front page of this agreement.

9.8 If the Land Act date or OIA date is not shown on the front page of this agreement that date shall be the settlement date or a date 65 working days from the date of this agreement whichever is the sooner, except where the property comprises residential (but not otherwise sensitive) land in which case that date shall be the settlement date or a date 20 working days from the date of this agreement, whichever is the sooner.

9.9 Resource Management Act condition

(1) If this agreement relates to a transaction to which section 225 of the Resource Management Act 1991 applies then this agreement is subject to the appropriate condition(s) imposed by that section.

9.10 Operation of conditions

If this agreement is expressed to be subject either to the above or to any other condition(s), then in relation to each such condition the following shall apply unless otherwise expressly provided:

(1) The condition shall be a condition subsequent.

(2) The party or parties for whose benefit the condition has been included shall do all things which may reasonably be necessary to enable the condition to be fulfilled by the date for fulfilment.

(3) Time for fulfilment of any condition and any extended time for fulfilment to a fixed date shall be of the essence.

(4) The condition shall be deemed to be not fulfilled until notice of fulfilment has been served by one party on the other party.

(5) If the condition is not fulfilled by the date for fulfilment, either party may at any time before the condition is fulfilled or waived avoid this agreement by giving notice to the other. Upon avoidance of this agreement, the purchaser shall be entitled to the immediate return of the deposit and any other moneys paid by the purchaser under this agreement and neither party shall have any right or claim against the other arising from this agreement or its termination.

(6) At any time before this agreement is avoided, the purchaser may waive any finance condition and either party may waive any other condition which is for the sole benefit of that party. Any waiver shall be by notice.

10.0 Claims for compensation

10.1 If the purchaser has not purported to cancel this agreement, the breach by the vendor of any term of this agreement does not defer the purchaser's obligation to settle, but that obligation is subject to the provisions of this clause 10.0.

10.2 The provisions of this clause apply if:

(1) the purchaser claims a right to compensation for:

(a) a breach of any term of this agreement; or

(b) a misrepresentation; or

(c) a breach of section 9 or section 14 of the Fair Trading Act 1986; or

(d) an equitable set-off, or

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(2) there is a dispute between the parties regarding any amounts payable:
  (a) under subclause 3.12 or subclause 3.13; or
  (b) under subclause 5.2.

10.3 To make a claim under this clause 10.0:
  (1) the claimant must serve notice of the claim on the other party on or before the last working day prior to the settlement date (except for claims made after the settlement date for amounts payable under subclause 3.12 or subclause 3.13, in respect of which the claimant may serve notice of the claim on the other party at any time after a dispute arises over those amounts); and
  (2) the notice must:
    (a) state the particular breach of the terms of the agreement, or the claim under subclause 3.12, subclause 3.13 or subclause 5.2, or for misrepresentation, or for breach of section 9 or section 14 of the Fair Trading Act 1986, or for an equitable set-off; and
    (b) state a genuine pre-estimate of the loss suffered by the claimant; and
    (c) be particularised and quantified to the extent reasonably possible as at the date of the notice.

10.4 If the claimant is unable to give notice under subclause 10.3 in respect of claims under subclause 10.2(1) or subclause 10.2(2)(b) by the settlement date by reason of the conduct or omission of the other party, the notice may be served on or before the working day immediately preceding the last working day on which settlement must take place under a settlement notice served by either party under subclause 11.1.

10.5 If the amount of compensation is agreed, it shall be deducted from or added to the amount to be paid by the purchaser on settlement.

10.6 If the purchaser makes a claim for compensation under subclause 10.2(1) but the vendor disputes the purchaser's right to make that claim, then:
  (1) the vendor must give notice to the purchaser within three working days after service of the purchaser's notice under subclause 10.3, time being of the essence; and
  (2) the purchaser's right to make the claim shall be determined by an experienced property lawyer or an experienced litigator appointed by the parties. If the parties cannot agree on the appointee, the appointment shall be made on the application of either party by the president for the time being of the New Zealand Law Society. The appointee's costs shall be met by the party against whom the determination is made.

10.7 If the purchaser makes a claim for compensation under subclause 10.2(1) and the vendor fails to give notice to the purchaser pursuant to clause 10.6, the vendor is deemed to have accepted that the purchaser has a right to make that claim.

10.8 If it is accepted, or determined under subclause 10.6 that the purchaser has a right to claim compensation under subclause 10.2(1) but the amount of compensation claimed is disputed, or if the claim is made under subclause 10.2(2) and the amount of compensation claimed is disputed, then:
  (1) an interim amount shall be paid on settlement by the party required to a stakeholder until the amount of the claim is determined;
  (2) if the parties cannot agree on a stakeholder, the interim amount shall be paid to a stakeholder nominated on the application of either party by the president for the time being of the New Zealand Law Society;
  (3) the interim amount must be a reasonable sum having regard to all of the circumstances, except that where the claim is under subclause 3.13 the interim amount shall be the lower of the amount claimed, or an amount equivalent to interest at the interest rate for late settlement for the relevant default period on such portion of the purchase price (including any deposit) as is payable under this agreement on or by the settlement date;
  (4) if the parties cannot agree on the interim amount, the interim amount shall be determined by an experienced property lawyer, an experienced litigator, or, where the claim for compensation is made under subclause 5.2, an experienced registered valuer or quantity surveyor appointed by the parties. The appointee's costs shall be met equally by the parties. If the parties cannot agree on the appointee, the appointment shall be made on the application of either party by the president for the time being of the New Zealand Law Society;
  (5) the amount of the claim determined to be payable shall not be limited by the interim amount;
  (6) the stakeholder shall lodge the interim amount on an interest-bearing call deposit with a bank registered under the Reserve Bank of New Zealand Act 1989 in the joint names of the vendor and the purchaser;
  (7) the interest earned on the interim amount net of any withholding tax and any bank or legal administration fees and commission charges shall follow the destination of the interim amount;
  (8) apart from the net interest earned on the interim amount, no interest shall be payable by either party to the other in respect of the claim for compensation once the amount of the claim has been determined, provided that if the amount determined is in excess of the interim amount, the party liable to make payment of that excess shall pay interest to the other party at the interest rate for late settlement on the amount of that excess if it is not paid on or before the third working day after the date of notification of the determination, computed from the date of such notification until payment.

10.9 Where a determination has to be made under subclause 10.6(2) or subclause 10.8(4) and the settlement date will have passed before the determination is made, the settlement date shall be deferred to the second working day following the date of notification to both parties of the determination. Where a determination has to be made under both of these subclauses, the settlement date shall be deferred to the second working day following the date on which notification to both parties has been made of both determinations.

10.10 The procedures prescribed in subclauses 10.1 to 10.9 shall not prevent either party from taking proceedings for specific performance of the contract.

10.11 A determination under subclause 10.6 that the purchaser does not have a right to claim compensation under subclause 10.2(1) shall not prevent the purchaser from pursuing that claim following settlement.

10.12 Where a determination is made by a person appointed under either subclause 10.6 or subclause 10.8, that person shall not be liable to either party for any costs or losses that either party may claim to have suffered in respect of the determination.

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11.0 Notice to complete and remedies on default

11.1 (1) If the sale is not settled on the settlement date, either party may at any time thereafter serve on the other party a settlement notice.

(2) The settlement notice shall be effective only if the party serving it is at the time of service either in all material respects ready, able, and willing to proceed to settle in accordance with clauses 3.0 and 10.0 or is not so ready, able, and willing to settle only by reason of the default or omission of the other party.

(3) If the purchaser is in possession, the vendor's right to cancel this agreement will be subject to sections 28 to 36 of the Property Law Act 2007 and the settlement notice may incorporate or be given with a notice under section 28 of that Act complying with section 29 of that Act.

11.2 Subject to subclause 11.1(3), upon service of the settlement notice the party on whom the notice is served shall settle:

(1) on or before the twelfth working day after the date of service of the notice; or

(2) on the first working day after the 13th day of January if the period of twelve working days expires during the period commencing on the 6th day of January and ending on the 13th day of January, both days inclusive,

time being of the essence, but without prejudice to any intermediate right of cancellation by either party.

11.3 (1) If this agreement provides for the payment of the purchase price by instalments and the purchaser fails duly and punctually to pay any instalment on or within one month from the date on which it fell due for payment then, whether or not the purchaser is in possession, the vendor may immediately give notice to the purchaser calling up the unpaid balance of the purchase price, which shall upon service of the notice fall immediately due and payable.

(2) The date of service of the notice under this subclause shall be deemed the settlement date for the purposes of subclause 11.1.

(3) The vendor may give a settlement notice with a notice under this subclause.

(4) For the purpose of this subclause a deposit is not an instalment.

11.4 If the purchaser does not comply with the terms of the settlement notice served by the vendor then, subject to subclause 11.1(3):

(1) Without prejudice to any other rights or remedies available to the vendor at law or in equity, the vendor may:

(a) sue the purchaser for specific performance; or

(b) cancel this agreement by notice and pursue either or both of the following remedies, namely:

(i) forfeit and retain for the vendor's own benefit the deposit paid by the purchaser, but not exceeding in all 10% of the purchase price; and/or

(ii) sue the purchaser for damages.

(2) Where the vendor is entitled to cancel this agreement, the entry by the vendor into a conditional or unconditional agreement for the resale of the property or any part thereof shall take effect as a cancellation of this agreement by the vendor if this agreement has not previously been cancelled and such resale shall be deemed to have occurred after cancellation.

(3) The damages claimable by the vendor under subclause 11.4(1)(b)(ii) shall include all damages claimable at common law or in equity and shall also include (but shall not be limited to) any loss incurred by the vendor on any bona fide resale contracted within one year from the date by which the purchaser should have settled in compliance with the settlement notice. The amount of that loss may include:

(a) interest on the unpaid portion of the purchase price at the interest rate for late settlement from the settlement date to the settlement of such resale; and

(b) all costs and expenses reasonably incurred in any resale or attempted resale; and

(c) all outgoings (other than interest) on or maintenance expenses in respect of the property from the settlement date to the settlement of such resale.

(4) Any surplus money arising from a resale shall be retained by the vendor.

11.5 If the vendor does not comply with the terms of a settlement notice served by the purchaser, then, without prejudice to any other rights or remedies available to the purchaser at law or in equity the purchaser may:

(1) sue the vendor for specific performance; or

(2) cancel this agreement by notice and require the vendor forthwith to repay to the purchaser any deposit and any other money paid on account of the purchase price and interest on such sum(s) at the interest rate for late settlement from the date or dates of payment by the purchaser until repayment.

11.6 The party serving a settlement notice may extend the term of the notice for one or more specifically stated periods of time and thereupon the term of the settlement notice shall be deemed to expire on the last day of the extended period or periods and it shall operate as though this clause stipulated the extended period(s) of notice in lieu of the period otherwise applicable; and time shall be of the essence accordingly. An extension may be given either before or after the expiry of the period of the notice.

11.7 Nothing in this clause shall preclude a party from suing for specific performance without serving a settlement notice.

11.8 A party who serves a settlement notice under this clause shall not be in breach of an essential term by reason only of that party's failure to be ready and able to settle upon the expiry of that notice.

12.0 Non-merger

12.1 The obligations and warranties of the parties in this agreement shall not merge with:

(1) the giving and taking of possession;

(2) settlement;

(3) the transfer of title to the property;

(4) delivery of the chattels (if any); or

(5) registration of the transfer of title to the property.

Approved by the Auckland District Law Society and REINZ June 2019

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13.0 Goods and Services Tax

13.1 If this agreement provides for the purchaser to pay (in addition to the purchase price stated without GST) any GST which is payable in respect of the supply made under this agreement, then:

(1) the purchaser shall pay to the vendor the GST which is so payable in one sum on the GST date;

(2) where the GST date has not been inserted on the front page of this agreement the GST date shall be the settlement date;

(3) where any GST is not so paid to the vendor, the purchaser shall pay to the vendor:

(a) interest at the interest rate for late settlement on the amount of GST unpaid from the GST date until payment; and

(b) any default GST;

(4) it shall not be a defence to a claim against the purchaser for payment to the vendor of any default GST that the vendor has failed to mitigate the vendor's damages by paying an amount of GST when it fell due under the GST Act; and

(5) any sum referred to in this clause is included in the moneys payable by the purchaser on settlement pursuant to subclause 3.8(1).

13.2 If the supply under this agreement is a taxable supply, the vendor will deliver a tax invoice to the purchaser on or before the GST date or such earlier date as the purchaser is entitled to delivery of an invoice under the GST Act.

13.3 (1) Without prejudice to the vendor's rights and remedies under subclause 13.1, where any GST is not paid to the vendor on or within one month of the GST date, then whether or not the purchaser is in possession, the vendor may immediately give notice to the purchaser calling up any unpaid balance of the purchase price, which shall upon service of the notice fall immediately due and payable.

(2) The date of service of the notice under this subclause shall be deemed the settlement date for the purposes of subclause 11.1.

(3) The vendor may give a settlement notice under subclause 11.1 with a notice under this subclause.

14.0 Zero-rating

14.1 The vendor warrants that the statement on the front page regarding the vendor's GST registration status in respect of the supply under this agreement and any particulars stated by the vendor in Schedule 1 are correct at the date of this agreement and will remain correct at settlement.

14.2 The purchaser warrants that any particulars stated by the purchaser in Schedule 1 are correct at the date of this agreement.

14.3 Where the particulars stated on the front page and in Schedule 1 indicate that:

(1) the vendor is and/or will be at settlement a registered person in respect of the supply under this agreement;

(2) the recipient is and/or will be at settlement a registered person;

(3) the recipient intends at settlement to use the property for making taxable supplies; and

(4) the recipient does not intend at settlement to use the property as a principal place of residence by the recipient or a person associated with the recipient under section 2A(1)(c) of the GST Act,

GST will be chargeable on the supply under this agreement at 0% pursuant to section 11(1)(mb) of the GST Act.

14.4 If GST is chargeable on the supply under this agreement at 0% pursuant to section 11(1)(mb) of the GST Act, then on or before settlement the purchaser will provide the vendor with the recipient's name, address, and registration number if any of those details are not included in Schedule 1 or they have altered.

14.5 (1) If any of the particulars stated by the purchaser in Schedule 1:

(a) are incomplete; or

(b) alter between the date of this agreement and settlement,

the purchaser shall notify the vendor of the particulars which have not been completed and the altered particulars as soon as practicable before settlement.

(2) The purchaser warrants that any added or altered particulars will be correct as at the date of the purchaser's notification.

(3) If the GST treatment of the supply under this agreement should be altered as a result of the added or altered particulars, the vendor shall prepare and deliver to the purchaser or the purchaser's lawyer an amended settlement statement, if the vendor has already tendered a settlement statement, and a credit note or a debit note, as the case may be, if the vendor has already issued a tax invoice.

14.6 If

(1) the particulars in Schedule 1 state that part of the property is being used as a principal place of residence at the date of this agreement; and

(2) that part is still being so used at the time of the supply under this agreement,

then, the supply of that part will be a separate supply in accordance with section 5(15)(a) of the GST Act.

14.7 If

(1) the particulars stated in Schedule 1 indicate that the recipient intends to use part of the property as a principal place of residence by the recipient or a person associated with the recipient under section 2A(1)(c) of the GST Act; and

(2) that part is the same part as that being used as a principal place of residence at the time of the supply under this agreement,

then the references in subclauses 14.3 and 14.4 to "the property" shall be deemed to mean the remainder of the property excluding that part and the references to "the supply under this agreement" shall be deemed to mean the supply under this agreement of that remainder.

14.8 If the particulars stated on the front page and in Schedule 1 indicate in terms of subclause 14.3 that GST will be chargeable on the supply under this agreement at 0% pursuant to section 11(1)(mb) of the GST Act, but any of the particulars stated by the purchaser in Schedule 1 should alter between the date of this agreement and settlement, such that GST no longer becomes chargeable on the supply at 0%, then:

(1) the purchase price shall be plus GST (if any), even if it has been expressed as being inclusive of GST (if any) on the front page of this agreement; and

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(2) if the vendor has already had to account to the Inland Revenue Department for the GST which is payable in respect of the supply under this agreement and did so on the basis that in accordance with subclause 14.3 the GST would be chargeable at 0%, the purchaser shall pay GST and any default GST to the vendor immediately upon demand served on the purchaser by the vendor (and where any GST or default GST is not so paid to the vendor, the purchaser shall pay to the vendor interest at the interest for late settlement on the amount unpaid from the date of service of the vendor's demand until payment).

15.0 Supply of a Going Concern

15.1 If there is a supply under this agreement to which section 11(1)(mb) of the GST Act does not apply but which comprises the supply of a taxable activity that is a going concern at the time of the supply, then, unless otherwise expressly stated in this agreement:

(1) each party warrants that it is a registered person or will be so by the date of the supply;
(2) each party agrees to provide the other party by the date of the supply with proof of its registration for GST purposes;
(3) the parties agree that they intend that the supply is of a taxable activity that is capable of being carried on as a going concern by the purchaser; and
(4) the parties agree that the supply made pursuant to this agreement is the supply of a going concern on which GST is chargeable at 0%.

15.2 If it subsequently transpires that GST is payable in respect of the supply and if this agreement provides for the purchaser to pay (in addition to the purchase price without GST) any GST which is payable in respect of the supply made under this agreement, then the provisions of clause 13.0 of this agreement shall apply.

16.0 Limitation of Liability

16.1 If any person enters into this agreement as trustee of a trust and if that person has no right to or interest in any assets of the trust, except in that person's capacity as a trustee of the trust, then that person's liability under this agreement will not be personal and unlimited but will be limited to the actual amount recoverable from the assets of the trust from time to time ("the limited amount").

16.2 If the right of that person to be indemnified from the trust assets has been lost or impaired, that person's liability will become personal but limited to the extent of that part of the limited amount which cannot be recovered from any other person.

17.0 Counterparts

17.1 This agreement may be executed and delivered in any number of counterparts (including scanned and emailed PDF counterparts).

17.2 Each executed counterpart will be deemed an original and all executed counterparts together will constitute one (and the same) instrument.

17.3 This agreement shall not come into effect until each person required to sign has signed at least one counterpart and both vendor and purchaser have received a counterpart signed by each person required to sign.

17.4 If the parties cannot agree on the date of this agreement, and counterparts are signed on separate dates, the date of the agreement is the date on which the last counterpart was signed and delivered to all parties.

18.0 Agency

18.1 If the name of a licensed real estate agent is recorded on this agreement, it is acknowledged that the sale evidenced by this agreement has been made through that agent whom the vendor has appointed as the vendor's agent according to an executed agency agreement.

18.2 The scope of the authority of the agent under subclause 18.1 does not extend to making an offer, counteroffer, or acceptance of a purchaser's offer or counteroffer on the vendor's behalf without the express authority of the vendor for that purpose. That authority, if given, should be recorded in the executed agency agreement.

18.3 The vendor shall be liable to pay the agent's charges including GST in accordance with the executed agency agreement.

19.0 Collection of Sales Information

19.1 Once this agreement has become unconditional in all respects, the agent may provide certain information relating to the sale to the Real Estate Institute of New Zealand Incorporated (REINZ).

19.2 This information will be stored on a secure password protected network under REINZ's control and may include (amongst other things) the sale price and the address of the property, but will not include the parties' names or other personal information under the Privacy Act 1993.

19.3 This information is collected, used and published for statistical, property appraisal and market analysis purposes, by REINZ, REINZ member agents and others.

19.4 Despite the above, if REINZ does come to hold any of the vendor or purchaser's personal information, that party has a right to access and correct that personal information by contacting REINZ at info@reinz.co.nz or by post or telephone.

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FURTHER TERMS OF SALE

See Further Terms Attached

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20. Conditions

20.1 This agreement is conditional upon the purchaser being satisfied in their absolute and sole discretion in all respects that the property is suitable for the purchaser's requirements following the purchaser carrying out a due and diligent investigation of all aspects of the property, including **but not limited to:**

20.1.1 Approval of Title;

20.1.2 Approval of LIM;

20.1.3 Obtaining satisfactory finance;

which the purchaser considers appropriate within 10 working days from the date of this agreement.

20.2 The condition in clause 20.1 has been included for the sole benefit of the Purchaser.

21. Vendor Subdividing

21.1 **Survey Plan and Resource Consent to Subdivide:** The Vendor has obtained a resource consent from the Waimakariri District Council **(Council)** to complete the subdivision of 29 Pentecost Road, Rangiora under number RC 185198 **(Consent)**. The Purchaser acknowledges that the subdivision is to be completed in stages.

21.2 **Completion of Subdivision Works:** The Vendor will, at its cost in all things:

21.2.1 complete all works required to subdivide the land in a good and competent manner, and in accordance with sound construction and engineering practice;

21.2.2 comply in all respects with any terms and conditions imposed by the Council under the Consent; and

21.2.3 prepare and submit a land transfer plan largely in accordance with the Preliminary Plan attached to the Consent to the Council for its approval.

21.3 **Vendor to Lodge Survey Plan:** Following approval of the plan by the Council, the Vendor will lodge the survey plan with Land Information New Zealand, and will promptly arrange for the deposit of the survey plan.

21.4 **Costs:** The Vendor will pay all costs, charges, expenses and disbursements associated with the subdivision and deposit of the survey plan including, but not limited to:

21.4.1 all Resource Consent and application fees;

21.4.2 any reserve fund and other financial contributions payable to the Council;

21.4.3 the costs of all subdivision works and the installation of all services required under the terms of the Consent;

21.4.4 all costs of compliance with any terms and conditions imposed by the Council in the granting of its approval to the subdivision; and

21.4.5 all Land Information New Zealand costs up to the issue of a separate unique titles.

22. Area

22.1 Should the final area of the Property vary by 5% or more or if the dimensions are materially different from the proposed subdivision plan attached then the Purchaser can elect to either:

22.1.1 Terminate the Agreement; or

22.1.2 Accept a variation of the purchase price (increased or decreased) on a pro rata square metre basis.

23. Easements, Consents etc

23.1 The Vendor reserves the right to grant or receive the benefit of any easements, rights, restrictions and other encumbrances and rights which the Vendor, in its absolute discretion, deems necessary or are required by the Council. The Purchaser shall not be entitled to make any objection or requisition or claim any compensation in relation to any such easements, rights, restrictions and other encumbrances and rights provided that in the opinion of the Vendor, such matter will not substantially and materially affect the Purchaser's use or enjoyment of the property.

23.2 The Purchaser accordingly must take title to the property subject to, and with the benefit of, any such easements, rights, restrictions and other encumbrances, rights and obligations and will sign any such documentation and do such acts and things as may be required to obtain the deposit of the subdivision plan and the registration or any such easements, rights, restrictions and other encumbrances, rights and obligations as above.

24. Covenants

24.1 The Purchaser acknowledges that the Title will be subject to Covenants as attached to this Agreement.

24.2 The vendor reserves the right to amend the Covenants prior to settlement if in the opinion of the Vendor, such matter will not substantially and materially affect the Purchaser's use or enjoyment of the property.

25. Sunset Clause

25.1 If the new Certificate of Title for the Property does not issue by 23 December 2020 then the Purchaser may cancel the Agreement and any deposit held will be returned to the Purchaser. This condition is inserted for the sole benefit of the Purchaser.

26. No Caveat

26.1 The Purchaser agrees that it will not lodge a caveat against the Head Title. In the event the Purchaser does lodge a caveat the Vendor may immediately take all steps necessary at the Purchaser's expense to secure removal of the Caveat.

27. Power of Attorney

27.1 In consideration of the entry by the Vendor into this Agreement, the Purchaser irrevocably appoints the Vendor or any nominee of the Vendor to be the true and lawful attorney of the Purchaser for the purposes of executing all documents, plans and consents and to perform all acts, matters and things as may be necessary (without limitation):

J.S

27.1.1 To ensure the Purchaser's obligations under this Agreement are met;

27.1.2 To complete the subdivision of the property held in underlying Title 856490 and situated at 29 Pentecost Road, Rangiora **(Land)**. Such subdivision is to be undertaken in stages as anticipated by the proposed Plan attached hereto; and

27.1.3 To discharge any caveat registered against the Land in accordance with clause 26.

27.2 The disclosure of clause 27.1 to the Purchaser's mortgagee, professional advisors, LINZ or any Relevant Authority will without further requirement or reference to the Purchaser comprise an irrevocable authorisation and instruction to the person involved or the Purchaser's mortgagee to execute any consent sought by the Vendor for any of the purposes set out in clause 27.1 or will be sufficient evidence of the rights and powers of the Vendor or the Vendor's nominee to act as the Purchaser's attorney for such purposes.

27.3 The Purchaser will, if called upon to do so, enter into and execute a Deed of Appointment of Power of Attorney in favour of the Vendor or any nominee of the Vendor on the terms and for the purposes set out in clause 27.1.

28. No Objection

28.1 The Purchaser agrees that the Covenants will include provisions specifying that the Purchaser will not object to, and will support when asked by the Vendor, any current or future applications for subdivision consent relating to the Land.

28.2 The Purchaser also agrees to do nothing that would adversely affect the progress of the subdivision of the Land and any future subdivision that the Vendors may wish to complete on any part of the Land retained by the Vendor.

29. Lowest Price

29.1 The parties acknowledge that:

29.1.1 Despite any deferred or extended date for settlement or the giving and taking of possession under this agreement, the purchase price of the property set out in this agreement is the lowest price at which the property could be purchased;

29.1.2 The purchase price of the property set out in this agreement does not include any capitalised interest; and

29.1.3 The "lowest price" for the purchases of section EW 32(3) of the Income Tax Act 2007 is equal to the purchase price of the property set out in this agreement.

Blue 5.5

Builders Additional Terms and Conditions of Sale

30. Sale and Purchase of Builders Lots

30.1 These Additional Terms and Conditions of Sale apply in addition to the Further Terms of Sale.

31. Settlement Date

31.1 The Settlement Date under this Agreement is due 6 weeks following notice of the issue of the new Record of Title being given to the Purchaser or the Purchaser's solicitor.

32. On Sale

32.1 The Purchaser may not on-sell any residential lots comprising part of the property without having entered into an agreement with an on-sale purchaser which includes the lots as part of a home and land package.

33. Construction Bond

33.1 The Purchaser agrees to execute and pay a construction bond of $2,000 **(Construction Bond)** as part of this Agreement. The Construction Bond is to cover any damage or costs incurred as a result of actions by the Purchaser and/or its subcontractors which, if not rectified, is to be paid out of the Construction Bond.

33.2 The Construction Bond must be paid to Lane Neave's Trust Account prior to the commencement of construction of the property. The vendor is entitled to deduct from the Construction Bond any costs of remedying any damage caused by the purchaser and/or its subcontractors.

33.3 Upon completion of the dwelling on the Property the Construction Bond will be returned to the Purchaser within five (5) working days after the vendor receives a written request by the purchaser, less any deductions under clause 33.2 above.

33.4 At any time up to six months after the issue of a Code Compliance Certificate for the first dwelling built on the lot (time being of the essence), the purchaser shall be entitled to apply to the vendor for the refund of the Bond. The application shall be in writing, and must be accompanied by a copy of the Code Compliance Certificate for the dwelling.

33.5 In the event that the purchaser sells the lot without building on it, the vendor shall continue to hold the Bond on the terms set out above and will make any refund of the Bond to the owner of the lot at the time the dwelling is built. It is recommended that the purchaser make provision in any agreement to sell the lot for the party purchasing to refund the Bond to the purchaser direct.

34. Access Prior to Settlement

34.1 The purchaser may take access of the property solely for the purpose of constructing a dwelling and associated improvements on the property and landscaping the property in accordance with this clause 34. If the purchaser seeks early access the vendor will procure and permit access from the date determined by the vendor and approved in writing by the vendor.

34.2 The provisions of this clause 34.2 shall apply from the date the purchaser is given access under clause 34.1 in respect of the period to, or actions before settlement without prejudice to the rights and obligations of the parties on and after settlement.

34.2.1 The purchaser must comply with the land covenants.

34.2.2 The purchaser shall be responsible for obtaining all Consents required for any action of the purchaser on the property.

34.2.3 The purchaser shall not deposit any fill or rubbish on, remove any fixtures or improvements or soil from, or cut down any trees on, the property, without the prior written consent of the vendor.

34.2.4 The purchaser will provide to the vendor, within 3 working days of any request by the vendor, any information in relation to any activity undertaken or to be undertaken on the property and that is requested by the vendor. The purchaser warrants that all material and information provide to the vendor under this clause is complete, true and accurate to the best of the knowledge and belief of the purchaser.

34.2.5 The purchaser will promptly notify the vendor of any lawsuits, claims, proceedings, investigations or adverse events which occur, be threatened, brought, asserted or commenced against the purchaser involving the property or any activity on the property, and not admit, settle, compromise or otherwise deal with any such matter except in accordance with the vendor's prior written consent (not to be unreasonably or arbitrarily withheld or delayed).

34.2.6 The dwelling and associated landscaping of the property will be at the sole risk of the purchaser.

34.2.7 The purchaser must comply with all and any Health and Safety legislative requirements.

34.2.8 In exercising any rights or performing any obligations under this clause 34 the purchaser shall:

(a) Comply with all legal obligations applicable to the exercise of the rights or performance of the obligations;

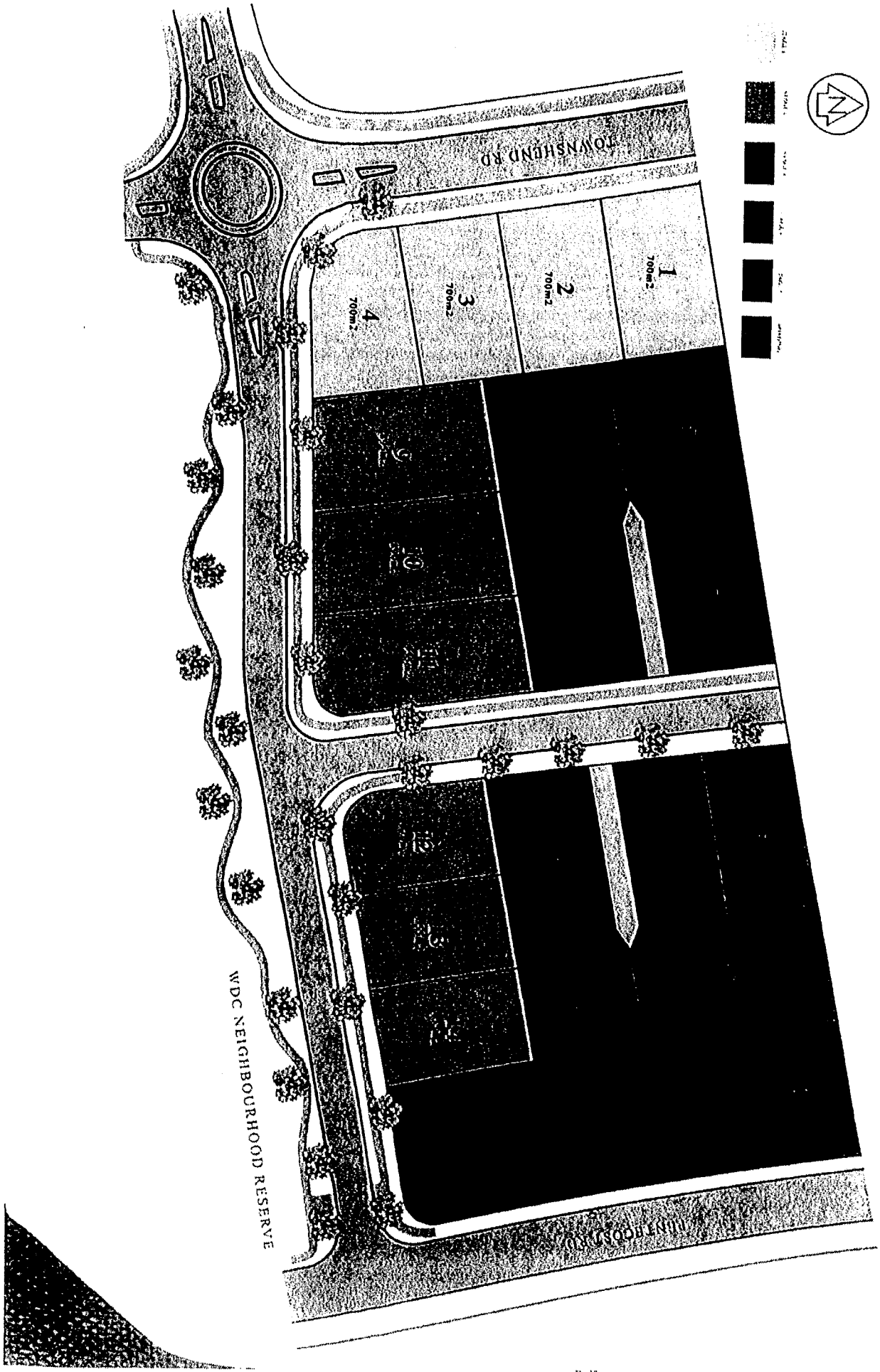
(b) Use all reasonable endeavours to avoid any interference with the vendor's development work; and

(c) Meet the cost of making good any damage to the Land other than the property; or improvements on the Land other than the property (including any roads, gutters, kerbs, gutter or kerb crossings and footpaths), caused by the purchaser or its officers, employees, advisers, consultants and contractors.

34.3 If this agreement is validly terminated for any reason other than breach by the vendor then:

(a) the vendor may by notice in writing require the purchaser to remove any dwelling and any other improvements constructed or installed on the property by the purchaser and restore the property to the condition at the time access to the property was given to the purchaser within 20 working days of notice from the vendor requiring that action.

34.4 The purchaser shall indemnify the vendor, and keep the vendor indemnified, for any costs (including solicitor costs on a solicitor client basis) incurred in respect of any action under this clause, and any costs (including solicitor costs on a solicitor client basis) incurred or loss suffered because the purchaser or its officers, employees, advisers, consultants and contractors fail to meet the obligations under this clause to the extent that the vendor has not caused or contributed to the failure. Without limiting this clause the vendor may require any costs incurred by the vendor before settlement that are required to be indemnified under this clause to be paid by the purchaser to the vendor on settlement in cleared funds as a requirement of settlement occurring.


TOWNSHEND RD
1
700m2
2
700m2
3
700m2
4
700m2
WDC NEIGHBOURHOOD RESERVE

SCHEDULE 1

(GST Information – see clause 14.0)

This Schedule must be completed if the vendor has stated on the front page that the vendor is registered under the GST Act in respect of the transaction evidenced by this agreement and/or will be so registered at settlement. Otherwise there is no need to complete it.

Section 1 Vendor		
1(a)	The vendor's registration number (if already registered): 117 798 895	
1(b)	(i) Part of the property is being used as a principal place of residence at the date of this agreement.	~~Yes~~/No
	(ii) That part is: (e.g. "the main farmhouse" or "the apartment above the shop".)	Yes/No
	(iii) The supply of that part will be a taxable supply.	Yes/No
Section 2 Purchaser		
2(a)	The purchaser is registered under the GST Act and/or will be so registered at settlement.	Yes/No
2(b)	The purchaser intends at settlement to use the property for making taxable supplies.	Yes/No
If the answer to either or both of questions 2(a) and 2(b) is "No", go to question 2(e)		
2(c)	The purchaser's details are as follows: (i) Full name:	
	(ii) Address:	
	(iii) Registration number (if already registered):	
2(d)	The purchaser intends at settlement to use the property as a principal place of residence by the purchaser or by a person associated with the purchaser under section 2A(1)(c) of the GST Act (connected by blood relationship, marriage, civil union, de facto relationship or adoption).	Yes/No
	OR	
	The purchaser intends at settlement to use part of the property (and no other part) as a principal place of residence by the purchaser or by a person associated with the purchaser under section 2A(1)(c) of the GST Act. That part is: (e.g. "the main farmhouse" or "the apartment above the shop")	Yes/No
2(e)	The purchaser intends to direct the vendor to transfer title to the property to another party ("nominee").	Yes/No
If the answer to question 2(e) is "Yes", then please continue. Otherwise, there is no need to complete this Schedule any further.		
Section 3 Nominee		
3(a)	The nominee is registered under the GST Act and/or is expected by the purchaser to be so registered at settlement.	Yes/No
3(b)	The purchaser expects the nominee at settlement to use the property for making taxable supplies.	Yes/No
If the answer to either or both of questions 3(a) and 3(b) is "No", there is no need to complete this Schedule any further.		
3(c)	The nominee's details (if known to the purchaser) are as follows: (i) Full name:	
	(ii) Address:	
	(iii) Registration number (if already registered):	
3(d)	The purchaser expects the nominee to intend at settlement to use the property as a principal place of residence by the nominee or by a person associated with the nominee under section 2A(1)(c) of the GST Act (connected by blood relationship, marriage, civil union, de facto relationship or adoption).	Yes/No
	OR	
	The purchaser expects the nominee to intend at settlement to use part of the property (and no other part) as a principal place of residence by the nominee or by a person associated with the nominee under section 2A(1)(c) of the GST Act. That part is: (e.g. "the main farmhouse" or "the apartment above the shop".)	Yes/No

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SCHEDULE 2

List all chattels included in the sale
(strike out or add as applicable)

Stove	Rangehood	Wall oven	Cooktop
Dishwasher	Kitchen waste disposal	Light fittings	Smoke detector(s)
Burglar alarm	Heated towel rail(s)	Heat pump(s)	Garage door remote control(s)
Blinds	Curtains	Fixed floor coverings	

SCHEDULE 3

Residential Tenancies

Name of Tenant(s):

Rent: **Term:** **Bond:**

Commercial/Industrial Tenancies
(If necessary complete on a separate schedule)

1. Name of Tenant(s):
Rent: **Term:** **Right of Renewal:** **Other:**

2. Name of Tenant(s):
Rent: **Term:** **Right of Renewal:** **Other:**

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WARNING *(This warning does not form part of this agreement)*
This is a binding contract. Read the information set out on the back page before signing.

Acknowledgements

Where this agreement relates to the sale of a residential property and this agreement was provided to the parties by a real estate agent, or by a licensee on behalf of the agent, the parties acknowledge that they have been given the guide about the sale of residential property approved by the Real Estate Authority.

Where this agreement relates to the sale of a unit title property, the purchaser acknowledges that the purchaser has been provided with a pre-contract disclosure statement under section 146 of the Unit Titles Act.

Signature of Purchaser(s):

Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply
If no option is deleted, the signatory is signing in their personal capacity

Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply
If no option is deleted, the signatory is signing in their personal capacity

Signature of Vendor(s):

Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply
If no option is deleted, the signatory is signing in their personal capacity

Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply
If no option is deleted, the signatory is signing in their personal capacity

*If this agreement is signed under:

(i) a Power of Attorney – please attach a **Certificate of non-revocation** (available from ADLS: 4098WFP or REINZ); or
(ii) an Enduring Power of Attorney – please attach a **Certificate of non-revocation and non-suspension of the enduring power of attorney** (available from ADLS: 4997WFP or REINZ); or
(iii) where the attorney signs for a trustee, a Certificate in the relevant form in Schedule 4 to the Trustee Act 1956.

Also insert the following wording for the Attorney's Signature above:
Signed for [full name of the donor] by his or her Attorney [attorney's signature].

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BEFORE SIGNING THE AGREEMENT

- Note: the purchaser is entitled to a copy of any signed offer at the time it is made.
- It is recommended both parties seek professional advice before signing. This is especially so if:
  - there are any doubts. Once signed, this will be a binding contract with only restricted rights of termination.
  - the purchaser is not a New Zealand citizen. There are strict controls on the purchase of a property in New Zealand by persons who are not New Zealand citizens.
  - property such as a hotel or a farm is being sold. The agreement is designed primarily for the sale of residential and commercial property.
  - the property is vacant land in the process of being subdivided or there is a new unit title or cross-lease to be issued. In these cases additional clauses may need to be inserted.
  - there is any doubt as to the position of the boundaries.
  - the purchaser wishes to check the weathertightness and soundness of construction of any dwellings or other buildings on the land.
- Both parties may need to have customer due diligence performed on them by their lawyer or conveyancer in accordance with the Anti-Money Laundering and Countering Financing of Terrorism Act 2009 which is best done prior to the signing of this agreement.
- The purchaser should investigate the status of the property under the Council's District Plan. The property and those around it are affected by zoning and other planning provisions regulating their use and future development.
- The purchaser should investigate whether necessary permits, consents and code compliance certificates have been obtained from the Council where building works have been carried out. This investigation can be assisted by obtaining a LIM from the Council.
- The purchaser should compare the title plans against the physical location of existing structures where the property is a unit title or cross-lease. Structures or alterations to structures not shown on the plans may result in the title being defective.
- In the case of a unit title, before the purchaser enters into the agreement:
  - the vendor must provide to the purchaser a pre-contract disclosure statement under section 146 of the Unit Titles Act;
  - the purchaser should check the minutes of the past meetings of the body corporate, enquire whether there are any issues affecting the units and/or the common property, check the body corporate's long-term maintenance plan and enquire whether the body corporate has imposed or proposed levies for a long-term maintenance fund or any other fund for the maintenance of, or remedial or other work to, the common property.
- The vendor should ensure the warranties and undertakings in clauses 7.0 and 8.0:
  - are able to be complied with; and if not
  - the applicable warranty is deleted from the agreement and any appropriate disclosure is made to the purchaser.
- Both parties should ensure the chattels' list in Schedule 2 is accurate.
- Both parties should seek professional advice regarding the GST treatment of the transaction. This depends upon the GST information supplied by the parties and could change before settlement if that information changes.

THE ABOVE NOTES ARE NOT PART OF THIS AGREEMENT AND ARE NOT A COMPLETE LIST OF MATTERS WHICH ARE IMPORTANT IN CONSIDERING THE LEGAL CONSEQUENCES OF THIS AGREEMENT.

PROFESSIONAL ADVICE SHOULD BE SOUGHT REGARDING THE EFFECT AND CONSEQUENCES OF ANY AGREEMENT ENTERED INTO BETWEEN THE PARTIES.

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AGREEMENT FOR SALE AND PURCHASE OF REAL ESTATE

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DATE:

VENDOR:
Oakville Estate Limited as Trustee of the Oakville Estate Trust
Contact Details:

VENDOR'S LAWYERS:
Firm: Lane Neave
Individual Acting: Chris Anderson
Email: chris.anderson@laneneave.co.nz
Contact Details:
PO Box 2331, Christchurch
Ph: 03 379 3720
Fax: 03 379 8370

Email Address for Service of Notices:
(subclause 1.4)
Vanessa.boyd@laneneave.co.nz

PURCHASER:
Jordan Joyce

Contact Details:
joycebuilt@outlook.co.nz
0224128 1259

PURCHASER'S LAWYERS:
Firm: Steel & Co
Individual Acting: Andy Steel
Email:
Contact Details:
PO Box 753, Christchurch
Ph: 03 366 5169
Fax: 03 366 3061

Email Address for Service of Notices:
(subclause 1.4)
andy@steelandco.co.nz

LICENSED REAL ESTATE AGENT:
Agent's Name: Private Treaty
Manager:
Salesperson:
Contact Details:

Approved for ADLS by Registrar-General of Land under No. 2018/6263

COVENANT INSTRUMENT TO NOTE LAND COVENANT

Sections 116(1)(a) & (b) Land Transfer Act 2017

Registrar-General of Land Approval 2018/6263 ADLS

Covenantor *Surname(s) must be underlined or in CAPITALS.*

Oakville Estate Limited

Covenantee *Surname(s) must be underlined or in CAPITALS.*

Oakville Estate Limited

Grant of Covenant

The Covenantor, being the registered owner of the burdened land(s) set out in Schedule A, **grants to the Covenantee** (and, if so stated, in gross) the covenant(s) set out in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s).

Schedule A *Continue in additional Annexure Schedule, if required*

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title)	Benefited Land (Record of Title) or in gross
Land Covenant relating to building and land use matters		**Lots 1-4 (inclusive) and 50 DP 547441 (935219-935223)**	**Lots 1-4 (inclusive) and 50 DP 547441 (935219-935223)**

Covenant rights and powers (including terms, covenants and conditions)

Delete phrases in [ ] and insert memorandum number as required; continue in additional Annexure Schedule, if required

The provisions applying to the specified covenants are those set out in:

~~[Memorandum number , registered under section 209 of the Land Transfer Act 2017.]~~

[Annexure Schedule **B**].

REF: 7200 – © AUCKLAND DISTRICT LAW SOCIETY INC. 2018

Annexure Schedule

2015/5049
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Registrar-General of Land

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Continue in additional Annexure Schedule, if required

Annexure Schedule B

Recitals

1. The Covenantor wishes to establish restrictive covenants over each of the lots shown as the Burdened Land in Schedule A for the benefit of all the lots shown as the Benefited Land in Schedule A.

2. Section 56 of the Property Law Act 2007 provides that a Covenantor may convey to itself.

3. Section 278 of the Property Law Act 2007 provides that a covenant for the purposes of or incidental to any conveyance of property made by a Covenantor with itself shall be as valid as if made by another.

4. It is the intent of the Covenantor and Covenantee that the land covenants will be restrictive covenants running pursuant to the time frame recorded within clause 13 herein to bind each of the said lots shown as the Burdened Land in Schedule A for the benefit of all the lots shown as the Benefited Land in Schedule A.

Definitions

5. In these Land Covenants:

5.1 **Accessory Building** means any non attached residential flat, shed or other utility building.

5.2 **Development** means the development located at 29 Pentecost Road, Rangiora including but not limited to the existing and future facilities (if any), roading, access ways, open spaces, trees and all other associated infrastructure of which the property and the development forms part.

5.3 **Developer** means Oakville Estate Limited as Trustee of the Oakville Estate Trust or its assigns or nominee.

5.4 **Dwelling** means one self contained building to be used predominantly for residential activity only by one or more persons who form a single household unit and includes an attached garage.

5.5 **Fence** means:

5.5.1 Any solid structure having a low visual transparency; or

5.5.2 Hedge which is over a height of 600 mm;

which may or may not be erected on any boundary of the Lot with the intent of dividing or creating a barrier between the Lot and any adjoining Lot, legal road or other property.

5.6 **Hedge** means any row of bushes, shrubs or small trees.

5.7 **Lot** means the Lots numbered 1-4 and 50 on the Subdivision Plan being DP 547441 and any further subdivision of these Lots.

If this annexure schedule is used as an expansion of an instrument, all signing parties and either their witnesses or solicitors must sign or initial in this box.

Annexure Schedule

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Continue in additional Annexure Schedule, if required

5.8 **Registered Owner** means the owner of any Lot.

5.9 **Subdivision** means a subdivision of all that land containing approximately 2.1440m^2 being Lot 14 Deposited Plan 529017 and contained in Record of Title 856490 to be completed in a number of stages.

5.10 **Works** means the building, construction or erection of any Dwelling on the Lot and includes any laying out, compacting, excavation, filing, levelling or other works preparatory to the commencement of such building, construction or erection.

NOW THEREFORE The Covenantor as Registered Owner of the Burdened Land set out in Schedule A further covenants for the benefit of the Covenantee as Registered Owner of the Benefited Land set out in Schedule A as follows:

Covenants

6. It is acknowledged that the Development is intended to be a modern, high quality and well designed subdivision to ensure a quality development that is in harmony with the unique surrounding environment. It is therefore desirable that supervision and control be exercised for the protection and in the interest of all Registered Owners of the land in relation to any development of the land. In recognition of these objectives, at all times from the date of this Land Covenant the Registered Owner shall:

6.1 Not erect or carry out any building, fencing (including live hedging), landscaping or any other structure on the Lot (this includes but is not limited to exterior finishes and excavation of foundations) unless the Developer has approved all plans and specifications including the site plan of the Dwelling, Fence, external colour scheme, landscaping or any other structure prior to building commencing in accordance with clause 6.4 below.

6.2 Not further subdivide the Lot without the prior written approval of the Developer. The decision of the Developer shall be final and binding.

6.3 Not grant or allow to be granted any further easements to be registered on any Lot, including any right of way easement, without the prior written approval of the Developer. The decision of the Developer shall be final and binding.

6.4 Submit two sets of all design plans for any Dwelling or Accessory Building, or any other structure, or Fences fronting the road or reserves or waterways. The Dwelling plans required are the elevations, floor plan and site plan and must detail exterior cladding and show lot and DP number. All design plans must be approved by the Developer in writing prior to construction commencing. The design for any Dwelling or Accessory Building or other structure shall be submitted to the Developer at sketch plan stage so that approval for the design can be given prior to the commencement of working drawings. In exercising its discretion the Developer shall take into account the following matters:

6.4.1 The height and positioning of any Dwelling, Accessory Building or structure within the Lot; and

6.4.2 The external appearance of any built structure including any Dwelling, Accessory Building, structure or landscaping.

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6.5 Not erect any Dwelling or Accessory Building of any kind utilising fibro-cement panels and/or second hand materials (apart from good quality used brick and slate which shall be allowed). No relocatable or kitset Dwelling or structures are to be erected without specific written permission from the Developer.

6.6 Not erect any Dwelling which has a roof pitch of less than 26 degrees. Flat and partially flat roof areas may be allowed at the discretion of the Developer. Roof lines should not have one long continuous line. Preference will be for gables and architectural roof lines in lieu of multiple hip roofing.

6.7 Not erect any structure other than one new Dwelling with a minimum floor area, including garage, of not less than 190m^2.

6.8 Not erect any Dwelling or Accessory Building which is more than a single storey on the proposed Lots 5, 6 and 7.

6.9 Not erect any separate stand alone garage (ie not attached to the house).

6.10 Design plans for the Dwelling and Ancessory Buildings that shall have on the exterior street front elevations, architectural features such as a large window, feature chimney, boxed windows, or brick or plastered columns. The Developer reserves the right to approve such plans that do not comply with the above if in the Developer's sole discretion such departure will not adversely effect the Subdivision or the environment.

6.11 Not construct, place or permit any caravan, hut, garage, container or shed or transportable home or other similar structure on the Lot for any kind of permanent or temporary residential use. Additionally, no boat, plant, caravan or vehicle of any unsightly nature is to be allowed or suffered to be brought onto or remain on the Lot and no boat building or other similar activity is to take place on the Lot unless such boat, caravan, vehicle or activity is adequately garaged or screened to prevent viewing from the street frontage or from adjoining Lots and nor shall any such item be located on the road adjacent to the Lot.

6.12 Not use any part of the Lot as a junkyard, metal or scrap metal yard.

6.13 Not permit any rubbish, noxious substances, noxious livestock and/or birds or animals likely to cause nuisance or annoyance to the neighbouring occupiers to accumulate and/or be placed on the Lot, or permit grass and/or weeds to grow to a height exceeding 150mm. All household rubbish bins are to be screened from the road frontage. Appropriate rubbish skips shall be maintained within the Lot for all rubbish and shall be cleared at regular intervals. At no time shall rubbish be permitted to blow outside of the Lot or be permitted to cause an unsightly mess. All rubbish skips must be covered each night to ensure that rubbish is not blown out by high winds.

6.14 Maintain the Lot to a high standard and regularly mow both the grass on the Lot and on any road berm fronting the Lot and trim any boundary weeds or long grass including maintenance of any gardens that maybe planted fronting the Lot.

6.15 Not permit a Dwelling to be occupied until a Code Compliance Certificate has been issued by the relevant Territorial Authority and all driveways, pathways, letterbox and Fences to the Lot boundaries are completed. All unpaved areas that are visible from the road are to be properly grassed or landscaped within three (3) months of the date of occupation of the Dwelling.

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6.16 Not leave the outside of any Dwelling unfinished or any exterior walls or doors unpainted or unstained except where cedar cladding or decorative brick/stone are used.

6.17 Ensure that any Dwellings or Accessory Buildings being built on the Lot have been fully completed within 18 months of the date that Works commenced and no Dwelling or Accessory Building under construction shall be left without substantial Works being carried out for a period exceeding three (3) months.

6.18 Not register a caveat against any Record of Title owned by the Developer which form part of the Subdivision.

6.19 Accept that the Developer reserves the right to reasonably alter or amend the Land Covenants prior to registration.

6.20 Not breach any of the terms of the Waimakariri District Council or Environment Canterbury subdivision consent for the subdivision.

6.21 Not make any submission or objection to the Waimakariri District Council or any other relevant authority against any application made by the Developer in respect of resource consent applications of whatever nature whatsoever for further subdivision.

6.22 Not allow contractors and subcontractors to commence Works on the Lot without first informing them of the restrictions created by these covenants and ensuring their particular compliance therewith of the following:

6.22.1 The reinstatement of and repair of any damage to the proximate footpath and relevant berm crossing.

6.22.2 Ensure that all building site sheds be placed within the relevant Lot. No unloading of materials is permitted onto the footpath or berm areas or neighbouring Lots, walkways, road or reserve. If any damage is caused to such adjoining Lot, road, curbing footpath or berms or landscaped or planted areas or enhancement or architectural feature the Registered Owner will immediately (time being strictly of the essence) at the cost of that Registered Owner, repair and reinstate.

6.22.3 Not, prior to settlement, build, erect or place on the Lot any buildings or Fence without the prior consent of the Developer. Without limiting its discretion the Developer may refuse to approve some landscape designs, fencing and plants of which in its sole opinion have a detrimental effect on another Lot or Lots within the Subdivision now or at a later date.

6.23 Be bound by a Fencing Covenant within the meaning of Section 2 of the Fencing Act 1978.

6.24 Not call upon the Developer to pay for or contribute towards the expense of construction or maintenance of any fence between the Lot and any contiguous land of the Developer PROVIDED HOWEVER that this covenant shall not enure for the benefit of any subsequent owner of the contiguous lot.

6.25 Not to erect or permit to be erected on the Lot any Fence or boundary wall:

6.25.1 Within 4.0 m of the legal road boundary except on any Lot which has frontage to two public roads in which instance the fencing on the secondary road frontage will be permitted on the boundary. All street front fencing shall be of similar materials to the dwelling and may include "piers" with infill

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timber panels. All road frontages, right of way frontages, boundaries fronting a public reserve or waterway Fences that are in view of the public, must be painted or stained. Approval of Fence design may be declined at the Developer's sole discretion if the planned fencing is seen to potentially cause detriment to the Subdivision. On boundaries fronting a public reserve or waterway preference shall be given to some open style fencing on the reserve boundary.

6.25.2 On the internal boundaries (being boundaries not fronting a road or right of way) of a height greater than 2 metres above the finished ground level or of materials other than new timber. All internal boundary Fences shall be constructed in the form of a paling Fence and timber capping. Colour steel fencing may be approved at the sole discretion of the Developer.

6.26 Not plant or permit to grow any live hedge comprising of pinus radiata or cedrus macrocarpa trees.

6.27 Acknowledge that all approvals and/or consents required from the Developer shall be given or refused in the sole absolute and unfettered discretion of the Developer subject to the Developer reserving its right to approve requests for one party without creating any form of precedent to another party. Further the Developer may refuse an identical request from another party without having to give reasons.

6.28 Not allow livestock, poultry, reptiles or animals of any kind or size to be raised, bred or kept on any Lot or in any Dwelling or Accessory Building; provided however that up to two dogs, two cats or other common domesticated household pets that are not dangerous or annoying may be raised and reside, provided such pets are not kept, bred or maintained for any commercial purposes. Such permitted pets shall be kept on the owner's Lot however dogs shall not be allowed off the Registered Owner's Lot except under controlled supervision. Any dog which in whole or in part, resembles any of the pit bull terrier, the Japanese Tosa, the Dogo Argentino or the Fila Brasilero breeds and any other potentially aggressive or noisy breed of animal is expressly prohibited. No permitted pet shall be allowed to make noise in a manner or of such volume as to annoy or disturb other Registered Owners. Any Registered Owner who allows or keeps a pet on their Lot is responsible for any loss or liability of any kind arising from the keeping of such pet.

7. No Objection

7.1 The Registered Owner agrees that the Registered Owner shall not oppose, object to, frustrate or take any action of any kind, or encourage or cause others to oppose, object to, frustrate or take any action of any kind, that might in any way prevent or hinder the Developer from progressing and completing the Subdivision or Development including but not limited to effecting any zone change and/or subdivision and/or resource consents including providing any easements over the Lot or other Lots shown or in favour of neighbouring lots required by the Developer or any of its associated companies or by any relevant Territorial Authority.

8. Enforcement

8.1 The Developer shall not be required or obliged to enforce all or any of the covenants, stipulations and restrictions contained in this instrument nor be liable to the Registered Owners for any breach thereof by any of the Registered Owners from time to time of the other Lots that comprise the Subdivision.

9. Indemnity

9.1 The Registered Owner covenants that the Registered Owner will at all times save harmless and keep indemnified the Developer from all proceedings, costs, claims and demands in respect of breaches by the

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Registered Owner of any of the stipulations, restrictions and covenants contained in the preceding clauses.

10. **Default Provisions**

10.1 The Registered Owner shall not allow or cause any breach or non-observance of any of the foregoing covenants (and without prejudice to any other remedies available at law to the Developer or Covenantor to any other liability which the Registered Owner may have to any person having the benefit of this covenant) and the Registered Owner will on written demand being made by the Developer or any of the Registered Owners of the Benefited Land as described in Schedule A herein:

10.1.1 Pay to the person making such demand liquidated damages in the sum of One Hundred Dollars ($100.00) per day for every day that such breach or non-observance continues after the date upon which written demand has been made; and

10.1.2 Remove or cause to be removed from the Lot any Dwelling, Accessory Building, Fence or other structure erected or placed on the Lot in breach or non-observance of the above covenants; or

10.1.3 Replace any building materials used in breach or non-observance of the above covenants; and

10.1.4 Repair or reinstate any damage done to the Lots as a result of any breach or non-observance of these covenants.

11. **Arbitration**

11.1 Except as relates to the exercise of any discretion, opinion or consent requested of the Developer under these covenants, and without prejudice to the enforcement of the provisions of this document, if any dispute arise between or among the parties concerning the covenants above, then the parties shall enter into negotiations in good faith to resolve their dispute.

11.2 If the dispute is not resolved within twenty (20) working days from the date on which the parties begin their negotiations then the parties shall submit to the arbitration of an independent arbitrator appointed jointly by the parties. If the parties agree, that person appointed may act as a expert and not an arbitrator.

11.3 If an arbitrator cannot be agreed upon within a further ten (10) working days then and an independent arbitrator will be appointed by the President for the time being of the Canterbury District Law Society.

11.4 Such arbitration will be determined in accordance with the Arbitration Act 1996 (and its amendments) or any enactment passed in substitution.

12. **Termination of Covenants upon Vesting of Road or Reserve**

12.1 The Subdivision is to be undertaken in a number of stages. Where any survey plan notes that a Lot or Lots or part thereof in any stage of the Subdivision is to be vested in any local authority, territorial authority or the Crown then the Covenantor and the Covenantee consent to such vesting and the covenants herein will automatically cease to have any effect on any such Lot or Lots or part thereof that will vest as road or reserve in any stage of the Subdivision upon the relevant survey plan being approved as to survey by Land Information New Zealand.

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13. **Expiry**

13.1 The covenants contained herein shall cease to have any force and effect on 31 December 2029. Such cessation shall be without prejudice to any rights accruing for any antecedent breach of the covenants.

If this annexure schedule is used as an expansion of an instrument, all signing parties and either their witnesses or solicitors must sign or initial in this box.

WAIMAKARIRI DISTRICT COUNCIL

23 November 2020

Our Reference: BC201209.01

Jordan A Joyce
C/- VIP Design Limited
158 Maces Road
Christchurch 8062

Dear Sir/Madam

PROJECT INFORMATION MEMORANDUM

Please find enclosed your Project Information Memorandum in respect of the proposed work at 4 Goldie Drive RANGIORA.

Prior to **commencing building work**, the applicant must ensure that a Building Consent has been applied for and issued and that any "authorisations" have been obtained and any conditions of the PIM have been verified.
These include:

RC185198 – Consent notices
The following consent notices are registered on the record of title for **Lot 14**:

- **Minimum Finished Floor Level**
  The Consent Holder shall ensure that the minimum floor level of any habitable dwelling erected on Lots 9 – 14 shall have a minimum floor level of 400mm above the combined 0.5% Annual Exceedance Probability local flood and 0.5% Ashley River break out event.
- **Geotechnical**
  Prior to a dwelling being established on Lots 9 – 14 the Consent Holder shall engage a Geotechnical Chartered Professional Engineer with relevant experience in residential development to undertake a shallow geotechnical investigation in accordance with NZS 3604:2011 and/or MBIE's guidelines to confirm the local bearing capacity and prepare foundation designs. The investigation shall be in accordance with the Technical Category of the Lot.

Building Location Certificate
The applicant is made aware that as the Resource Consent for this subdivision requires a minimum finished floor level to be achieved, a building location certificate may be required during the Building Consent process and all levels are to refer back to a fixed Benchmark Datum located in the paved areas.

Vehicle Crossing – Urban
This property has been identified as requiring a new vehicle crossing. **A formal Vehicle Crossing application will need to be submitted (along with a $160.00 processing fee) for approval and established prior to the erection of a dwelling or other significant building.** (Rule 3.2, Waimakariri District Council Vehicle Crossing Bylaw 2007). Note that a legal and compliant vehicle crossing will need to be established (in accordance with WDC Engineering Code of Practice **DWG 600-211** (Urban). Resource Consent approval **will** need to be sought if the location of the proposed vehicle crossing cannot be **located within 1m or greater than 7m** to the adjacent vehicle crossing. The minimum width must

be no less than 4mtrs and the maximum width must be no greater than 6mtrs. (Waimakariri District Plan Rule 30.6.1.19). **Any person who begins work on a vehicle crossing without first receiving a vehicle crossing permit from the Council commits an offence against this bylaw.** (Rule 4.4 Waimakariri District Council Vehicle Crossing Bylaw 2007)

The approval plan along with any Development Contribution notification or Resource Consent Certificate (where applicable) attached to this Project Information Memorandum must be included with the Building Consent for the project (when issued). Any significant departure from the original plans may require that a new Project Information Memorandum be issued.

Yours faithfully

Joanna Eckersley
PIMs Officer

Project Information Memorandum

Sections 31-38, Building Act 2004

Application

J A Joyce 77 Fullers Road RD 1 Kaiapoi 7691	No.	BC201209.01
	Issue date	23 November 2020
	Received date	6 November 2020
	Responsible Officer	Joanna Eckersley

Project

Description	SPLIT LEVEL DWELLING WITH ATTACHED GARAGE
Intended Life	Indefinite (50+)
Intended Use	Residential Dwelling
Estimated Value	$400000.00
Location	4 Goldie Drive RANGIORA
Legal Description	LOT 14 DP 553457 0.065500 Ha
Valuation No.	2166000110

This project information memorandum is confirmation that the proposed building work may be undertaken, subject to the provisions of the Building Act 2004, and any requirements of the building consent.

This project information memorandum includes:

___ Information identifying special features of the land concerned
___ Information about the land or building concerned notified to the Council by any statutory organisation having the power to classify land or buildings
___ Details of relevant utility systems
___ Details of authorisations which have been granted
___ Notification of any other authorisations which must be obtained before the proposed building work may be undertaken
___ Important information

All boundary survey pegs are to be located by discovery or redefinition and flagged before work is commenced.
A current copy of the certificate of title is to be submitted with the building consent application.
The certificate of title may make reference to land covenants - a copy of which should be submitted with the Building Consent application.
No part of the structure is to exceed the Councils recession plane.

4 Project Information Memorandum [continued]

This project Information Memorandum does not purport to be a full report on every aspect of the property which is likely to be relevant to the building works proposed. It is information that is known to the Council at the date of the issue of this memorandum. It is issued pursuant to Sections 30-39 of the Building Act 2004.

INFORMATION IDENTIFYING RELEVANT SPECIAL FEATURES OF THE LAND
Wind Zone High
Snow Zone 4
Earthquake Zone 2
This building project is located approximately 27m above mean sea level
The AMSL is given for snow loading only and not to be used as datum for minimum floor levels or other design purposes.

Comments:
Minimum Finished Floor Level
The Consent Holder shall ensure that the minimum floor level of any habitable dwelling erected on Lot 14 shall have a minimum floor level of 400mm above the combined 0.5% Annual Exceedance Probability local flood and 0.5% Ashley River break out event.

Attachments:
Nil

INFORMATION ABOUT THE LAND OR BUILDINGS NOTIFIED TO THE COUNCIL BY ANY STATUTORY ORGANISATION HAVING THE POWER TO CLASSIFY LAND OR BUILDINGS
Environment Canterbury (Canterbury Regional Council)

Comments:
Environment Canterbury (Canterbury Regional Council) Liquefaction hazard study
The shading on the enclosed ECAN liquefaction study map identifies areas where liquefaction assessment is needed and where a site specific geotechnical investigation and report is required as part of a Building Consent application.

Installing a Woodburner / solid Fuel Burner, or other forms of heating in your home.
The applicant is advised to check with Environment Canterbury (Canterbury Regional Council) as to what type of fire if any may be installed into your proposed dwelling, this is determined by the Clean Air Zones. Tel: 0800324636 – This property is located **within the Clean Air Zone**

Attachments:
ECan liquefaction hazard map

DETAILS OF RELEVANT UTILITY SYSTEMS (administered by the Waimakariri District Council)
PLEASE NOTE:
It is the applicant's responsibility to locate all service laterals prior to commencing any building work. If further information is required on any of the services please contact the Waimakariri District Council Utilities Department on 0800965468

Sewer

Is a connection to a public sewer scheme available?	Yes
If yes, which public sewer scheme?	Eastern District
Is the property already connected?	Yes

Comments:
Connect to the service lateral provided in compliance with conditions of the Resource Consent for this development

The reticulation shall gravitate to the existing main located in **Goldie Drive**. The reticulation design shall incorporate the following minimum requirements:

5 Project Information Memorandum [continued]

a) The shared lateral between the road boundary and the sewer main (into which the shared lateral discharges) shall be verified for grade related capacity and condition.
b) If lateral grade related capacity in (a) above is not satisfactory, then the sub divider shall install a new lateral within the road reserve to connect to the public main.
c) The minimum grade for this shared lateral within the road reserve shall be a minimum of 1 in 80.

Notes:
Sewer connections must be installed by registered drainlayers. It is the property owner's responsibility to arrange connections. New connections to sewer mains must be inspected and approved by the Council prior to backfilling.
A trench opening permit is required to open a footpath or street.
A Capital charge is payable where the property has not previously paid sewer rates.

Water

Is a connection to a public water supply available?	Yes
If yes, which public water supply?	Rangiora
Is the property already connected?	Yes

Comments:
Connect to the service lateral provided in compliance with conditions of the Resource Consent for this development

Notes:
Water connections to property boundaries are installed by the Council after the receipt of charges payable.
A capital charge is payable where the property has not previously paid water rates.

Stormwater

Is a connection to a public drainage system available?	Yes
Is the property already connected?	Yes

Discharge point: Kerb & channel

Comments:
Connect to the service lateral provided in compliance with conditions of the Resource Consent for this development

Notes:
Stormwater connections must be installed by registered drainlayers. It is the property owner's responsibility to arrange connection. New connections to drainage systems must be inspected and approved by the Council prior to backfilling.
A trench opening permit is required if crossing a footpath.
A Capital charge is payable where the property has not previously paid urban drainage rates.

Attachments
"As Built" services plan

DETAILS OF AUTHORISATIONS THAT HAVE BEEN GRANTED
Resource Consent

Comments:
RC185198 – Stage 2 of 23 lot residential subdivision – 224c & consent notices issued
RC205157 – Variation to RC185198 deleting condition 22 (vehicle access)

Attachments:
RC185198 Consent notices
RC205157 Decision

6 Project Information Memorandum [continued]

DETAILS OF AUTHORISATIONS THAT MUST BE OBTAINED BEFORE BUILDING CAN COMMENCE:
Minimum Finished Floor level
Geotechnical
Vehicle crossing permit

Comments:
Minimum Finished Floor Level
The Consent Holder shall ensure that the minimum floor level of any habitable dwelling erected on Lot 14 shall have a minimum floor level of 400mm above the combined 0.5% Annual Exceedance Probability local flood and 0.5% Ashley River break out event.

Geotechnical
Prior to a dwelling being established on Lot 14 the Consent Holder shall engage a Geotechnical Chartered Professional Engineer with relevant experience in residential development to undertake a shallow geotechnical investigation in accordance with NZS 3604:2011 and/or MBIE's guidelines to confirm the local bearing capacity and prepare foundation designs. The investigation shall be in accordance with the Technical Category of the Lot.

Vehicle Crossing – Urban
This property has been identified as requiring a new vehicle crossing. **A formal Vehicle Crossing application will need to be submitted (along with a $160.00 processing fee) for approval and established prior to the erection of a dwelling or other significant building.** (Rule 3.2, Waimakariri District Council Vehicle Crossing Bylaw 2007). Note that a legal and compliant vehicle crossing will need to be established (in accordance with WDC Engineering Code of Practice **DWG 600-211** (Urban). Resource Consent approval **will** need to be sought if the location of the proposed vehicle crossing cannot be **located within 1m or greater than 7m** to the adjacent vehicle crossing. The minimum width must be no less than 4mtrs and the maximum width must be no greater than 6mtrs. (Waimakariri District Plan Rule 30.6.1.19). **Any person who begins work on a vehicle crossing without first receiving a vehicle crossing permit from the Council commits an offence against this bylaw.** (Rule 4.4 Waimakariri District Council Vehicle Crossing Bylaw 2007)

Attachments:
Vehicle crossing application form

DETAILS OF VEHICLE CROSSING (ENTRANCEWAY), TYPE OF FRONTAGE AND TRENCH OPENING PERMIT

Vehicle Crossing (Entranceway)
Is formation of a vehicle crossing from road edge to property boundary required? Yes
Type of access required: DWG 600-211 (Urban)

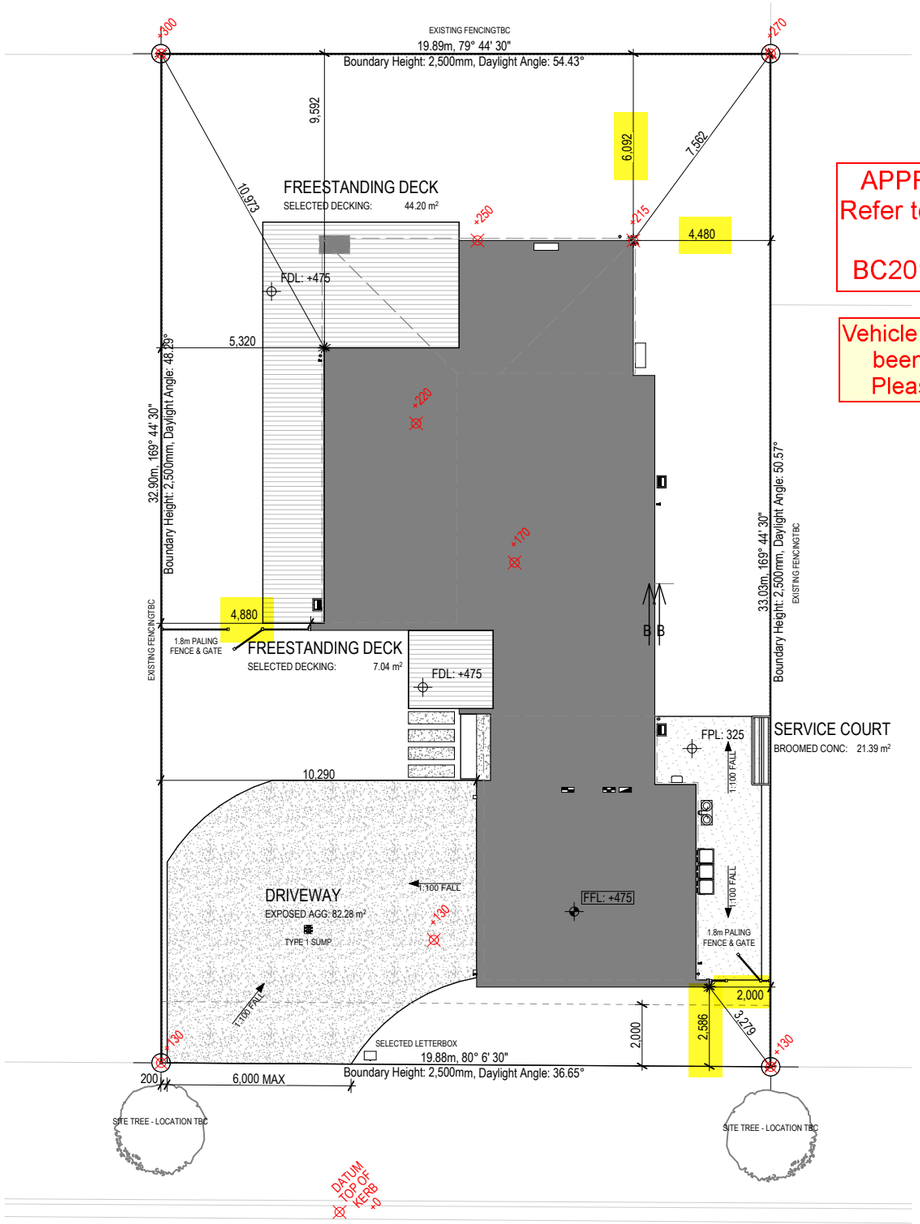
Advice Notes

n/a

This project information memorandum is confirmation that the proposed building work may be undertaken subject to the provisions of the Building Act 2004 and any requirements of the building consent **Not yet Approved**.

Signed for and on behalf of the Council:

Name: **Joanna Eckersley** **Date: 23/11/2020**



APPROVED PIM APPLICATION
Refer to PIM report for conditions of this application
BC201209 20/11/2020 joannae

Vehicle crossing separation compliance has not been checked as part of this assessment. Please refer to District Plan Rule 30.6.1.19

DEVELOPMENT INFOMATION

OVER FRAMING (GF)	:	190.02 m²	
OVER FRAMING (FF)	:	44.74 m²	
TOTAL FLOOR AREA	:	234.76 m²	
OVER FOUNDATION	:	192.91 m²	
SITE COVERAGE AREA	:	215.79 m²	
SITE AREA	:	655m²	
SITE COVERAGE	:	32.95%	(35% PERMITTED)
IMPERVIOUS SURFACE AREA	:	103.67 m²	(EXCLUDING DWELLING & GARAGE)

TOPOGRAPHICAL INFOMATION

EARTHQUAKE ZONE	:	2
WINDZONE	:	HIGH
SNOW ZONE	:	N4 : 1kPa
EXPOSURE ZONE	:	B

SITE INFOMATION

TERRITORIAL AUTHORITY	:	WAIMAKARIRI DISTRICT COUNCIL
PLANNING ZONE	:	RESIDENTIAL 2
HISTORICAL INTEREST	:	N/A
NATURAL HAZARDS	:	N/A
INTERIM FLOOR LEVEL	:	N/A
TC CATEGORY	:	TC1
FOUNDATION TYPE	:	NZS 3604:2011 SINGLE POUR SLAB & PERIMETER FOUNDATION.
BOUNDARY INFO	:	AS PER LT 553457
SITE LEVELS	:	OBTAINED
SITE INFO	:	LOCATIONS OF ROAD CROSSINGS, SERVICES LOCATIONS, STREET TREES, LAMP POSTS, PARKING BAYS, PEDESTRIAN ISLANDS ETC TBC
LANDSCAPING	:	INDICATIVE ONLY
NON COMPLIANCES	:	N/A
DEVELOPER APPROVAL	:	ROOF PITCH UNDER 26° REQUIRES APPROVAL

GENERAL NOTES

STEPS	:	A STEP/S OR APPROPRIATE LANDSCAPING IS TO BE PROVIDED IF DROP FROM EXTERNAL DOORS IS GREATER THAN 190mm FROM FFL TO FGL
PAVED AREAS	:	ALL ACCESS ROUTES MUST PROVIDE A NON-SLIP SURFACE IN ACCORDANCE TO NZBC D1/AS1 TABLE 2 CONVEY SURFACE WATER FROM SEALED DRIVE TO AN APPROPRIATE APPROVED OUTFALL
DECKS	:	TIMBER DECK AREAS ARE TO BE FREESTANDING ELEMENTS - NOT CONNECTED TO MAIN BUILDING & UNDER 1.5m IN HEIGHT. THEREFORE THESE ARE EXEMPT FROM BUILDING CONSENT APPLICATION AS PER THE BUILDING ACT 2004, SCHEDULE 1. DECK & STEPS ARE HOWEVER ARE TO BE CONSTRUCTED IN FULL ACCORDANCE WITH NZBC D1/AS1 4.1.1, 4.1.8, 6.0 & FIG. 26 AND NZBC SIMPLE HOUSE SH/AS1 SECTION 3.4

SITE LEVEL NOTES

DATUM	:	TOP OF KERB

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ARCHITECTURAL DESIGNERS
PHONE: 027 313 0880
EMAIL: admin@vipdesign.co.nz
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KEY	SYMBOL
METER BOARD	
DISTRIBUTION BOARD	
COMMS PANEL	
GULLY TRAP	
HOSE TAP	
DOWNPIPE	
INT HEAT PUMP	
EXT HEAT PUMP	
GAS BOTTLES	
GAS METER	
GAS CALIFONT	
SETOUT LINE	

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

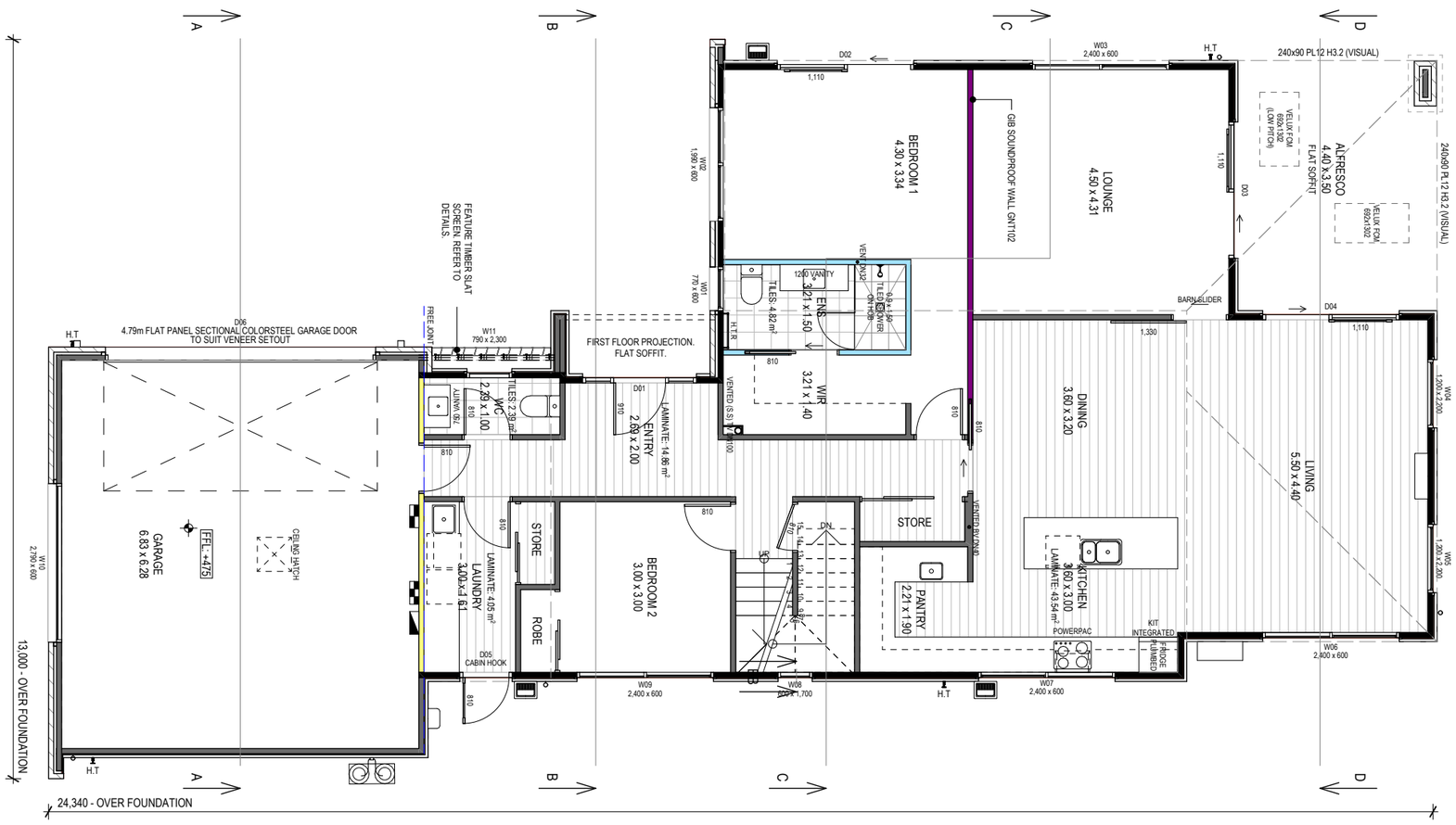
29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE: CONSENT ISSUE	**VERSION:** 1.2A
DATE: 13.10.2020	**SCALE:** 1:200

A1.01
SITE PLAN

APPROVED PIM APPLICATION
Refer to PIM report for conditions of this application
BC201209 20/11/2020 joannae



ENVELOPE NOTES

WALL CLADDING : 50mm SPECIALISED AAC PANEL ON 20mm CAVITY
10 SERIES BLOCK VENEER ON 50mm CAVITY, STACK BOND

ROOF CLADDING : COLORSTEEL LONGRUN TRIMLINE

CONSTRUCTION NOTES

ENGINEERING : N/A

EXTRAS : BACK TO WALL BATH
PLUMBED FRIDGE
KIT INTERGRATED FRIDGE
FEATURE TIMBER SLAT SCREEN
GARAGE DOOR TO SUIT BLOCK VENEER
X3 VELUX SKYLIGHTS
SOUND PROOFING TO BED 1 (LOUNGE TO BED WALL)

GENERAL NOTES

ROOF PITCH : 40°, 3°
EAVE WIDTH : 70mm (TO SUIT CLADDING)
GABLE WIDTH : 70mm (TO SUIT CLADDING)
PITCHING HEIGHT : 2455mm TO GF
HEEL HEIGHT : 300mm TO 3 DEGREE TRUSSES
300mm TO BED 4 & GF ROOF APART FROM GARAGE
LINTEL HEIGHT : 2200mm GENERAL
2100mm TO W01 & W02 (TO SUIT VENEER)
2300mm TO GARAGE DOOR & W11 (TO SUIT VENEER)
1900mm TO BED 3, BED 4 (INCLUDING ROBES)
3300mm TO STAIR
1600mm TO KITCHEN
SOFFIT TYPE : FLAT

RAKING CEILING : ATTIC TRUSSES @ 900mm CRS TO FF (190mm TOP CHORD, 240mm BOTTOM CHORD)
RAISED CEILING : N/A

DOOR LEAF HEIGHT : O/H : 2200mm, STANDARD TO FF (1900mm TO ROBE SLIDERS)

GENERAL NOTES

HEATING : HEAT PUMP LOCATED AS SHOWN

VENTILATION : REFER TO ELECTRICAL PLAN FOR PATH AND METHODS.

SMOKE ALARMS : REQUIRED WITHIN 3m OF ALL SLEEPING AREAS, OR A CHANGE IN LEVEL & ENTRY/EXITS AS PER NZS 4514 & BRANZ BULLETIN NO.606

FLOORING : ALL HARD FLOOR FINISHES TO COMPLY WITH NZBC D1/AS TABLE 2 FLOOR TILES TO BE NON-SLIP & HAVE A SLIP COEFFICIENT VALUE OF 0.35 - 0.65 FOR GRIT FINISHED CERAMIC TILES

WET AREAS : SATIN ENAMEL WALL FINISH TO BATHROOMS & WALLS NEXT TO SINKS
IMPERVIOUS LINING TO BE USED ABOVE BASINS, VANITIES & BENCHES
SEAL BOTTOM EDGE WITH MOULD RESISTANT SEALANT

WATER PROOFING : SELECTED WATERPROOFING MEMBRANE REQUIRED TO BATHROOMS & REBATED/LEVEL ACCESS SHOWERS

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KEY	SYMBOL
METER BOARD	
DISTRIBUTION BOARD	
COMMS PANEL	
GULLY TRAP	
HOSE TAP	
DOWNPIPE	
INT HEAT PUMP	
EXT HEAT PUMP	
GAS BOTTLES	/
GAS METER	
GAS CALIFONT	

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

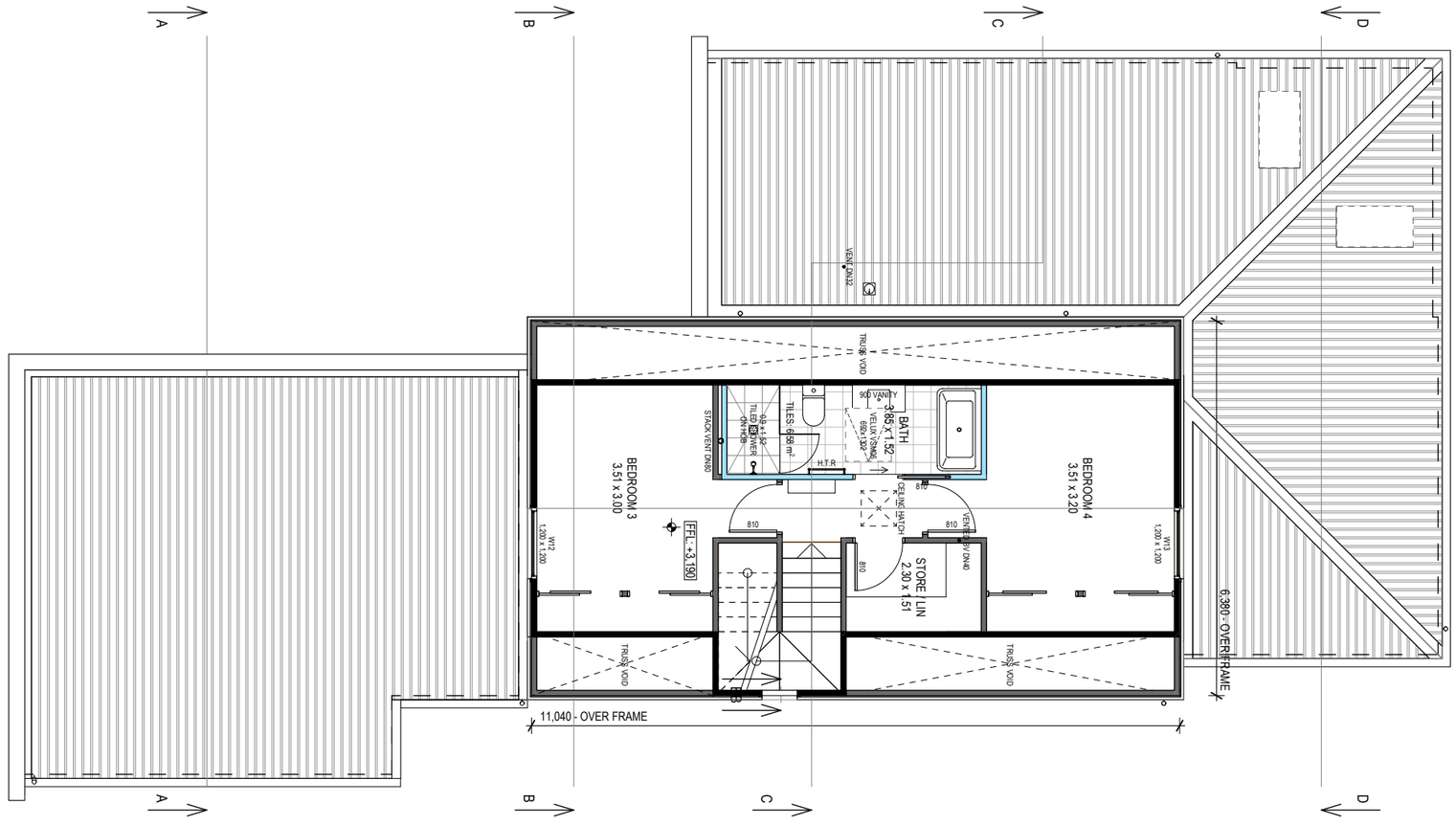
DRAWING DETAILS:

STAGE:	VERSION:
CONSENT ISSUE	1.2A
DATE:	**SCALE:**
13.10.2020	1:100

A2.01

FLOOR PLAN : GF

APPROVED PIM APPLICATION
Refer to PIM report for conditions of this application
BC201209 20/11/2020 joannae



ENVELOPE NOTES

WALL CLADDING	:	50mm SPECIALISED AAC PANEL ON 20mm CAVITY 10 SERIES BLOCK VENEER ON 50mm CAVITY, STACK BOND
ROOF CLADDING	:	COLORSTEEL LONGRUN TRIMLINE

CONSTRUCTION NOTES

ENGINEERING	:	N/A
EXTRAS	:	BACK TO WALL BATH PLUMBED FRIDGE KIT INTERGRATED FRIDGE FEATURE TIMBER SLAT SCREEN GARAGE DOOR TO SUIT BLOCK VENEER X3 VELUX SKYLIGHTS SOUND PROOFING TO BED 1 (LOUNGE TO BED WALL)

GENERAL NOTES

ROOF PITCH	:	40°, 3°
EAVE WIDTH	:	70mm (TO SUIT CLADDING)
GABLE WIDTH	:	70mm (TO SUIT CLADDING)
PITCHING HEIGHT	:	2455mm TO GF
HEEL HEIGHT	:	300mm TO 3 DEGREE TRUSSES 300mm TO BED 4 & GF ROOF APART FROM GARAGE
LINTEL HEIGHT	:	2200mm GENERAL 2100mm TO W01 & W02 (TO SUIT VENEER) 2300mm TO GARAGE DOOR & W11 (TO SUIT VENEER) 1900mm TO BED 3, BED 4 (INCLUDING ROBES) 3300mm TO STAIR 1600mm TO KITCHEN
SOFFIT TYPE	:	FLAT
RAKING CEILING	:	ATTIC TRUSSES @ 900mm CRS TO FF (190mm TOP CHORD, 240mm BOTTOM CHORD)
RAISED CEILING	:	N/A
DOOR LEAF HEIGHT	:	O/H : 2200mm, STANDARD TO FF (1900mm TO ROBE SLIDERS)

GENERAL NOTES

HEATING	:	HEAT PUMP LOCATED AS SHOWN
VENTILATION	:	REFER TO ELECTRICAL PLAN FOR PATH AND METHODS.
SMOKE ALARMS	:	REQUIRED WITHIN 3m OF ALL SLEEPING AREAS, OR A CHANGE IN LEVEL & ENTRY/EXITS AS PER NZS 4514 & BRANZ BULLETIN NO.606
FLOORING	:	ALL HARD FLOOR FINISHES TO COMPLY WITH NZBC D1/AS TABLE 2 FLOOR TILES TO BE NON-SLIP & HAVE A SLIP COEFFICIENT VALUE OF 0.35 - 0.65 FOR GRIT FINISHED CERAMIC TILES
WET AREAS	:	SATIN ENAMEL WALL FINISH TO BATHROOMS & WALLS NEXT TO SINKS IMPERVIOUS LINING TO BE USED ABOVE BASINS, VANITIES & BENCHES SEAL BOTTOM EDGE WITH MOULD RESISTANT SEALANT
WATER PROOFING	:	SELECTED WATERPROOFING MEMBRANE REQUIRED TO BATHROOMS & REBATED/LEVEL ACCESS SHOWERS

BC201209

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HOSE TAP	
DOWNPIPE	
INT HEAT PUMP	
EXT HEAT PUMP	
GAS BOTTLES	/
GAS METER	
GAS CALIFONT	

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE: CONSENT ISSUE	**VERSION:** 1.2A
DATE: 13.10.2020	**SCALE:** 1:100

A2.02

FLOOR PLAN : FF

PROPOSED BUILDING R VALUES

ROOF	:	COLORSTEEL TRIMLINE ON 70x45mm H1.2 PURLINS @ 900mm CRS ON SELF-SUPPORTING ROOF UNDERLAY OVER PRE-FABRICATED TRUSSES @ 900mm CRS WITH R3.6 INSULATION
CONSTRUCTION R VALUE	:	**3.23**
WALLS	:	90 SERIES BLOCK VENEER ON 20mm CAVITY, 90x45 H1.2 SG8 FRAMING @ 400mm CRS, DWANGS @ 400mm CRS, 10mm STANDARD PLASTERBOARD WITH R2.6 INSULATION
CONSTRUCTION R VALUE	:	**2.27**
		50mm SPECIALIZED AAC PANEL ON 20mm CAVITY, 90x45 H1.2 SG8 FRAMING @ 600mm CRS, DWANGS @ 800mm CRS, 10mm STANDARD PLASTERBOARD WITH R2.6 INSULATION
CONSTRUCTION R VALUE	:	**2.80**
FLOOR	:	FLOOR SLAB ON GRADE (NZS 3604:2011 SINGLE POUR SLAB & PERIMETER FOUNDATION.)
CONSTRUCTION R VALUE	:	**1.37**
EXTERIOR JOUNERY	:	DOUBLE GLAZING (TOTAL GLAZING <30%)
CONSTRUCTION R VALUE	:	**0.26**

APPROVED PIM APPLICATION
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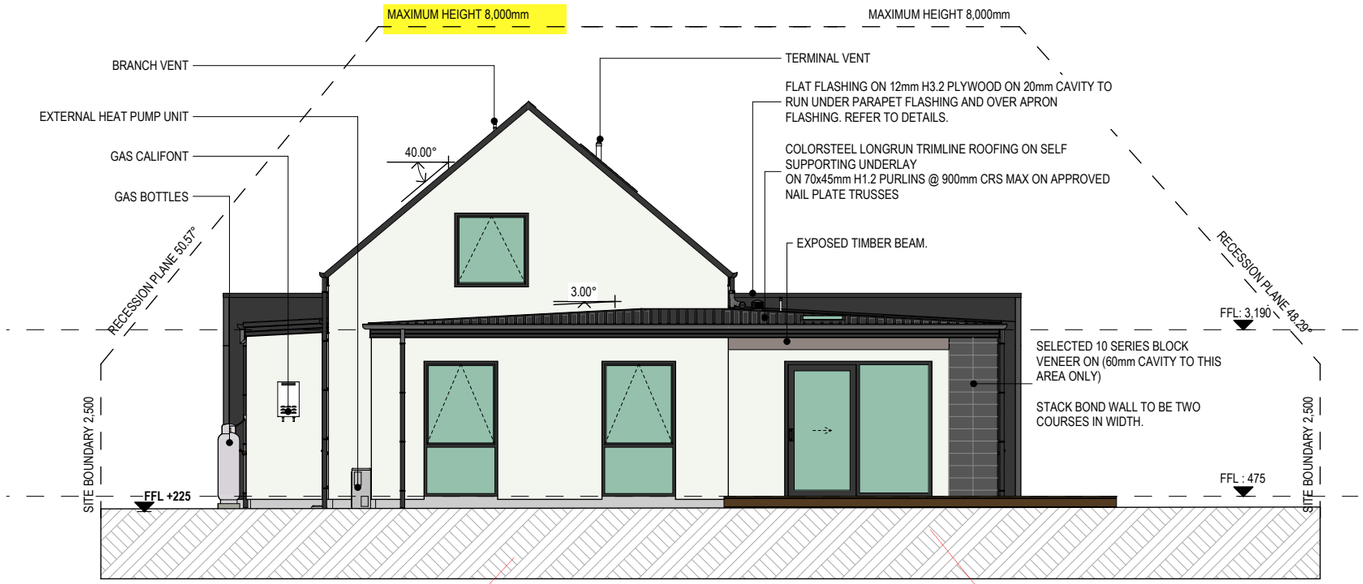
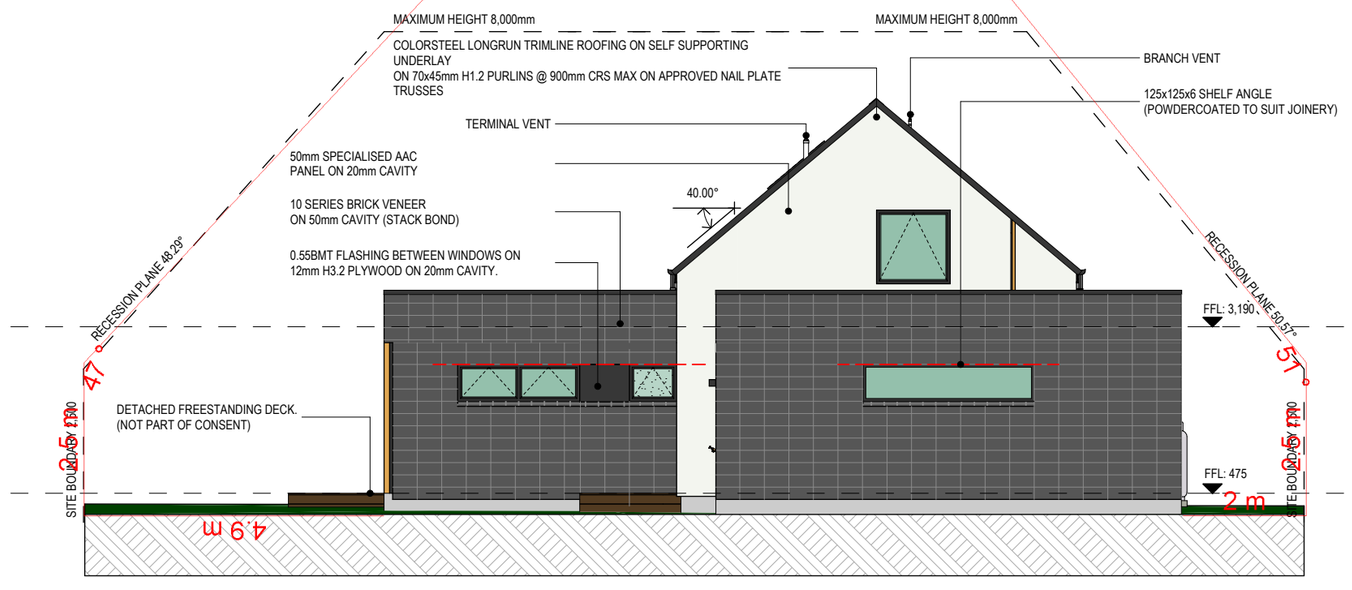
BC201209 20/11/2020 joannae

BUILDING ENVELOPE RISK MATRIX		
NORTH ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	High risk	3
Deck design	Low risk	0
Total Risk Score:		**13**



DRAWING : NORTH ELEVATION
1:100

BUILDING ENVELOPE RISK MATRIX		
SOUTH ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**



DRAWING : SOUTH ELEVATION
1:100

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29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

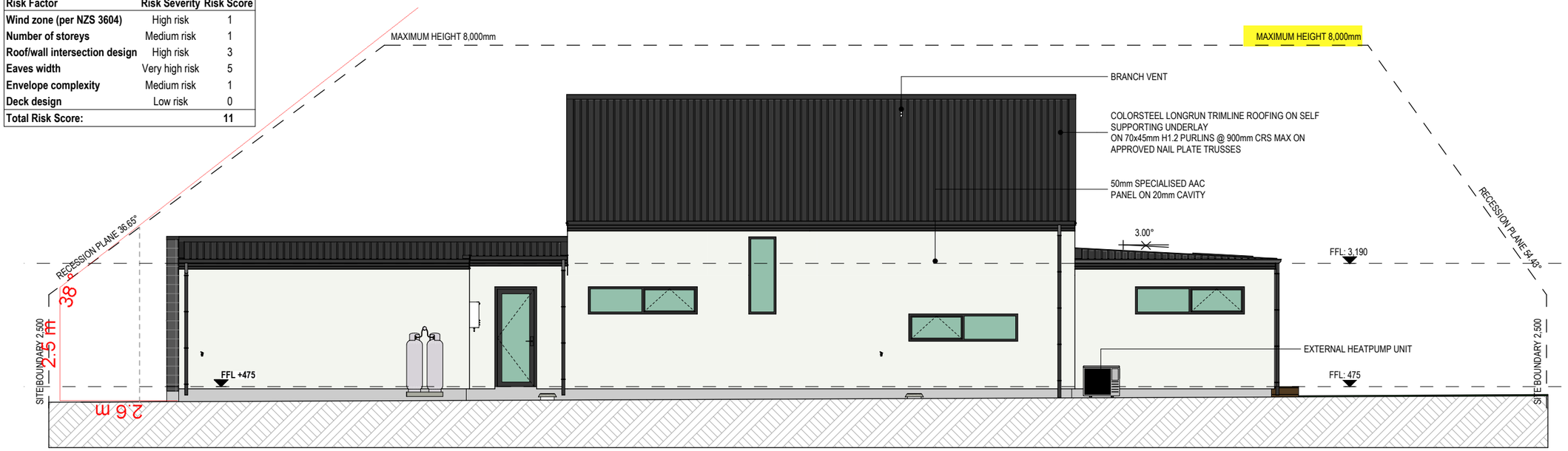
STAGE: CONSENT ISSUE	**VERSION:** 1.2A
DATE: 13.10.2020	**SCALE:** 1:100

A3.01
ELEVATIONS

CONSENT ISSUED BC201209 - Page 78 of 689

BC201209

BUILDING ENVELOPE RISK MATRIX		
EAST ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**



DRAWING : EAST ELEVATION

1:100

APPROVED PIM APPLICATION
Refer to PIM report for conditions of this application
BC201209 20/11/2020 joannae

BUILDING ENVELOPE RISK MATRIX		
WEST ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**

DRAWING : WEST ELEVATION

1:100

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PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

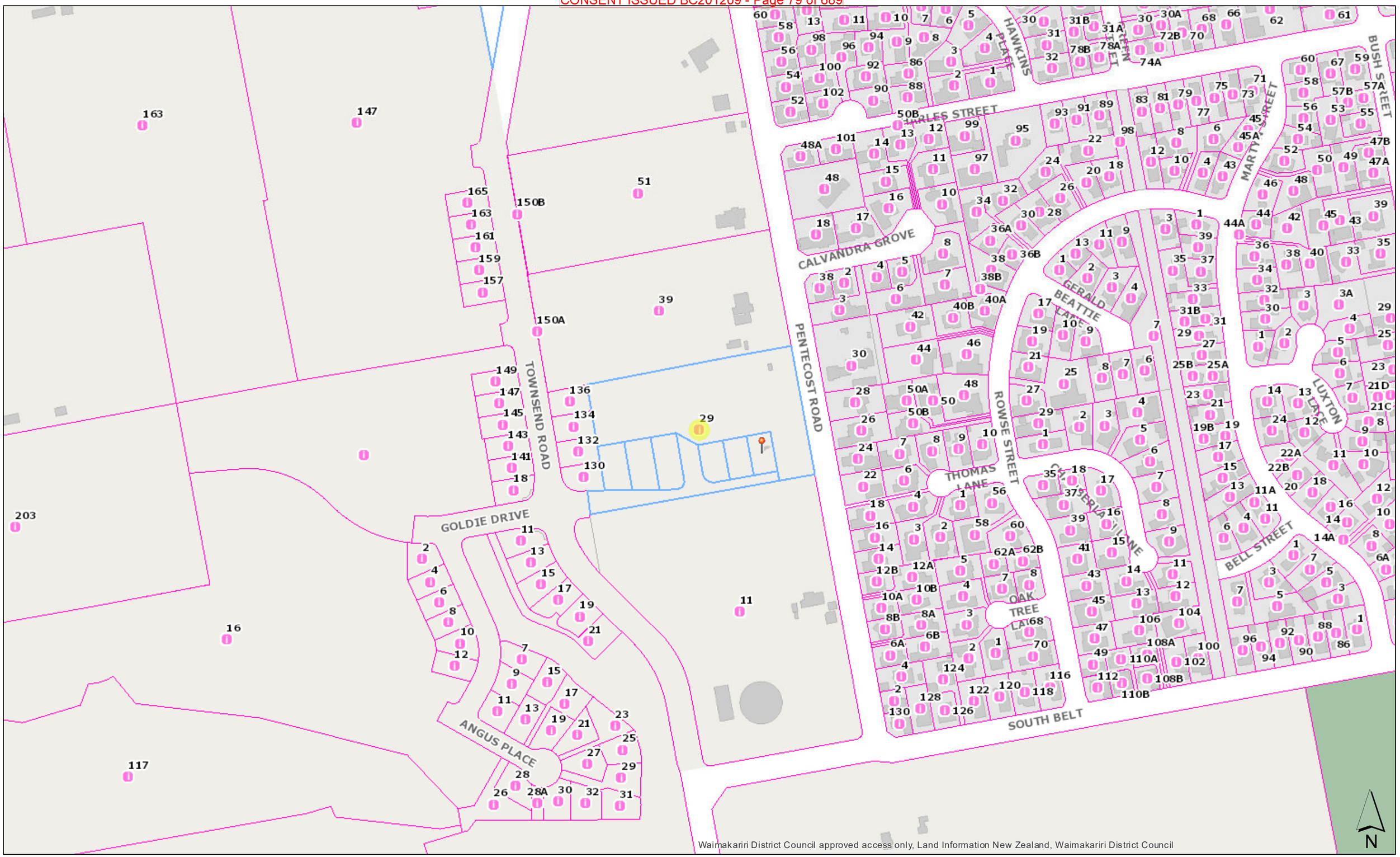
ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE:	**VERSION:**
CONSENT ISSUE	1.2A
DATE:	**SCALE:**
13.10.2020	1:100

A3.02
ELEVATIONS



WAIMAKARIRI DISTRICT COUNCIL

District Plan & Property

Date: 23/11/2020
Author: joannae@WMK

0 30 60 90 120
Meters
Scale 1:2825 @ A3

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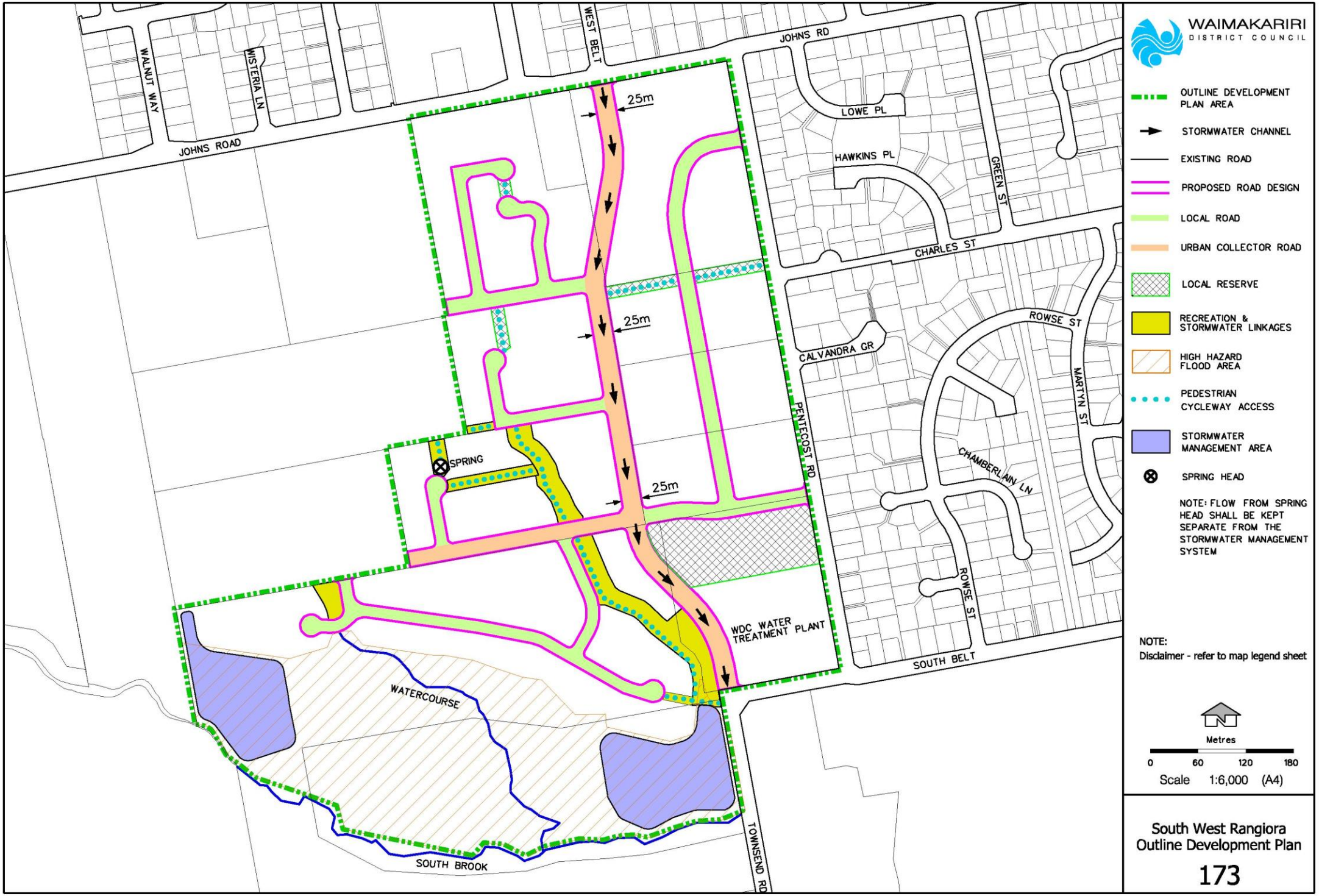
Map Created by WAIMAP Utilities at 9:26:48 AM

Legend

- LOT 14
- Properties < 1 ha
- Properties > 1 ha
- Approved to Survey Land Parcels
- Property Boundaries
- Deposited Land Parcels



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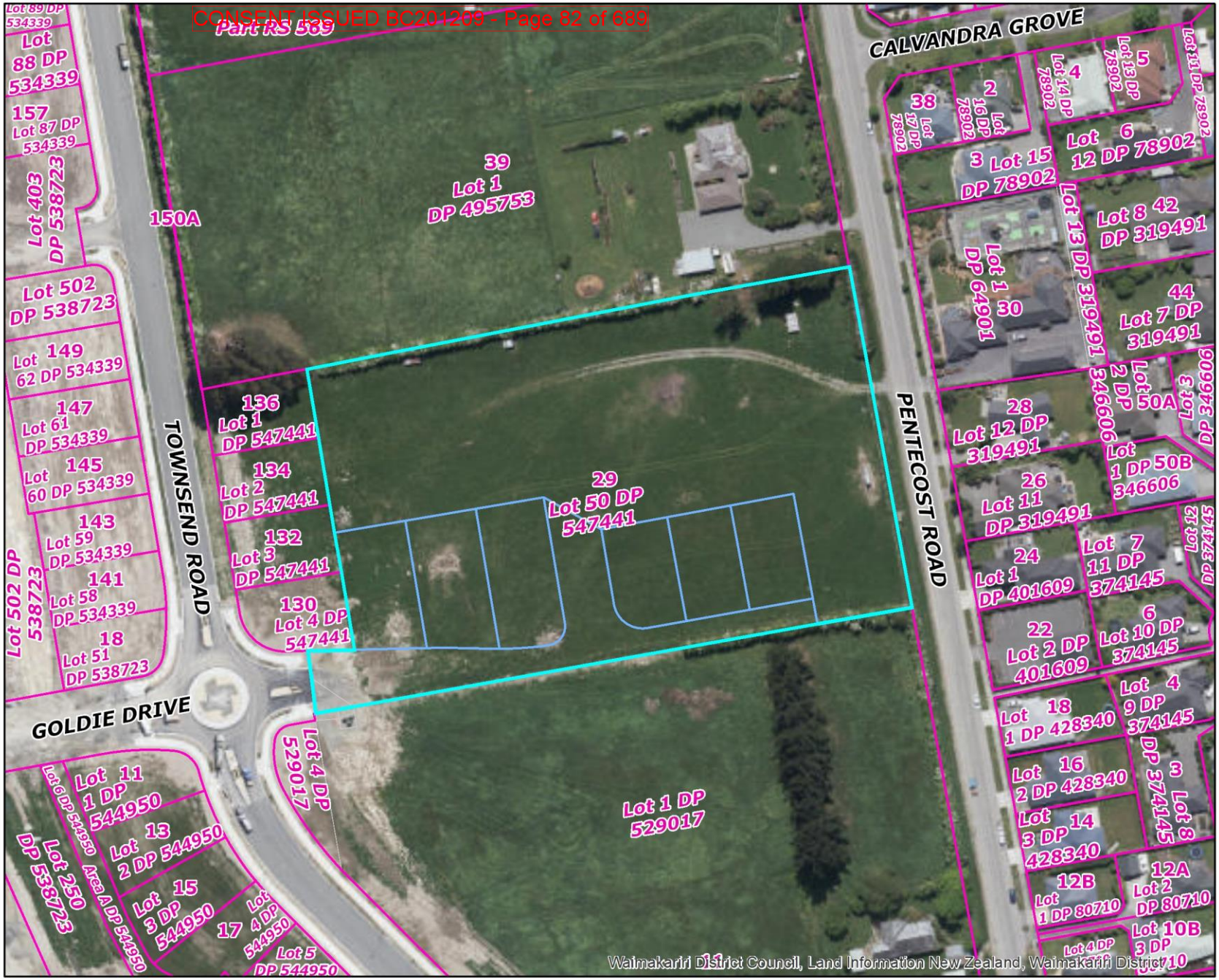
9/12/13

Legend

- Road
- Property Address
- River
- Approved to Survey Land Parcel
- Property Boundary
- Land Parcel



0 20 40 60 80
Metres

Scale 1:1715
Original Size - A4

Property Information

Date: 23/11/2020

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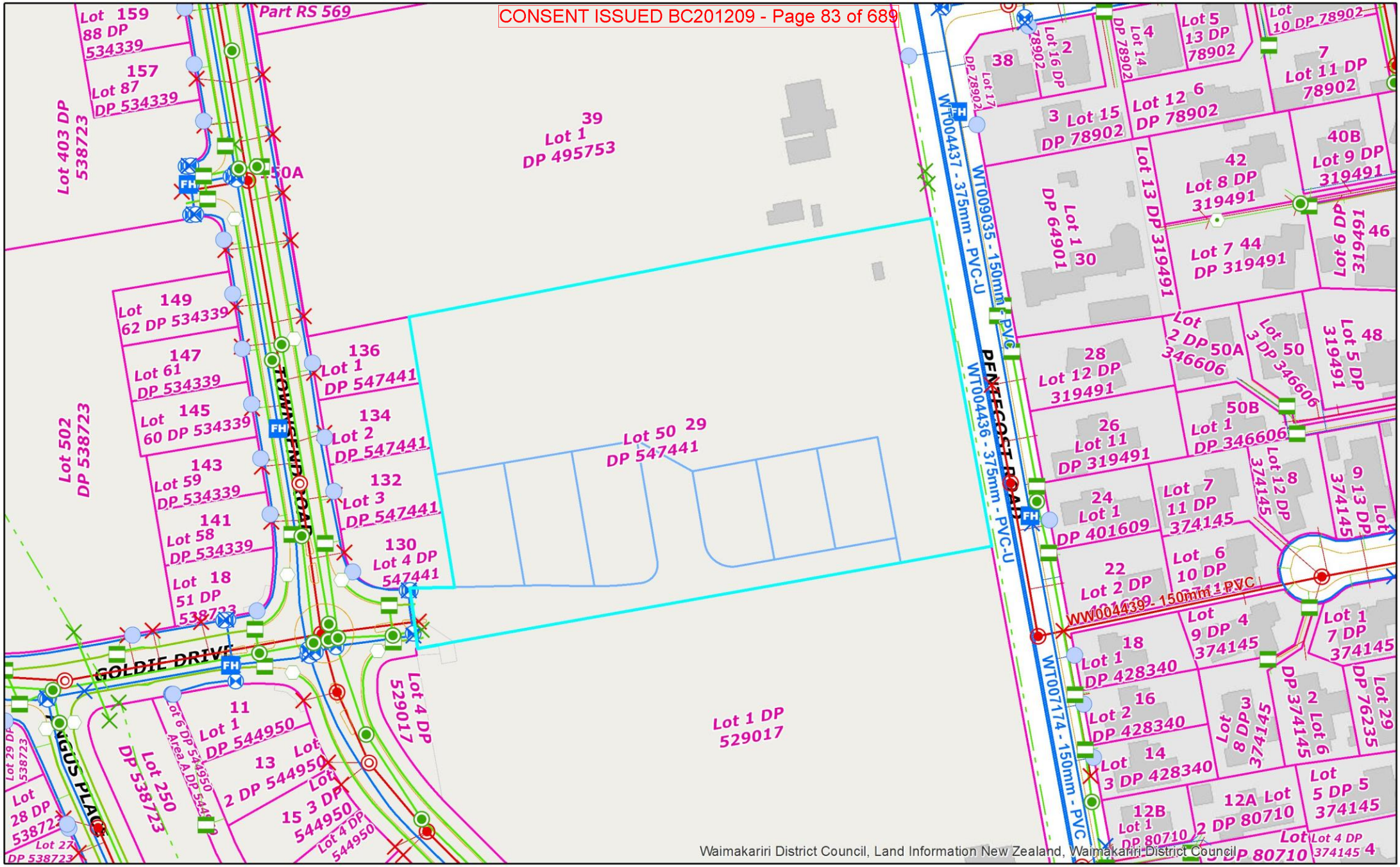
WAIMAKARIRI DISTRICT COUNCIL



0 10 20 30 40
Metres

Scale 1:1563
Original Size - A4

Utilities

Date: 23/11/2020

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WAIMAKARIRI DISTRICT COUNCIL

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WATER SUPPLY

- Main
- Abandoned Main
- Lateral
- Hurunui Main
- Facility
- Endcap
- Hydrant
- Valve
- Node
- Well
- Pump
- Tank
- Toby

WATER RACE

- Water Race Pond
- Water Race

STORMWATER

- Main
- Abandoned Main
- Lateral
- Kerb
- Swale
- Channel Other
- Channel WDC
- Facility
- Manhole
- End
- Valve
- Node
- Pump
- Sump
- Inspection
- Inspection Chamber

WASTEWATER

- Main
- Abandoned Main
- Lateral
- Facility
- Manhole - Standard
- Manhole - Vented
- Flush Tank
- Lamphole
- Rodding Eye
- Unknown
- Valve
- Node
- Pump
- Septic Tank
- Inspection
- Inspection Chamber

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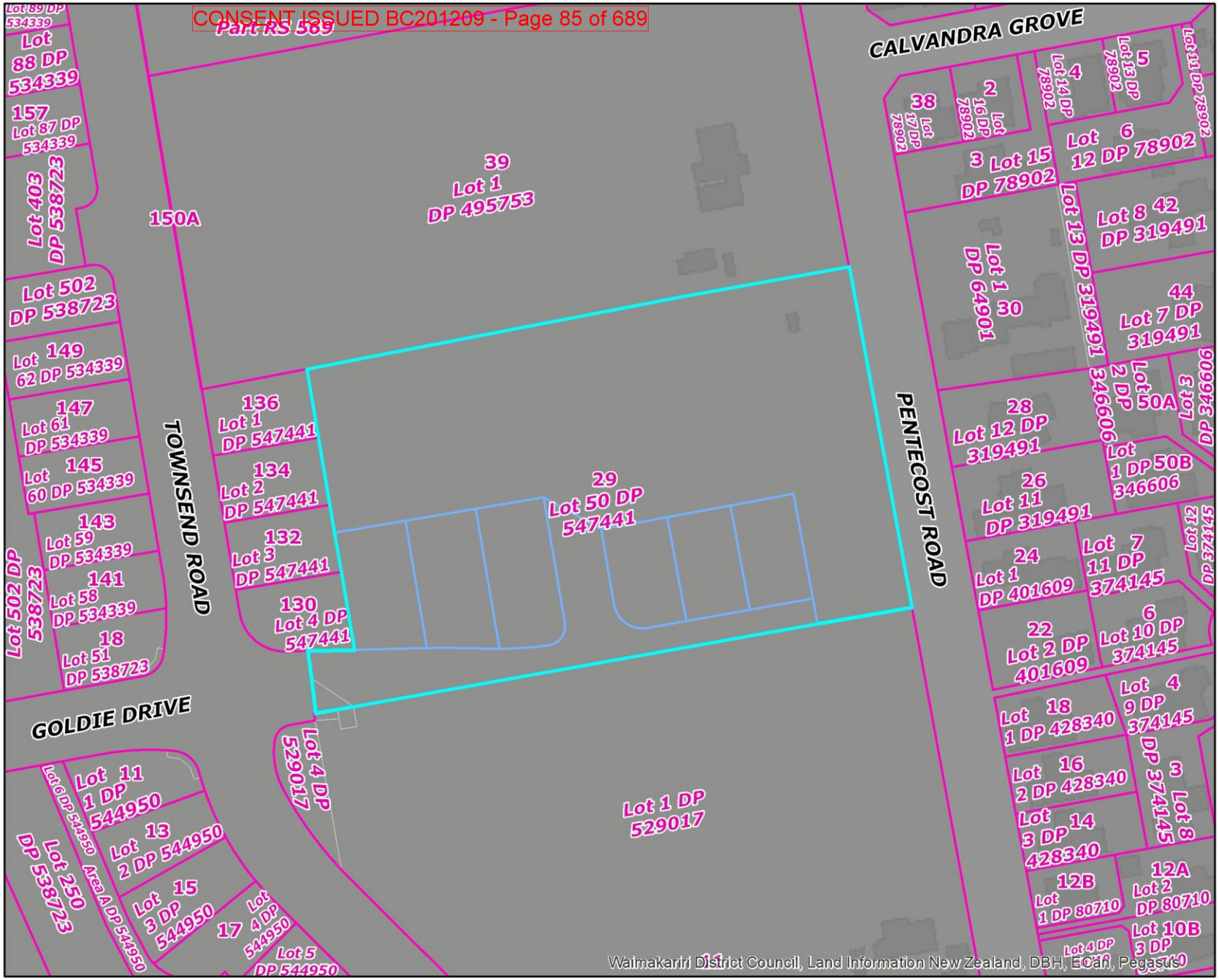
Legend

- Road
- Property Address
- River
- Approved to Survey Land Parcel
- Property Boundary
- Land Parcel

Liquefaction Risk

- Broadly Equivalent To TC1
- Broadly Equivalent To TC2
- TC2
- TC3
- Further Geotechnical Assessment Required
- Red Zone
- DBH not zoned
- Damaging liquefaction unlikely
- Liquefaction assessment needed



0 20 40 60 80 Metres

Scale 1:1715
Original Size - A4

Liquefaction Risk

Date: 23/11/2020

DISCLAIMER
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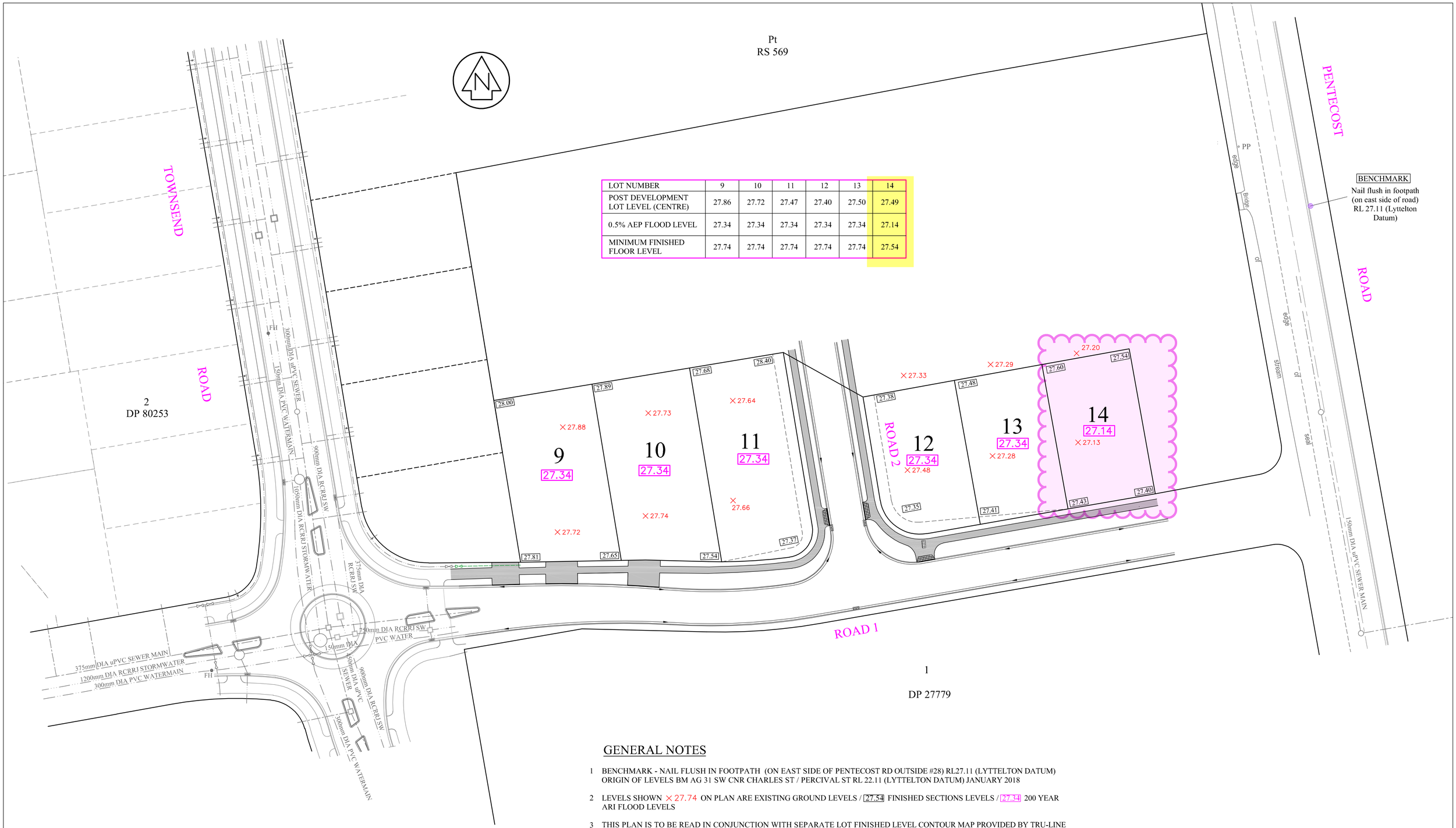
WAIMAKARIRI DISTRICT COUNCIL



LOT NUMBER	9	10	11	12	13	14
POST DEVELOPMENT LOT LEVEL (CENTRE)	27.86	27.72	27.47	27.40	27.50	27.49
0.5% AEP FLOOD LEVEL	27.34	27.34	27.34	27.34	27.34	27.14
MINIMUM FINISHED FLOOR LEVEL	27.74	27.74	27.74	27.74	27.74	27.54

GENERAL NOTES

1 BENCHMARK - NAIL FLUSH IN FOOTPATH (ON EAST SIDE OF PENTECOST RD OUTSIDE #28) RL27.11 (LYTTELTON DATUM) ORIGIN OF LEVELS BM AG 31 SW CNR CHARLES ST / PERCIVAL ST RL 22.11 (LYTTELTON DATUM) JANUARY 2018

2 LEVELS SHOWN × 27.74 ON PLAN ARE EXISTING GROUND LEVELS / 27.54 FINISHED SECTIONS LEVELS / 27.34 200 YEAR ARI FLOOD LEVELS

3 THIS PLAN IS TO BE READ IN CONJUNCTION WITH SEPARATE LOT FINISHED LEVEL CONTOUR MAP PROVIDED BY TRU-LINE CIVIL LIMITED.

SURVUS CONSULTANTS
PLANNING + SURVEYING + ENGINEERING

4 Meadow Street, PO Box 5558, Papanui, Christchurch
P 03 352 5599 AMBERLEY 03 314 9200
F 03 352 5527 ASHBURTON 03 307 7021
TOLL FREE 0508 787 887 DARFIELD 03 318 8151

CLIENT: OAKVILLE ESTATES LTD

PROJECT: Oakville RESIDENTIAL ESTATE

REV	DATE	REVISION DETAILS	ISSUED
A	22/09/20	ISSUE FOR 224 APPLICATION	JLC

DRAWING TITLE: STAGE 2 FINISHED SECTION LEVELS & FLOOD LEVEL PLAN AS BUILT DETAILS - SHEET 1 OF 1

STATUS	SCALE	SIZE
FOR 224 APPROVAL	1:400	A1

PROJECT NO	DRAWING NO	REVISION
12704	AB-03	A

Landonline

Toitu te Land whenua Information New Zealand

TA Approvals

Territorial Authority	Waimakariri District Council TA Certification Division	**TA Reference**	RC185198/205157
Survey Number	LT 553457	**Survey Purpose**	LT Subdivision
Surveyor Reference	12704 Stage 2	**Land District**	Canterbury
Surveyor	Craig William Hurford		
Surveyor Firm	Survus Contracting Ltd		
Dataset Description	Lots 9-14, 50 and Lot 102 Being a Subdivision of Lot 50 DP 547441		

TA Certificates

Pursuant to Section 224(c) Resource Management Act 1991 I hereby certify that some of the conditions of the subdivision consent have been complied with to the satisfaction of the Waimakariri District Council TA Certification Division and that two (2) consent notices have been issued in respect of those conditions that have not been complied with. Dated this 3rd day of November 2020. ☑

Signature

Signed by Yvonne Sally Fear, Authorised Officer, on 03/11/2020 01:59 PM

Receipt Information

Transaction Receipt Number	13773727
Signing Certificate (Distinguished Name)	Fear, Yvonne Sally
Signing Certificate (Serial Number)	1292647429
Signature Date	03/11/2020

*** End of Report ***

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IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application by **QSB Family Trust** to subdivide land into 7 Lots (stage 2)

CONSENT NOTICE PURSUANT TO SECTION 221 OF THE RESOURCE MANAGEMENT ACT 1991

TO: The District Land Registrar
Canterbury Land Registry

TAKE NOTICE that the land described in the Schedule below is subject to a condition in relation to a subdivision consent as follows:

1. The Consent Holder shall ensure that the minimum floor level of any habitable dwelling erected on Lots 9 – 14 and Lot 50 (balance Lot) shall have a minimum floor level of 400mm above the combined 0.5% Annual Exceedance Probability local flood and 0.5% Ashley River break out event.

The above condition, as it applies to Lots 9 – 14 and Lot 50 (balance Lot) shall be subject to a consent notice pursuant to Section 221 of the Resource Management Act 1991 and shall register on the Records of title for Lots 9 – 14 and Lot 50 (balance Lot)

AND YOU are requested to register this Consent Notice as prescribed by Section 221 of the Resource Management Act 1991.

SCHEDULE
Estate in fee simple and being Lots 9 – 14 and Lot 50 (balance Lot) Deposit Plan 553457 and being a subdivision of Lot 50 DP 547441, Record of Title 935223.

Dated this 3rd day of November 2020

SIGNED for and on behalf of
the **WAIMAKARIRI DISTRICT COUNCIL**

Sally Fear
AUTHORISED OFFICER
WAIMAKARIRI DISTRICT COUNCIL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application by **QSB Family Trust** to subdivide land into 7 Lots (stage 2)

CONSENT NOTICE PURSUANT TO SECTION 221 OF THE RESOURCE MANAGEMENT ACT 1991

TO: The District Land Registrar
Canterbury Land Registry

TAKE NOTICE that the land described in the Schedule below is subject to a condition in relation to a subdivision consent as follows:

1. Prior to a dwelling being established on Lots 9 – 14 and Lot 50 (balance Lot), the Consent Holder shall engage a Geotechnical Chartered Professional Engineer with relevant experience in residential development to undertake a shallow geotechnical investigation in accordance with NZS 3604:2011 and/or MBIES's guidelines to confirm the local bearing capacity and prepare foundation designs. The investigation shall be in accordance with the Technical Category of the Lot.

The above condition, as it applies to Lots 9 – 14 and Lot 50 (balance Lot) shall be subject to a consent notice pursuant to Section 221 of the Resource Management Act 1991 and shall register on the Records of title for Lots 9 – 14 and Lot 50 (balance Lot)

AND YOU are requested to register this Consent Notice as prescribed by Section 221 of the Resource Management Act 1991.

SCHEDULE
Estate in fee simple and being Lots 9 – 14 and Lot 50 (balance Lot) Deposit Plan 553457 and being a subdivision of Lot 50 DP 547441, Record of Title 935223.

Dated this 3rd day of November 2020

SIGNED for and on behalf of
the **WAIMAKARIRI DISTRICT COUNCIL**

Sally Fear
AUTHORISED OFFICER
WAIMAKARIRI DISTRICT COUNCIL

RC205157 / 200702081334 2159133714

WAIMAKARIRI DISTRICT COUNCIL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application lodged by **QSB Family Trust** for a resource consent under Section 88 of the aforementioned Act.

APPLICATION

The applicants sought a resource consent to amend subdivision consent RC185198 by deleting condition 22 to enable the vehicle crossings to be installed at the time of dwelling construction, rather than at the time of subdivision.

Vehicle crossings will need to be approved either under the Council's Vehicle Crossing Bylaw, or if located in a non-complying position or of non-complying dimensions, through a land use consent process.

DECISION

The Planning Manager, on the 30th June 2020, approved:

THAT pursuant to Section 127 of the Resource Management Act 1991, consent be granted to delete Condition 22 of RC185198, being consent to subdivide Lot 14 DP 529017 into 23 residential lots, one link strip and three roads, at 29 Pentecost Road, Rangiora.

- **Delete Condition 22 in its entirety**

All other conditions to remain the same.

REASONS FOR THE DECISION

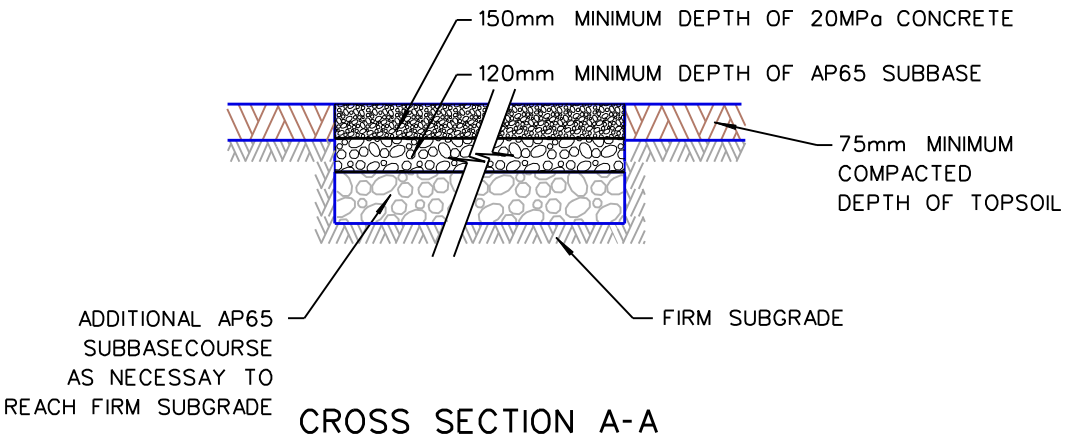
Pursuant to Section 113 of the Act the Council was satisfied that:

- No person is deemed to be adversely affected by the proposal:
  - Vehicle crossings can be installed at the time of dwelling construction.
- The adverse environmental effects will be less than minor:
  - No adverse effect on traffic safety or access will result from removal of Condition 22.

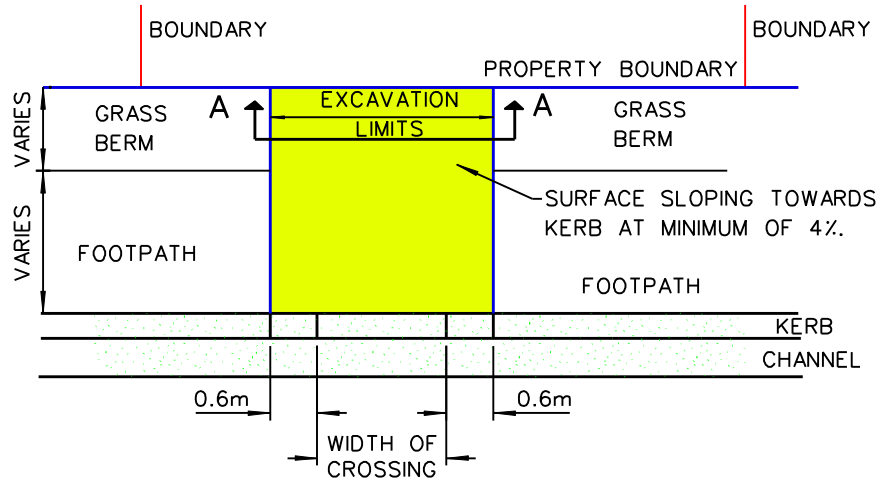
- The variation sought will not result in outcomes contrary to those sought by the Policies and Objectives of the District Plan.

DATED at Rangiora this 2nd Day of July 2020

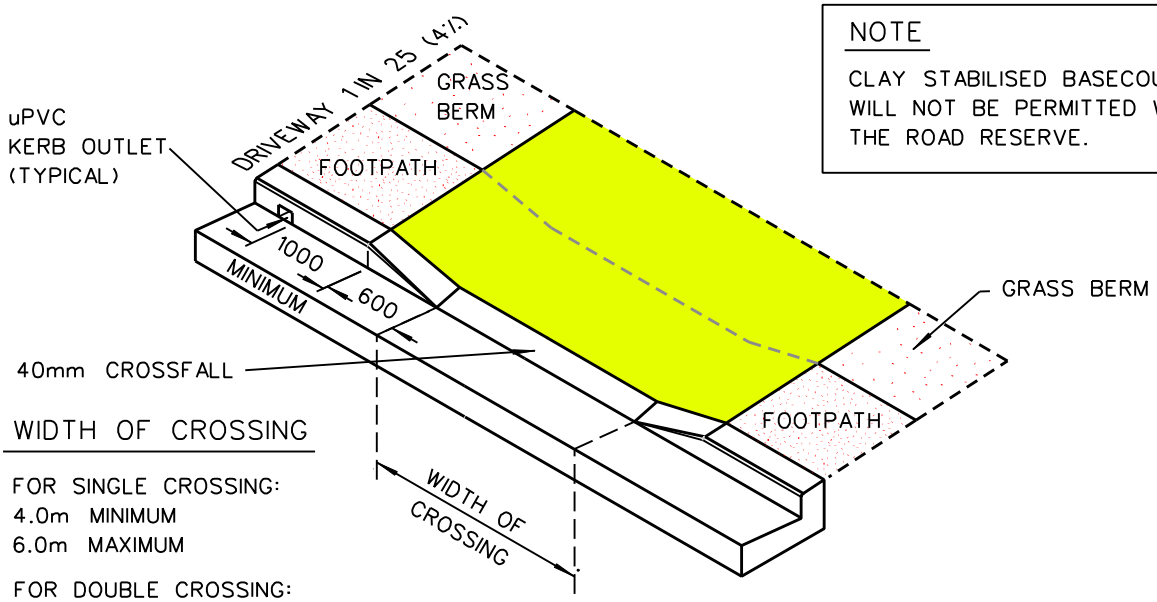
SIGNED by Garry Blay
RESOURCE MANAGEMENT PLANNER



CROSS SECTION A-A



PLAN



NOTE

CLAY STABILISED BASECOURSE WILL NOT BE PERMITTED WITHIN THE ROAD RESERVE.

WIDTH OF CROSSING

FOR SINGLE CROSSING:
4.0m MINIMUM
6.0m MAXIMUM

FOR DOUBLE CROSSING:
6.0m MINIMUM
8.0m MAXIMUM

ISOMETRIC VIEW

Cadastral data from LINZ's DCDB. Crown Copyright reserved.

WAIMAKARIRI DISTRICT COUNCIL technical services	NOT TO SCALE	SHEET TITLE: Typical Residential Concrete Vehicle Crossing (Flat Channel)	PROJECT TITLE: Standard Drawings	SHEET: 211A ISSUE: E PLAN No.: 600

Form 2A

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or 45, 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: Lot 14, Oakville Estate (29 Pentecost Road)	
Suburb: Rangiora	
Town/City: Christchurch	Postcode: 7400

THE OWNER(S)

Name(s): Jordan Joyce (Joyce Built)	
Mailing address:	
Suburb: 77 Fullers Road	PO Box/Private Bag:
Town/City: Woodend	Postcode: 7691
Phone number: 022-1281259	Email address: joycebuilt@outlook.co.nz

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 work 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 memorandum 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 Megan Verity carried out / supervised the following design work that is restricted building work

PRIMARY STRUCTURE: B1

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
All RBW design work relating to B1 ○		○ Carried out ○ Supervised	
Foundations and subfloor framing ○	Concrete slab on grade and foundations designed in accordance with NZS:3604 & B1/VM1 (Single Pour)	○ Carried out ○ Supervised	Refer to architectural plans, spec and geotechnical report.

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Walls ✓	Wall framing designed in accordance with NZS:3604 & Design It	○ Carried out ● Supervised	Refer to architectural plans & spec.
Roof ✓	Prefabricated timber trusses, designed by VIP Frames & Trusses.	○ Carried out ● Supervised	Refer to truss design & producer statement from VIP Frames & Trusses.
Columns and beams ✓	Timber lintels above openings sized by VIP Frames & Trusses & Design IT.	○ Carried out ● Supervised	Refer to truss design & producer statement from VIP Frames & Trusses & Design IT statements.
Bracing ✓	Wall bracing using GIB plasterboard and in accordance with NZS:3604.	○ Carried out ● Supervised	Refer to architectural plans & spec.
Other ○		○ Carried out ○ Supervised	

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ○		○ Carried out ○ Supervised	
Damp proofing ✓	DPC between all timber and concrete surfaces. 0.25mm DPM under slab with geotextile mesh at bottom.	○ Carried out ● Supervised	Refer to architectural plans & spec.
Roof cladding or roof cladding system ✓	Colorsteel longrun roofing on, underlay.	○ Carried out ● Supervised	Refer to architectural plans & spec.
Ventilation system (for example, subfloor or cavity) ✓	90 Series brick on 50mm Cavity & 50mm AAC panel on 20mm cavity.	○ Carried out ● Supervised	Refer to architectural plans & spec.
Wall cladding or wall cladding system ✓	90 Series brick on 50mm Cavity & 50mm AAC panel on 20mm cavity.	○ Carried out ● Supervised	Refer to architectural plans & spec.
Waterproofing ✓	Selected synthetic wall underlay to all external walls with flashing tape to openings.	○ Carried out ○ Supervised	Refer to architectural plans & spec.
Other ○		○ Carried out ○ Supervised	

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
FIRE SAFETY SYSTEMS: C1 - C6			
Emergency warning systems Evacuation and fire service operation systems ✓ Suppression or control systems Other	Smoke detectors specified and placed in accordance with NZBC F7/AS1	○ Carried out ◉ Supervised	Refer to architectural plans & spec.

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.

WAIVERS AND MODIFICATIONS

Waivers or modifications of the Building Code are required. ○ Yes ◉ No

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

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

ISSUED BY

Name and contact details of the licensed building practitioner who is licensed to carry out or supervise design work that is restricted building work.

Name: Megan Verity	LBP or Registration number: BP136952
The practitioner is a: (●) Design LBP ( ) Registered architect ( ) Chartered professional engineer	
Design Entity or Company (optional): VIP Design Ltd	
Mailing address (if different from below):	
Street address/Registered office: 158 Maces Road	
Suburb: Bromley	Town/City: Christchurch
PO Box/Private Bag: 19765 Woolston, ChCh	Postcode: 8062
Phone number: 021-910-218	Mobile: 021-910-218
After hours: As above	Fax:
Email address: megan@vipdesign.co.nz	Website:

DECLARATION

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

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

Signature:

Date: 4/11/2020

Application BC201209
Received 10/12/2020

engineering new zealand

CERTIFICATE OF DESIGN WORK
MEMORANDUM FROM LICENSED BUILDING PRACTITIONER

Section 30C and Section 45, Building Act 2004

The Building

Street address	29 Pentecost Road		
Suburb		**Town/city**	Rangiora
Postcode		**Building consent no.**	

The Owner

Name(s)	c/o VIP Design		
Email		**Phone**	
Address			

Basis for providing this memorandum

I am providing this memorandum in my role as the **specialist** designer who carried out or supervised specific Primary structure elements of restricted building work (RBW) design work as described in this memorandum. Other designers will provide memoranda covering the remaining RBW design work. Refer also to the attached PS1.

Identification of restricted building work (RBW) design work

I, Alexander Loye carried out or supervised the following RBW design work:

Primary structure: B1

Design work that is RBW		Description (as required) and reference to plans and specifications	Carried out or supervised
Foundations and subfloor framing	✓	Verandah post foundation	Carried out
Retaining walls	✗		
Beams	✗		
Portal	✗		
Bracing	✗		
Other (primary)	✓	Brick Shelf angles	Carried out

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

Initial **Date** 09.12.20

Application BC201209
Received 10/12/2020

Waivers and modifications

Are waivers or modifications of the Building Code required? No

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

Building Code clause	Waiver/modification required

Issued by

Name	Alexander Loye	**Design entity/company**	Tetrad Consulting Limited
Chartered status	CPEng	**Chartered no.**	1018605
Email	alex@tetrad.co.nz	**Website**	tetrad.co.nz
Phone (daytime)	033650726	**Phone (after hours)**	
Mobile			
Postal address	71 Peterborough Street, Christchurch		
Physical address	71 Peterborough Street, Christchurch		

Declaration

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

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

Signature **Date** 09.12.20

Application BC201209
Received 16/12/2020

engineering new zealand

CERTIFICATE OF DESIGN WORK
MEMORANDUM FROM LICENSED BUILDING PRACTITIONER

Section 30C and Section 45, Building Act 2004

The Building

Street address	29 Pentecost Road		
Suburb		**Town/city**	Rangiora
Postcode		**Building consent no.**	

The Owner

Name(s)	c/o VIP Design		
Email		**Phone**	
Address			

Basis for providing this memorandum

I am providing this memorandum in my role as the **specialist** designer who carried out or supervised specific Primary structure elements of restricted building work (RBW) design work as described in this memorandum. Other designers will provide memoranda covering the remaining RBW design work. Refer also to the attached PS1.

Identification of restricted building work (RBW) design work

I, Alexander Loye carried out or supervised the following RBW design work:

Primary structure: B1

Design work that is RBW		Description (as required) and reference to plans and specifications	Carried out or supervised
Foundations and subfloor framing	✓	Verandah post foundation	Carried out
Retaining walls	✗		
Beams	✗		
Portal	✗		
Bracing	✗		
Other (primary)	✓	Brick Shelf angles Stack bond masonry veneer	Carried out

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

Initial **Date** 11.12.20

Application BC201209
Received 16/12/2020

Waivers and modifications

Are waivers or modifications of the Building Code required? No

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

Building Code clause	Waiver/modification required

Issued by

Name	Alexander Loye	**Design entity/company**	Tetrad Consulting Limited
Chartered status	CPEng	**Chartered no.**	1018605
Email	alex@tetrad.co.nz	**Website**	tetrad.co.nz
Phone (daytime)	033650726	**Phone (after hours)**	
Mobile			
Postal address	71 Peterborough Street, Christchurch		
Physical address	71 Peterborough Street, Christchurch		

Declaration

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

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

Signature **Date** 11.12.20

SECTION 2

Geotech, Engineer Reports & Conditions PS1 & 2

- Calculations
- A4 Details

CONSENT ISSUED BC201209 - Page 104 of 689
Application BC201209
Received 23/12/2020

ENGINEERING DESIGN CONSULTANTS

22 December 2020 Our Ref: 45895 - Rev 2

Attn: Quintin Bruce

Oakville Estate,
Rangiora, Christchurch 8052

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Dear Quintin,

BUILDING CONSENT GEOTECHNICAL REPORT LOT 14, STAGE 2, OAKVILLE ESTATE

This covering letter is provided in the context of Resource Consent condition 20.1 (RC185198 / 190903122892), which requests a site-specific intrusive investigation to determine local bearing capacity and foundation design for Lot 14, Oakville Estate, previously 29 Pentecost Road.

EDC has had extensive involvement in the Oakville subdivision, having prepared the Resource Consent Report (Combined Geotechnical & Preliminary Site Investigation Report, Rev 0, dated 18/02/2016), Building Consent Report (Oakville Estate - Stage 2, 29 Pentecost Road, Geotechnical Report, REV 0, dated 19/02/2020) and Geotechnical Completion Report, REV 0, dated 03/12/2020. The Building Consent Report should be read in conjunction with this report. The following table is a summary of all the intrusive investigation holes located on or close to Lot 13, with collated logs forming Appendix A:

Hole Ref	Date	Location	Purpose
TP401	09.09.2020	On-site	Earthworks validation
TP402	09.09.2020	On-site	Earthworks validation
HA402	09.09.2020	On-site	Earthworks validation
HASC302	22.01.2020	On-site	Geotechnical investigation
HASC304	22.01.2020	On-site	Geotechnical investigation
HASC103	17.12.2015	3m to the south	Geotechnical investigation
CPT 301	21.01.2020	5m east	Geotechnical investigation
HA504	22/12/2020	On-site	Lot 14 Geotechnical investigation
HA505	22/12/2020	On-site	Lot 14 Geotechnical investigation
HA506	22/12/2020	On-site	Lot 14 Geotechnical investigation

Table 1: Summary of Lot 13 Investigation Locations

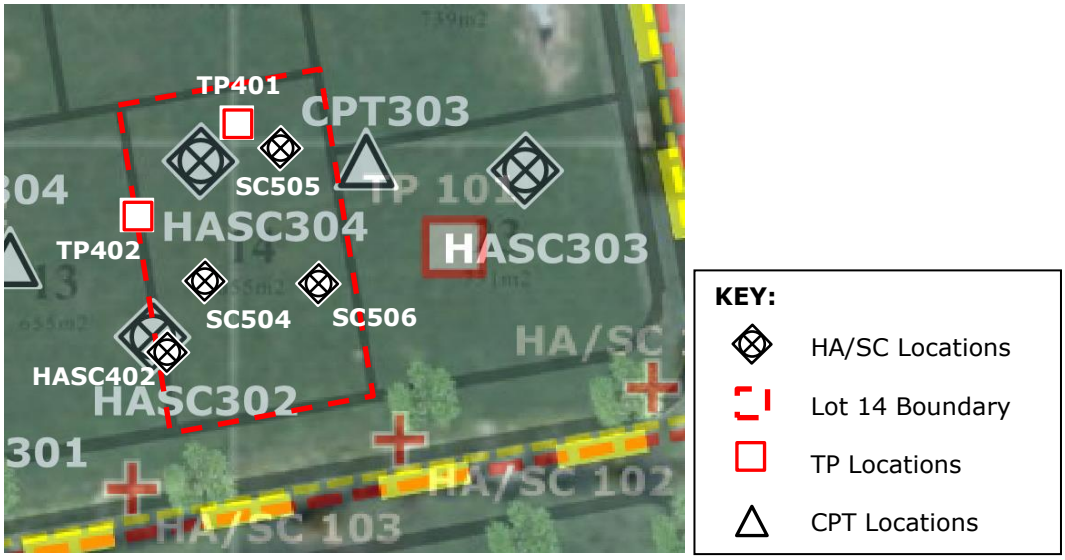


Figure 1: Intrusive Locations

A copy of the 22/12/2020 scala penetrometer test results and Ultimate Bearing Capacity (UBC) graph (based on Stockwell correlation to UBC) forms Appendix B.

Based on these reports, the site was found to have a consist soil profile of stiff to very stiff silty clay to 1.2m, overlying medium sand or firm silt, with shallow dense gravels. Varying depths of fill has been used to reach finished floor levels, with fill over 200mm is considered Engineered Fill which generally consists of clay or gravelly clay that is in accordance with NZS 4431:1989. The soils are considered to comply with NZS:3604 Good Ground from 0.4m below existing ground level (BEGL), with 300 kPa UBC available in the natural clay or engineered fill, and is considered to be TC 1 as defined by the MBIE guidance with respect to liquefaction risk (i.e. liquefaction damage is unlikely).

The recommendations contained in EDC's previous Building Consent stage geotechnical report are considered pertinent to Lot 13. In summary, two foundation options have been provided;

- *Type C concrete* slab-on-grade foundations in accordance with NZS 3604 (with B1/AS1 modifications). Any hardfill to be placed beneath the slab should consist of an appropriately compacted, well-graded gravel (AP40 or AP65), with a layer of geotextile (DuraForce AS280 or Bidim A19 or engineer approved equal) at the base.

  Or

- *Timber floor pile foundations* with either a pile perimeter or reinforced concrete perimeter footing, in accordance with NZS 3604 (with B1/AS1 modifications).

Either foundation should be founded in the natural inorganic clay or engineered fill generally encountered from 0.4m begl, where a Geotechnical UBC of 300kPa can be used for design.

Any topsoil/fill, very soft, organic or otherwise unsuitable material encountered is not considered a suitable bearing stratum and will require removal beneath the building platform.

A geotechnical engineer should inspect earthworks and foundation construction at the following stages, and pursuant to any Building Consent Conditions:

1. Formation level of any new foundations; and
2. If gravel hardfill is required and is >600mm thick, compaction testing should be undertaken. Frequency will be dependent on the validation test method adopted but should occur at least once gravel fill has been placed and compacted.

REPORT PREPARED BY:

Dan Pickering
BAppSci (Envi.), BSc (Hons) (Geol.)
Geotechnical Engineer

REPORT REVIEWED BY:

Giles Learman
BSc (Hons) CGeol FGS
Geotechnical Team Leader - Canterbury

1.0 LIMITATIONS

Except where required by law, the findings presented as part of this report are for the sole use of our client, as noted above. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing.

To the extent permitted by law, EDC expressly disclaims and excludes liability for any loss, damage, cost or expense suffered by any third party relating to or resulting from the use of, or reliance upon any information contained in this report. It is the responsibility of third parties to independently make enquiries or seek advice in relation to their particular requirements.

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

APPENDIX A

COLLATED FIELD LOGS RELEVENT TO LOT 13

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Application BC201209
Received 23/12/2020

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DRILLED: 09/09/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.:

TP 401

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Oakville Estate

LOGGED	PROCESSED	CHECKED
DP	DP	JF

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: -

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
0.2	TOPSOIL		TS				
0.4	FILL: Very stiff, light grey mottled orange brown Clayey SILT, moist						
0.6	Very stiff to hard, light grey CLAY, moist						
0.8	End of Test Pit (Target depth)		EOH @ 0.80 m				

NOTES:

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PO BOX 118 ALBANY, AUCKLAND 0755

PH (09) 451 9044
FAX (09) 415 1280

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DRILLED: 09/09/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: **TP 402**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Oakville Estate

LOGGED	PROCESSED	CHECKED
DP	DP	JF

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: 2173

DEPTH (m) GL	SOIL DESCRIPTION — Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
	TOPSOIL	TS				
0.2						
0.4	FILL: Very stiff, light grey mottled orange brown Clayey SILT, moist			●	-	
0.6	Very stiff to hard, light grey CLAY, moist					
	End of Test Pit (Target depth)	EOH @ 0.70 m				

NOTES:

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PO BOX 118 ALBANY, AUCKLAND 0755

PH (09) 451 9044
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD, ALBANY, AUCKLAND

PH (09) 451 9044

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DRILLED: 06/08/2020 **FILE: 45895 - Stage 2**

HAND AUGER NO.: **HA 402**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT: Oakville Estate Ltd**

ADDRESS: 29 Pentecost Road - Oakville Estate

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: 2173

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
	TOPSOIL		TS T				
0.2	FILL: Very stiff, light brownish grey silty CLAY, moist					-	
0.4	Very stiff to hard, light grey mottled orange brown silty CLAY, moist						
0.6					Peak Exceeded	-	
0.8	End of hand auger (Target depth)		EOH @ 0.80 m		Peak Exceeded	-	

NOTES:

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PO BOX 118 ALBANY, AUCKLAND 0755

PH (09) 451 9044
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DRILLED: 21/01/2020 **FILE: 45895 - Stage 2**

HAND AUGER NO.: **HA/SC 302**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT: Oakville Estate Ltd**

ADDRESS: 29 Pentecost Road - Oakville Estate

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: -

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
0.2	TOPSOIL - Soft to firm, light brown organic silt, dry		TS T				
0.4	Firm to stiff, light grey mottled light orange silty CLAY, dry, friable						
0.6							
0.8							
1.0							
1.2							
1.4	becoming silty CLAY with some fine sand.						
1.6				SWL			
1.8	Dense, dark grey silty fine SAND, moist to wet						
2.0	becoming saturated						
2.2							
2.4							
2.6	Stiff to very stiff, light bluish green mottled orange brown clayey SILT, wet.						
2.8							
3.0							
	End of hand auger (equipment refusal on assumed gravel)						

EOH @ 3.15 m

NOTES:
Groundwater encountered at 1.70m during hand auger drilling.
Hand auger terminated at 2.1m due to equipment refusal on assumed gravel.

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PO BOX 118 ALBANY, AUCKLAND 0755

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FAX (09) 415 1280

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DRILLED: 21/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 304

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Oakville Estate

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: -

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
0.2	TOPSOIL - Soft, light brown organic silt, dry		TS T				
0.4	Firm to stiff, light grey mottled light orange CLAY, dry, friable						
0.6							
0.8							
1.0							
1.2							
1.4	becoming dark grey mottled orange brown silty CLAY, moist						
1.6	Dense, dark yellowish brown silty fine SAND, moist						
1.8							
2.0							
2.2	Stiff, light grey mottled orange brown SILT with some clay, moist						
2.4	becoming light bluish grey						
2.6	becoming saturated			SWL			
2.8	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.80 m				

NOTES:

Groundwater encountered at 2.6 during hand auger drilling.
Hand auger terminated at 2.6m due to equipment refusal on assumed gravel. After 30mins, ground water is recorded at 2.5m.

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PO BOX 118 ALBANY, AUCKLAND 0755

PH (09) 451 9044
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DRILLED: 22/01/2016 **FILE:** 45895

HAND AUGER NO.: **HA 103**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** QSB Family Trust

ADDRESS: 29 Pentecost Road, Rangiora

LOGGED	PROCESSED	CHECKED
DT	MW	GL

BH LOCATION: COORDS: RL GROUND: SHEAR VANE ID#: -

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SHEAR STRENGTH (kPa) ○Residual ●Peak 40 80 120 160	SOIL SENSITIVITY	SCALA BLOWS (PER 50 mm) 5 10 15
	TOPSOIL - Soft, brown silt, moist		TS T				
0.2	Firm, grey/brown mottled orange SILT, moist						
	Stiff, light grey mottled orange silty CLAY, dry. Desiccated and friable.						
0.4							
0.6							
0.8							
	End of hand auger (target depth reached)		EOH @ 0.90 m				

NOTES:
Groundwater was not encountered during hand auger.

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PO BOX 118 ALBANY, AUCKLAND 0755
PH (09) 451 9044
FAX (09) 415 1280
1st FLOOR, UNIT 1, 100 BUSH ROAD, ALBANY, AUCKLAND
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APPENDIX B

22 DECEMBER 2020 SCALA PENETROMETER TEST ULTIMATE BEARING CAPACITY GRAPH

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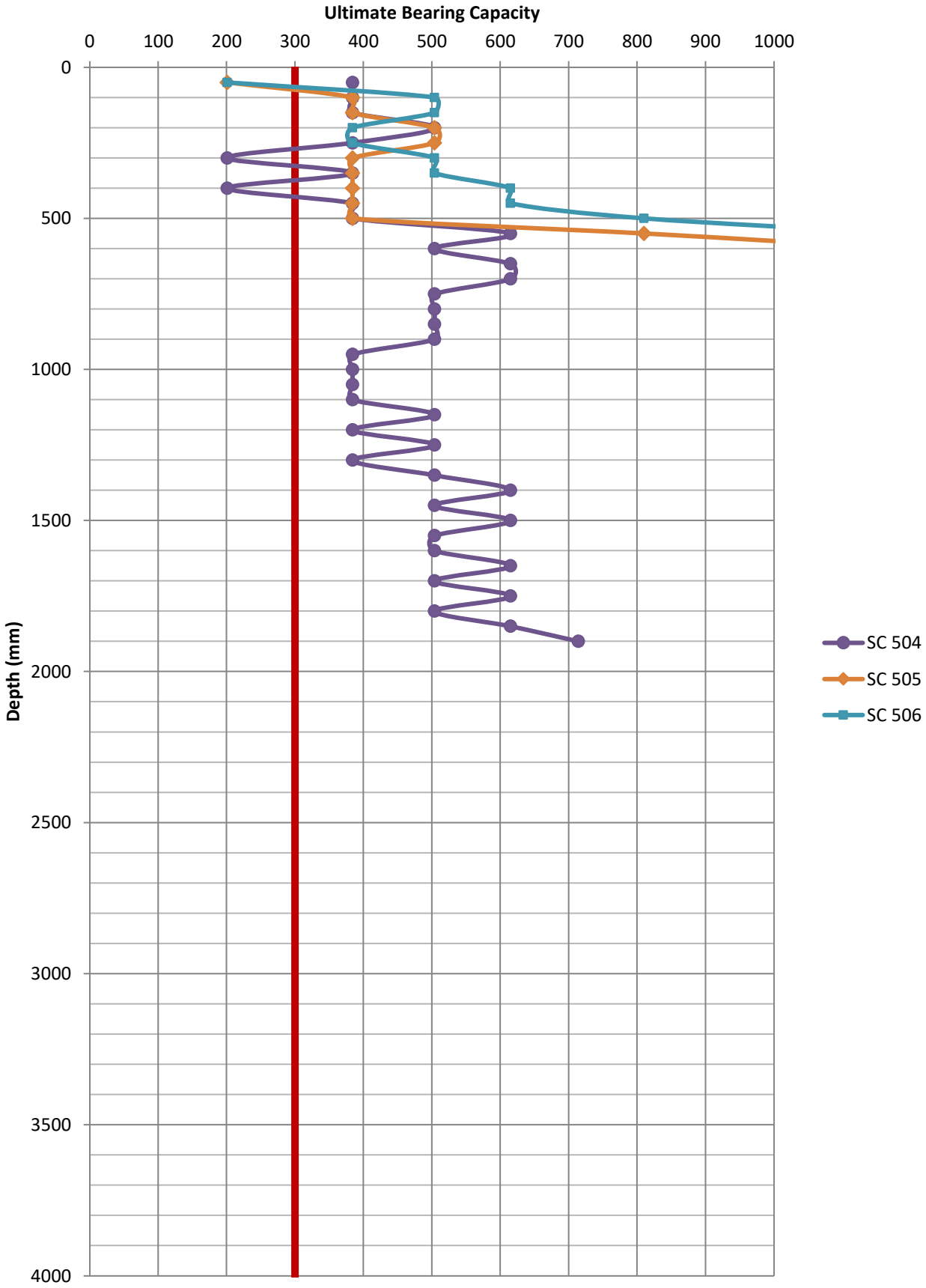
Summary of Ultimate Bearing Capacity vs Depth



NOTES

1. Based on Stockwell, M.J., 1977: Determination of allowable bearing pressure under small structures. New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.

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Blows Table

Scala Penetrometer Blowcount Summary

Depth (mm)	SC501	SC502	SC503	SC504	SC505	SC506
50	0.3	2	1	2	1	1
100	0.3	1	5	2	2	3
150	0.3	1	4	2	2	3
200	2	3	4	3	3	2
250	2	2	5	2	3	2
300	2	3	7	1	2	3
350	3	3	6	2	2	3
400	2	4	6	1	2	4
450	2	4	5	2	2	4
500	3	4	4	2	2	6
550	2	3	5	4	6	10
600	2	3	3	3	10	15
650	2	3	3	4	15	
700	5	4	4	4		
750	5	4	4	3		
800	5	4	3	3		
850	3	5	2	3		
900	4	5	4	3		
950	3	3	3	2		
1000	4	4	4	2		
1050	3	5	4	2		
1100	4	5	5	2		
1150	4	4	4	3		
1200	3	6	4	2		
1250	5	4	4	3		
1300	4	5	3	2		
1350	4	4	4	3		
1400	4	5	6	4		
1450	4	5	9	3		
1500	4	5	7	4		
1550	3	4	13	3		
1600	5	4	15	3		
1650	3	4		4		
1700	5	5		3		
1750	4	6		4		
1800	4	5		3		
1850	4	5		4		
1900	4	6		5		
1950						
2000						

ENGINEERING DESIGN CONSULTANTS

29 Pentecost Road, Rangiora - Stage 2

Geotechnical Report

Prepared for: Oakville Estate Ltd
C/O: Quintin Bruce

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Project #45895 - Rev.0 - 19/02/2020

Engineering Design Consultants Ltd
W: www.edc.co.nz
E: team@edc.co.nz
Christchurch: 1st Floor, 39 Carlyle St, Sydenham Ph (03) 355 5559 PO Box 7534, Sydenham, 8240
Auckland: 1st Floor, Unit 1, 100 Bush Rd, Albany Ph (09) 451 9044 PO Box 118, Albany Village, 0755

ACENZ

Revision	Date	Engineer	Description
0	19/02/2020	DP	FINAL

REPORT PREPARED BY:

Daniel Pickering
BAppSci (Envi), BSc(Hons) (Geology)
Junior Geotechnical Engineer

REPORT CHECKED BY:

Gareth B Williams
MSc(Eng) CPEng CMEngNZ IntPE(NZ) MInstD MEIANZ
Snr Geotechnical Engineer, Director

Limitations of Report

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Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

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The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

The Appendices should be read in conjunction with the main part of the report and this report should not be considered complete without them.

1.0 INTRODUCTION

1.1 Terms of Reference

Engineering Design Consultants Ltd (EDC) was commissioned by Oakvillage Estate on 14/01/2020 to provide a Building Consent stage geotechnical assessment and report for 29 Pentecost Road, Rangiora - Stage 2(Lot 1 DP 492222).

1.2 Proposed Development/Works

It is proposed to develop the second half of a previously investigated property. The second stage of the development (henceforth referred to as 'the Stage 2 site') consists of 12 residential lots (Lots 12 to 23), ranging from 655m^2 to 1038m^2 in area, at 29 Pentecost Road. The Stage site is the focus of this report.

A proposed development sketch provided by Servus Consultants forms Appendix A.

1.3 Existing Engineers Reports

EDC has previously produced two reports that form Appendix B;

1. 'Combined Geotechnical & Preliminary Site Investigation Report' for resource consent of the proposed subdivision (EDC Ref. 45895, dated 18 February 2016). The Combined Geotechnical & Preliminary Site Investigation Report stated that the eastern side of the subdivision would require lot specific shallow Cone Penetration Testing (CPT) to the top of the gravel layer to quantify the liquefaction potential of the shallow soils.
2. 'Geotechnical Report' for Building Consent for the western half of the subdivision (Stage 1) (EDC Ref. 45895, dated 17 December 2018).

The presence of desiccated clay soils was identified in the 2016 report. The December 2018 Geotechncila Report (Appendix B) included laboratory analysis to determine if the soils can be considered 'Good Ground' under the definition defined in NZS 3604. Four tests were considered sufficient for the site and consisted of Atterberg Limits and Linear Shrinkage, these samples were deemed non-expansive, in accordance with NZ3604.

1.4 Objective/Scope

The objective of this report is to provide a Building Consent stage assessment of ground conditions for the 12 Lots in the Stage 2 site (Lots 12 to 23). In order to achieve the outlined objectives, this geotechnical investigation comprised the following scope:

- An updated geotechnical desktop study to review geological mapping and geotechnical information resources.
- A site walkover.
- A shallow intrusive investigation comprising 12 hand auger boreholes and Scala Penetrometer tests.

- A deep machine investigation comprising four Cone Penetration Testing and subsequent liquefaction analysis.
- An assessment that quantifies the liquefaction susceptibility outlined in the previous 2016 report and defines an appropriate technical category recommendation for the site.
- Provision of an interpretive report summarising the above and providing geotechnical parameters for foundation design of the proposed development.

2.0 SITE DESCRIPTION

2.1 Site Location

The site is located at 29 Pentecost Road, Rangiora. Together, the Stage 2 and previously investigated Stage 1 have a rectangular boundary with an approximate area of 2.1Ha. The Stage 2 site is located on the eastern half of the subdivision and is roughly square in shape, having an approximate area of 1.2Ha (Figure 2). The subdivision can be accessed from either Pentecost Road or Townsend Road. The Google Earth coordinates of the approximate centre of the site are -43.317118N, 172.583858E.

Figure 1: Approximate location of the site in Rangiora

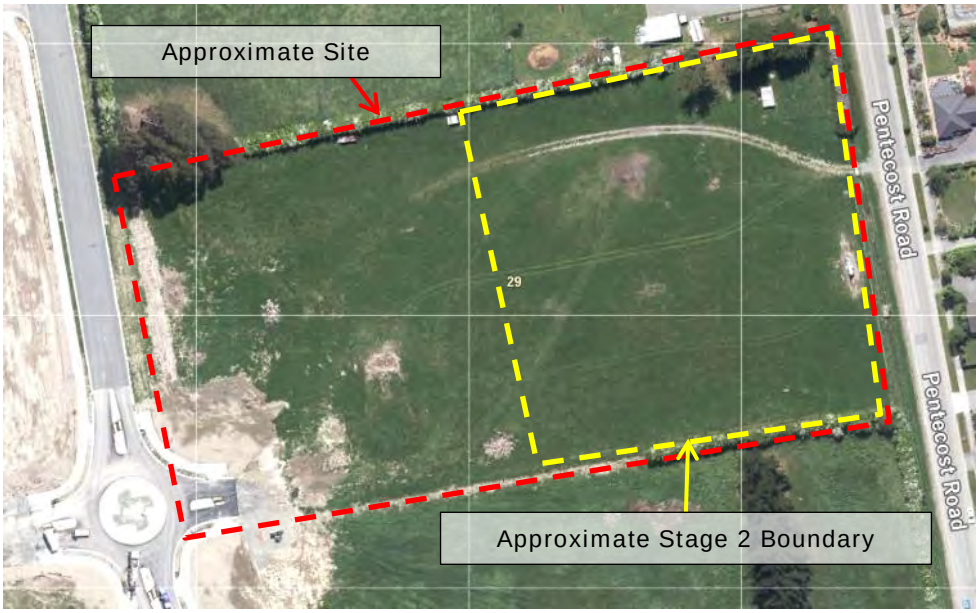

Figure 2: Aerial shot of the site showing the approximate boundaries of the subdivision relative to the second stage of development (Courtesy of Canterbury Maps)

The lot numbers are shown in detail in the proposed subdivision plan, which is enclosed in Appendix A.

2.2 Site Walkover

A site walkover was conducted by EDC on 20/01/2020. The Stage 2 site is generally flat grassed land with mature trees lining the eastern end of the northern boundary along with some old stumps. A small stockpile of gravel and fallen trees is located in the south western most corner of the site seen in Figure 3. A derelict shed is located in the northeastern corner of the Stage 2 site. The shed contains pump equipment to a water bore also located in this area.

A shallow slow-flowing drain that runs north-south along Pentecost Road was present along with a second dry drain that runs east west along the northern perimeter (Figure 5 & Figure 6). The depth of this drain was measured as 1.2m.

Stripping of topsoil noted on Stage 1 (Figure 2).

Figure 3 to Figure 6 show the site, taken during EDC's site walkover:

Figure 3: View of the site looking northeast, note the stockpile of gravel and fallen trees

Figure 4: View of the site from the eastern boundary, with old stumps to the north

Figure 5: View of low flow drain along the eastern perimeter, looking south

Figure 6: View of the dry drain along the northern perimeter

3.0 SITE HISTORY

3.1 Resource Consent Stage Geotechnical & Environmental Works

EDC has previously produced a 'Combined Geotechnical & Preliminary Site Investigation Report' for resource consent of the proposed subdivision (EDC Ref. 45895, dated 18 February 2018), of which the site forms the eastern half. The following forms a summary of the resource consent report which is relevant to the site.

3.1.1 Geotechnical Summary

"Under Section 106 (1) of the RMA, there is no evidence, from a geotechnical perspective, that the site is unsuitable for the proposed development provided any development is undertaken with appropriate engineering design measures (see section 7.0).

The depth to gravel generally decreased in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Available geological maps and nearby borehole information suggests that deep gravel deposits (>21m) are likely present on-site.

*The site is located in an area of 'Low' liquefaction potential based on Geotech's [*Geotech Consultants Ltd*] Liquefaction Study for the Waimakariri District. EDC's review of aerial photos did not identify any liquefaction ejecta following the 2010/2011 Canterbury Earthquake Sequence. EDC's qualitative liquefaction analysis is in line with this indicating a 'Low' risk of liquefaction related ground damage.'*

Area [Stage] *2 may be TC1/TC2 due to the thin layer of potentially liquefiable soils encountered. In order to confirm the Technical Category of 'Zone 2' on site, lot specific shallow CPT testing would be required to quantify the liquefaction potential of the shallow soils. This would also provide some of the information required for the building consent stage report. Alternatively, 'Zone 2' could be assumed to be TC2.*

In addition, the natural stiff clay or dense gravels encountered across the site are likely to meet the NZS: 3604 definition of 'Good Ground'.

Shallow hand testing was recommended, in accordance with the MBIE Guidelines, to confirm ground conditions in the area of specific building platforms to enable foundation design and obtain adequate information Building Consents."

3.1.2 Environmental Summary

"The existing and historical site uses are considered indicative of typical rural blocks with no significant sources of contamination identified. Several areas have been used for burning wood and timber… The qualitative contamination assessment suggests that it is highly unlikely, following the removal of the ash, that there will be an unacceptable risk to residential end-users or other identified potential receptors, with no significant potential sources identified. Therefore, the site is considered suitable for the proposed residential development, with the above-mentioned condition, and a Detailed Site Investigation (soil sampling) is not considered to be justified."

4.0 GEOLOGICAL DESK-BASED INFORMATION

4.1 Geological Mapping

According to the GNS Geological Unit QMap, available on the New Zealand Geotechnical Database (Earthquake Commission / Ministry of Business, Innovation & Employment, 2016), the site is underlain by Late Pleistocene (12,000 to 24,000-year-old) river deposits, comprising 'Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (loess) cap' (Q2a).

The GNS Active Fault maps, available on the NZGD indicate that the nearest active fault is the Ashley Fault, located approximately 3km north of the site.

4.2 Geological Investigation Data

Table 1 below is a summary of information obtained from the New Zealand Geotechnical Database (NZGD) and generalised test pits a previous investigation, from previous investigation holes within the local area:

Hole Reference	Location	Depth	Summary
TP_116816	~50m west	3.2	TOPSOIL to 0.3m Clay, stiff to very stiff to 1.2m Medium dense/dense sandy GRAVEL to 3.2m
BH-49032	~130m S	10.5	SILT with trace gravel to 1.0m Sandy GRAVEL to 1.6m SAND with some gravel to 2.5m GRAVEL with variable silt content to 10.5m

Table 1: Nearby Geological Investigation Summary

4.3 Ground Water Data

The ECan database piezometric contours suggest a groundwater level of approximately 26m above Mean Sea Level (AMSL). Land contours indicate the site has an approximate ground level of 29m AMSL. This suggests a groundwater depth of approximately 3m below ground level.

The piezometric contours indicate an approximate hydraulic gradient of approximately 1v:195h down to the southeast.

4.4 Nearby Springs

An artesian spring is located approximately 110m west of the site. This spring, labelled M35/7493 on the ECan GIS database, feeds the South Brook Stream.

5.0 GEO-HAZARDS DESK-BASED INFORMATION

5.1 Seismic Site Subsoil Classification

EDC considers that a seismic site subsoil classification 'Class D – Deep or soft soil sites', as defined in NZS:1170.5 is appropriate.

5.2 Liquefaction Risk

5.2.1 Waimakariri District Council Information

ECan commissioned Geotech Ltd to undertake a Liquefaction Study for the Waimakariri District Council (Geotech Consultants Ltd., 2008). The 'Map showing Liquefaction Potential' indicates that the site is located in Zone 2 (Areas of recent Holocene Age Alluvium, essentially the active flood plain and river bed area or the major rivers - Low liquefaction potential'.

5.2.2 Liquefaction Assessment Area Map

ECan's Liquefaction Assessment Maps is available on the New Zealand Geotechnical Database (NZGD), identifies areas where 'Damaging liquefaction (is) unlikely' and areas where 'Liquefaction assessment (is) needed'. The site is located in an area where damaging liquefaction is unlikely.

5.3 2010 / 2011 Canterbury Earthquake Sequence

5.3.1 NZGD

The NZGD (containing the previous Canterbury Geotechnical Database) contains information from ECan, EQC and MBIE relating to the 2010/2011 Canterbury Earthquake Sequence (CES). The concept of a database was introduced as part of the TC1, TC2 and TC3 investigations and the following information (in this section) has been extracted from the database and provides a general understanding of the geotechnical conditions of the land in the vicinity of the subject site. The following summary is information pertinent to the site:

- Environment Canterbury – Canterbury Maps

The Canterbury Maps website indicates the site is located in an area labelled 'Green Zone N/A – Rural & Unmapped' as of 10 February 2020.

- GNS Observed Liquefaction Maps

These maps were created by GNS Science to identify the rural areas affected by liquefaction during the 2010/2011 Canterbury earthquake sequence. Areas were mapped and tagged according to the features visually identified in the satellite images and aerial photography. These maps indicate that the majority of the site is covered by "possible" liquefaction ejecta following the 22 Feb 2011 Canterbury earthquake. Comments on this area state that there are possible remnants of liquefaction ejecta from the Darfield earthquake visible on a photo dated 27 Jan 2011 & 28 March 2011. EDC has reviewed these images, available on Google Earth and cannot confirm the presence of liquefaction ejecta on-site.

Important Notice:
This section contains information which was prepared and/or compiled for the Earthquake Commission (EQC) to assist in assessing insurance claims made under the Earthquake Commission Act 1993 and/or for the New Zealand Geotechnical Database on behalf of the Canterbury Earthquake Recovery Authority (CERA). It was not intended for any other purpose. EQC, CERA, their data suppliers and their engineers, Tonkin & Taylor, have no liability to any user of this map and data or for the consequences of any person relying on them in any way.

5.3.2 Recorded peak Ground accelerations

GNS records indicate that the nearest Strong Motion Seismograph location is at Ashley School (approximately 4.9km north-northeast of the site, Figure 7). The following table shows the recorded Peak Ground Accelerations (PGA's) observed at this sensor and the two next closest sensors during the significant earthquakes in the area during 2010 and 2011:

Figure 7: GNS Strong Motion Seismograph Locations

Earthquake event	ASHS	SWNC	KPOC
04 September 2010	0.17g	0.25	0.36
22 February 2011	0.09g	0.21	0.21
13 June 2011	0.05g	0.06	0.10
23 December 2011	0.04g	0.16	N/A

Table 2: Peak Ground Acceleration Records

Notes: Although these PGA's were measured at the seismograph location, it is possible that the site could have been affected by PGA's that were lower or higher.

5.4 Flooding

5.4.1 Flood Management Areas

The Waimakariri District Council (WDC) Natural Hazards GIS database (Waimakariri District Council, 2018) includes an assessment of Flood Hazard. The flood hazard is calculated based on flood water depths and velocity using ground contours and computer models for a 0.5% Annual Exceedance Probability (1 in 200 year) storm event.

The following is an excerpt of this WDC Flood Hazard Map (Figure 8). The site is generally within a 'Low' flood hazard area, with expected ponding of <100mm. Two areas that are located near open drains along the boundaries of the site are identified as having 'medium' flood hazard in blue, these areas could be subject to greater levels of ponding. It should be noted that subdivision earthworks have not yet been completed and are likely to affect the flood risk of the subdivision. It is therefore recommended that floor level requirements for the proposed dwellings are assessed based on the finalised earthworks and storm water control design.

Figure 8: WDC Flood Hazard Map Excerpt

5.4.2 Nearest Water Body / Water Course

A drainage ditch is located adjacent to the east boundary.

The South Brook Stream runs northwest to south east approximately 80m west of the site.

The nearest major watercourse is the Ashley River, located approximately 3.8km north of the site.

6.0 SITE INVESTIGATION

6.1 Rationale

As determined by EDC's 2016 geotechnical report, further lot-specific shallow hand testing and CPT's were recommended to assess potentially liquefiable soils and provide sufficient information for a Building Consent application.

In view of both the number of lots and their relatively small size EDC considers a spread of 12 hand augers, each accompanied by a Scala Penetrometer (SC) test and four Cone Penetration Tests (CPT) across the site. These are in addition to existing test pit data sufficient to provide ground conditions for a dwelling on each lot.

6.2 2016 EDC Intrusive Investigation Summary

As part of the Resource Consent stage geotechnical investigation conducted in 2016, EDC undertook eight test pits and 12 hand auger boreholes (Figure 9).

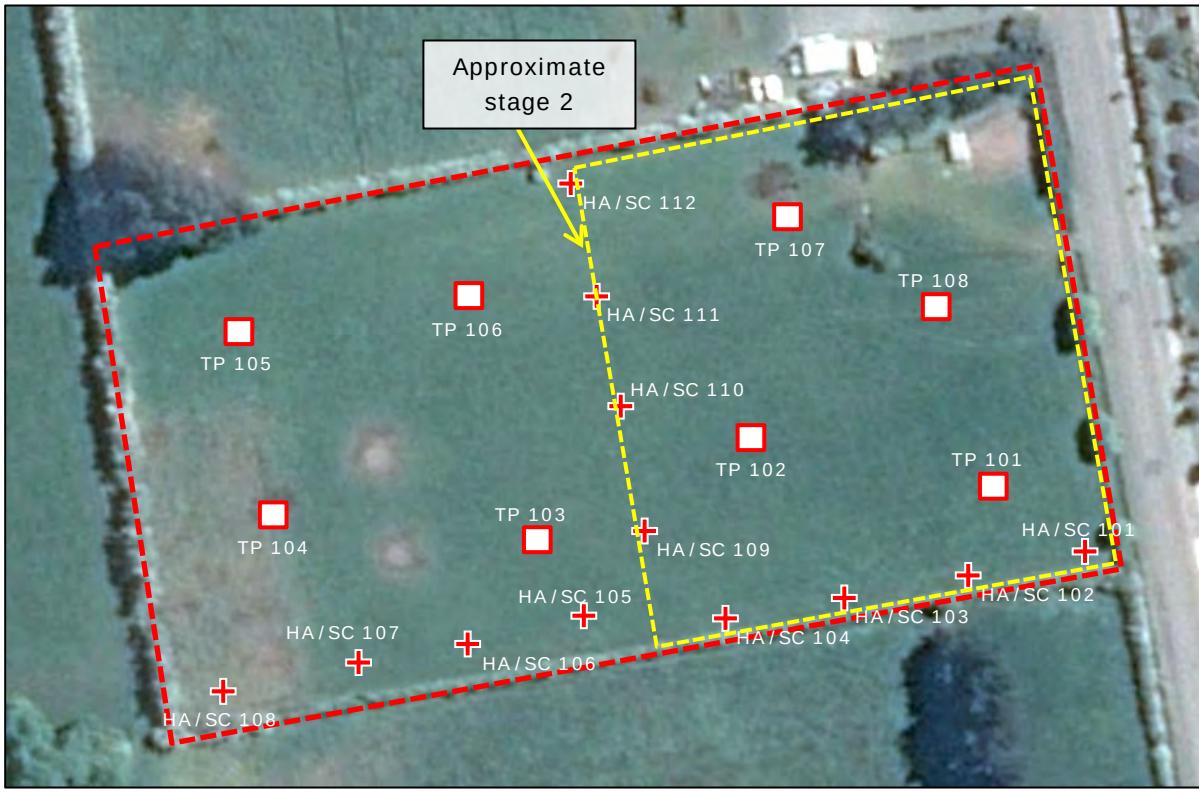

Figure 9: 2016 Intrusive Site Investigation Plan

Four of the test pits were in the site area that is the subject of this report (TP's 101, 102, 107 and 108). These four test pit logs are attached as Appendix C. A summary of ground conditions encountered in these four test pits is given below:

General Depth to top of layer	Generalised Ground Description	Density/Consistency
0.0m	Topsoil	N/A
0.2m	Silty CLAY	Stiff to very stiff
1.2m - 1.6m	Sand & silt layers	Medium dense / firm
2.5 – 3.0m	Sandy GRAVEL	Medium dense / dense

Table 3: Generalised Soil Profile of Site Area (TP's 103-106)

6.3 2020 EDC Intrusive Investigation Summary

6.3.1 Shallow Hand Testing

EDC undertook the shallow geotechnical investigation on the Stage 2 site between 20 and 22 January 2020. This investigation consisted of 12 hand auger boreholes with accompanying Scala Penetrometer (SC) testing, labelled HASC 301 to HA/SC312.

Soils have been described generally in accordance with NZGS: Field Description of Soil and Rock. The results of these shallow investigations form Appendix C.

Hand tests generally refused on inferred natural gravel at depths ranging from 2.00m to 3.10m begl. The approximate investigation locations for all shallow tests undertaken in January 2020 are shown in Figure 10 below:

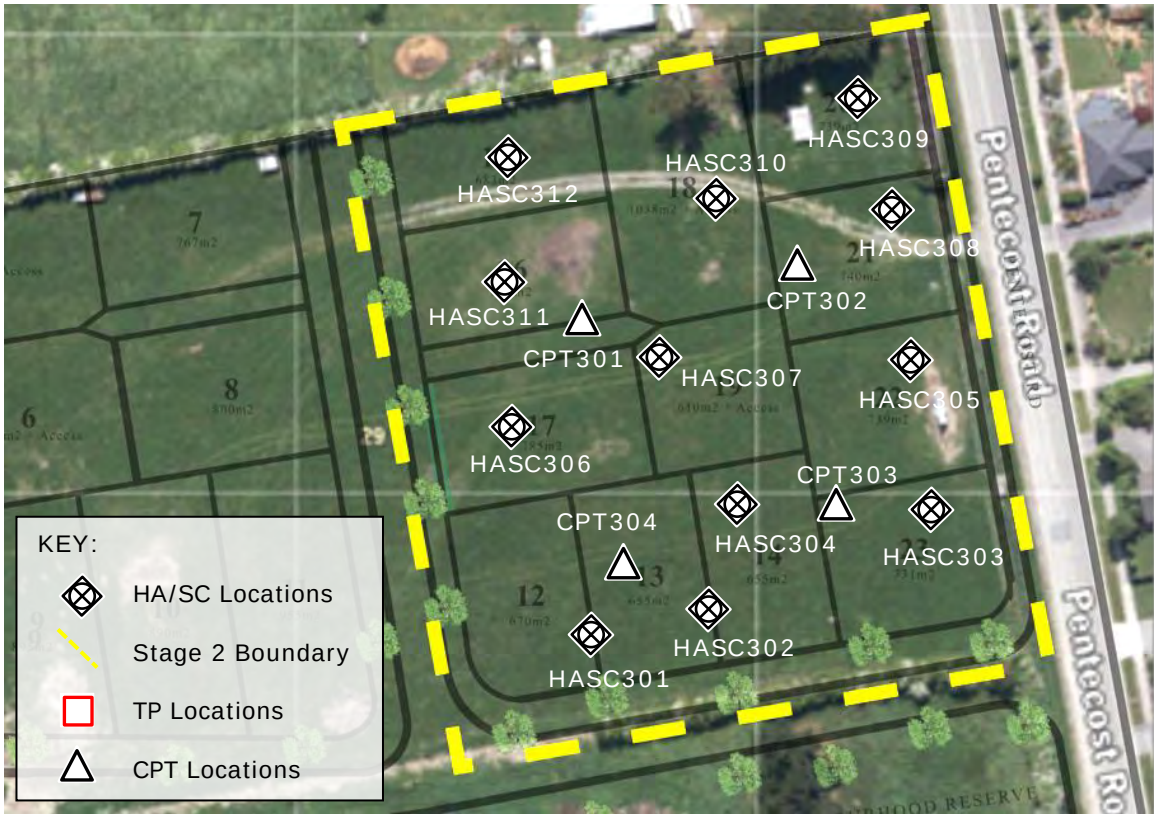

Figure 10: Approximate 2020 Intrusive Investigation Locations with Lot Numbers

6.3.2 Deep Machine Testing

The deep investigation included four Cone Penetration Tests (CPT) across the site, labelled CPT 301 to CPT 304, and was undertaken by Ground Investigation on 21 January 2020. The CPT's were expected to refuse in the dense gravels found at depths 2.00 to 3.10m, which was the case in CPT 301-303. CPT 304 however, reached depths of 10.00m begl, still in dense sandy gravels/dense sand.

The location of the CPT is indicated on Figure 10. Logs of the Normalised Soil Behaviour Type (SBT) for the CPT results are shown in Appendix E.

6.4 Summary of Ground Conditions

This investigation indicates the following approximate soil section across the site (The soils indicated by the CPT's (shaded in grey below) are based on the normalised SBT's established using the Geologismiki Software "CLiq" v.3.0.2.4:

General Depth to top of layer (m)	Generalised Ground Description	Density/Consistency
0.00	Topsoil	Soft to firm
0.25	CLAY with variable silt and sand	Stiff to very stiff
1.60 - 2.00	Sand & silt layers	Medium dense / firm
2.00 – 3.1	Sandy GRAVEL	Medium dense to very dense
>3.1	Sandy GRAVEL/SAND	Dense

Table 4: Generalised Deep Soil Profile Across the Site, 2020 investigation

Soils are generally consistent across the site and are described in Error! Reference source not found.. The depth to gravel generally increasing in depth towards the northeast of the Stage 2 site, with the exception of HA301 which refused on what is assumed to be an 'iron pan'.

CPT's 302 and 303 indicate thin organic horizons between 2.0 and 2.5m, however it is considered that the SBT is not in with the HA's which did not encounter any organics. The misinterpretation of organic soils in CPT analysis is not uncommon.

Variable depths of depths groundwater have been encountered across the site and range from 1.60m to no groundwater encountered to depths of 2.80m during hand auger excavations. Two standpipes were installed at HASC305 and HASC306, which recorded standing groundwater at depths of 1.40m after 24 hours. Test pits excavations in 2016 encountered groundwater at depths of 1.90m to 2.60m.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Static Ultimate Bearing Capacity Assessment

7.1.1 Scala Penetrometer Tests

The Scala Penetrometer results have been assessed using a correlation between Scala blow count and allowable bearing capacity by Stockwell (Stockwell, 1977).

Using this correlation, the Scala Penetrometer results indicate a geotechnical UBC of 300kPa can be assumed for the natural inorganic soils. Scala Penetrometer UBC Graphs from Appendix E.

7.2 Quantitative Liquefaction Analysis

7.2.1 Assessment Methods

Liquefaction analyses to assess estimated ground settlement were undertaken on the data from the CPT's, using the Geologismiki Software "CLiq" v.3.0.2.4, using the methods prescribed by the current MBIE guidance.

There are no major watercourses close to the site. Notwithstanding this, the site is located adjacent to a drain. However, the clays extend to 2.0m depth in the vicinity of the drain and ground water was also recorded at 2.0m depth. In view of this and the depth of the drain only being up to 1.2m it is considered that the risk of lateral spreading is low. As validation of this an assessment assuming groundwater at 2.0m has been undertaken for CPT 302 and 303 (those closest to the drain), assuming that those CPTs are 6m lateral distance from the drain.

7.2.2 Analysis Parameters

Groundwater was encountered in EDC's hand auger boreholes at a depth of between 1.40 and >2.80m, with the water table most commonly being 1.60m. A conservative static groundwater level of 1.50m begl has been assumed with a groundwater level of 1.00m begl used during an earthquake scenario for the liquefaction analyses.

Three seismic scenarios have been analysed for the purpose of assessing future ground performance, in accordance with the MBIE Guidance. The parameters used in these analyses are shown on Table 5:

Scenario	Earthquake Magnitude (Mw)	Peak Ground Acceleration (g)
SLS A	7.5	0.13
SLS B	6.0	0.19
ULS	7.5	0.35

Notes: Serviceability Limit State (SLS) design assesses the deformations that occur under working conditions, while Ultimate Limit State (ULS) assesses the situation that would lead to the collapse of a structure.

Table 5: Liquefaction Analysis Scenario Parameters

7.2.3 Estimated Ground Settlement

The graphical results sheets for each of the analyses are included in Appendix E. The following table summarises the results of estimated settlements:

Test Ref.	Hole Depth (m)	Estimated Total Settlement (mm)		
		SLS Scenario A	SLS Scenario B	ULS Scenario
CPT-301	3.1	0	1	10
CPT-302	6.8	1	3	11
CPT-303	10.1	3	6	21
CPT-304	4.7	1	1	8

Table 6: Summary of Estimated Liquefaction-Induced Settlement

The CPT's estimated settlement generally occurs consistently from 1.20m to 2.60m and again at 8.75m, however, the total settlement is minor being less than 10mm in an SLS event in either scenario, and less than 25mm during a ULS scenario.

7.2.4 Estimated Lateral Spread

The analysis of ULS case lateral spreading for CPT302 and 303 indicates 4mm and 17mm respectively. This is considered to be a worst case. Lateral spreading at SLS is calculated as 0mm.

7.2.5 Liquefaction Severity

The Liquefaction Severity Number (LSN) is a parameter that predicts the occurrence of damaging liquefaction by recognising that damaging liquefaction is related to the depth at which liquefaction occurs. The LSN's for the CPT analyses are shown below:

CPT ref.	Estimated Ground Damage		
	SLS Scenario A	SLS Scenario B	ULS Scenario
CPT-301	1	0	7
CPT-302	1	2	5
CPT-303	2	4	10
CPT-304	0	1	6

LSN Key
0 – 10 = Little to no expression of liquefaction,
10 – 20 = Minor expression of liquefaction,
20 – 30 = Moderate expression of liquefaction,
30 – 40 = Moderate to severe expression of liquefaction,
40 – 50 = Major expression of liquefaction,
>50 = Severe damage.

Table 7: Summary of Estimated Liquefaction-Induced Ground Damage

The above indicates that in an SLS event, little to no expression of liquefaction could be expected (based on Scenario A and B) in all CPT's. During a ULS event, little to minor expression of liquefaction could be anticipated based on CPT-303. CPT 301, 302, and CPT304 have generally more conservative values of LSN, which anticipate little to no expression of liquefaction (Table 9).

7.3 NZS 3604 **"Good Ground"** Assessment

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

The assessment of 300kPa UBC has been based on Scala Penetrometer testing below. In accordance with NZS 3604 soils can be assumed to have 300kPa, where 'the number of blows per 100 mm depth of penetration below the underside of the proposed footing at each test site exceeds:

- Five down to a depth equal to twice the width of the widest footing below the underside of the proposed footing;
- Three at greater depths; and
- Providing the set blow is relatively uniform, the number of blows per 100 mm may be obtained by averaging the number of blows for depths not exceeding 300 mm.

Based on EDC's assessment of the ground conditions, the natural clays encountered from a depth of approximately 0.30m across the site are considered to meet the NZS 3604 definition of 'Good Ground' on all Lots across Stage 2.

Scala Penetrometer Ultimate Bearing Capacity Graphs form Appendix D.

7.4 Technical Category Assessment

The following table is an excerpt from the MBIE Guidance Part A (Table 3.1 – Index criteria for foundation technical categories):

Foundation Technical Category	Future land performance expectations from liquefaction	Nominal SLS land settlement (mm)	Nominal ULS land settlements (mm)	Nominal lateral stretch (mm)
TC1	Liquefaction damage is unlikely in a future large earthquake.	0-15	0-25	Generally not expected
TC2	Liquefaction damage is possible in a future large earthquake.	0-50	0-100	<50
TC3	Liquefaction damage is possible in a future large earthquake	>50	>100	>50

Table 8: MBIE Technical Category Criteria

Lateral spreading relating to the drain adjacent to the east boundary is not anticipated in an SLS event and only 17mm is estimated, at a distance of 6m from the drain in a ULS event. This figure is considered conservative and such movement unlikely to present a significant risk of a structure being non-compliant with the Building Code ULS performance expectations.

Although only 1 hole achieved 10m depth (the depth upon which TC classification is based) it is considered that the likelihood for significant liquefiable layers beneath the termination depths of CPT 301, 302 and 304 is low. Therefore the estimated vertical settlements from the CPT analyses are considered to indicate that the site is within the TC1 Category across the site.

EDC considers an MBIE TC1 foundation solutions to be the most appropriate to the site.

8.0 CONCLUSIONS & RECOMMENDATIONS

8.1 Ground Description

Our intrusive investigations indicate the following approximate shallow soil profile across the site:

General Depth to top of layer (m)	Generalised Ground Description	Density/Consistency
0.00	Topsoil	Soft to firm
0.25	CLAY with variable silt and sand	Stiff to very stiff
1.60 - 2.00	Sand & silt layers	Medium dense / firm
2.00 – 3.1	Sandy GRAVEL	Medium dense to very dense
>3.1	Sandy GRAVEL/SAND	Dense

Table 9: Generalised Soil Profile Across the Site

Hand tests are generally consistent in geology and refused at shallow depths on what is inferred to be natural gravel at depths ranging from 2.00m to 3.10m begl, generally increasing in depth towards the northeast of the site. An exception is HA301 which refused on what is assumed to be an 'iron pan' at 1.30m. A nearby geotechnical investigation borehole indicates that the gravel layer is likely to extend to at least 21.00m begl.

Groundwater was encountered at variable depths groundwater, assumed to be under slight artesian pressure and range from as shallow to 1.60m or no groundwater and depths of 2.80m during hand auger excavations. Two standpipes were installed at HASC305 and HASC106, which recorded standing groundwater at depths of 1.40m after 24 hours. Test pits excavations in 2016 encountered groundwater at depths of 1.90m to 2.60m.

8.2 Static Ground Settlement

It is proposed to construct a light-weight dwelling on the site and provided that foundations are designed using the above Ultimate Bearing Capacities and on an approved bearing stratum the risk of static settlement is considered low.

8.3 Geotechnical Seismic Assessment

Based on the assessment of the ground conditions, EDC considers the natural clays encountered from depths of approximately 0.30m across the site to meet the NZS 3604 definition of 'Good Ground' on all Lots across Stage 2. A Geotechnical UBC of 300kPa (i.e. following application of the strength reduction factor Φ = 0.5, providing a dependable bearing capacity of 150kPa) can be assumed for design.

Any topsoil/fill, very soft, organic or otherwise unsuitable material encountered is not considered a suitable bearing stratum and will require removal beneath the building platform.

8.4 Water Bore Decommissioning

A water bore is located on proposed Lot 20. This water bore should be fully decommissioned and capped and the position surveyed. It is recommended that the bore be cut down to a minimum of 1.0m below ground level and the excavation backfilled with compacted AP40 hardfill. The capping works should be undertaken by an experienced water well contractor. It is recommended that IL 2 structures are not positioned over the well position.

8.5 Liquefaction Analyses

Liquefaction analysis indicates that:

- The sandy gravel encountered on-site from the depth of 2.20m to 3.10m and extending to a depth of 8.75m is generally non-liquefiable.
- CPT301 had the largest settlements in all scenarios, with liquefaction generally occurring above the non-liquefiable gravel.
- Settlements total 21mm under ULS conditions and are negligible under SLS conditions ($\leq$6 mm). These estimates seem realistic, as no liquefaction ejecta observed during EDC's review of GNS observed liquefaction Maps in our previous Stage 1 report.
- Lateral spreading relating to the drain adjacent to the east boundary is not anticipated in an SLS event and only 17mm is estimated, at a distance of 6m from the drain, in a ULS event. This figure is considered conservative and such movement unlikely to present a significant risk of a structure being non-compliant with the Building Code ULS performance expectations.
- Although only 1 hole achieved 10m depth (the depth upon which TC classification is based) it is considered that the likelihood for significant liquefiable layers beneath the termination depths of CPT 301, 302 and 304 is low.
- Based on the above the site is considered to be within the TC1 Category for land performance across the site.

8.6 Earthworks Comment

The natural soils onsite are considered suitable for bulk earthworks, subject to: moisture control, appropriate compaction, and geotechnical confirmation of its suitability. Any organic-rich soils are not suitable for use as engineered fill.

8.7 Flood Risk

The WDC Flood Hazards Maps indicate that the site is within a 'Low' flood hazard area (with expected ponding on <100mm). It should be noted that subdivision earthworks have not yet been completed and are likely to affect the flood risk of the subdivision. It is therefore recommended that floor level requirements and earthworks restrictions should be sought from Waimakariri District Council for Lots 15, 18, 22 and 23.

8.8 Dwelling Foundation Options

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

8.8.1 Concrete Floor

Type C concrete slab-on-grade foundations in accordance with NZS 3604 (with B1/AS1 modifications) are considered suitable for site conditions. Any hardfill to be placed beneath the slab should consist of an appropriately compacted, well-graded gravel (AP40 or AP65), with a layer of geotextile (DuraForce AS280 or Bidim A19 or engineer approved equal) at the base. Alternatively a suitably designed waffle-slab would also be appropriate.

The foundation can be founded in the natural inorganic clay generally encountered from 0.3m begl, where a Geotechnical UBC of 300kPa can be used for design.

8.8.2 Timber Floor

Timber floor pile foundations with either a pile perimeter or reinforced concrete perimeter footing, in accordance with NZS 3604 (with B1/AS1 modifications) would also be suitable.

The foundation can be founded in the natural inorganic clay generally encountered from 0.3m begl, where a Geotechnical UBC of 300kPa can be used for design.

8.9 General

It is unlikely that excavation depths will be such that dewatering is required. However should dewatering be required, the works should be undertaken in accordance with the Waimakariri District Council and ECan rules.

If gravel hardfill is required, it should be compacted in accordance with NZS 4431:1989 Code of Practice for Earthfill for Residential Development and MBIE Module 5A: Specification of ground improvement for residential properties in the Canterbury region (MBIE & NZGS, 2015). Any engineered fill greater than 600mm will require verification and sign off by a Chartered Professional Engineer (geotechnical).

According to the New Zealand Building Code ultimate bearing capacities should be multiplied by 0.80 – 0.90 (EDC recommends 0.8) for load combinations involving earthquake over strength and 0.40 – 0.55 (EDC recommends 0.50) for all other load combinations.

It is the structural engineer or designer's responsibility to ensure that the recommendations of this report are correctly understood and applied. We are happy to discuss the project with the structural engineer or designer and recommend that we review the final design documentation prior to construction.

Any topsoil/fill, very soft, organic or otherwise unsuitable materials encountered are not considered a suitable bearing stratum for new foundations and will require removal beneath the building platform.

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

8.10 Construction Inspections

It is recommended that a Chartered Professional Engineer with appropriate geotechnical experience be engaged to supervise any foundation works. This is in accordance with normal council practice at the Building Consent stage. It should also be noted that under the Building Act (2004), there are specific requirements for supervision by appropriately qualified personnel.

All inspections will require a minimum of 24 hours' notice and it should be noted that unless we are given the chance to undertake all appropriate inspections for the items specified in the Building Consent, a Producer Statement (PS4) will not be issued.

8.10.1 Foundation Inspections

The geotechnical engineer should inspect earthworks and foundation construction at the following stages, and pursuant to any Building Consent Conditions:

1. Formation level of any new foundations; and
2. If gravel hardfill is required and is >600mm thick, compaction testing should be undertaken. Frequency will be dependent on the thickness of the fill and the validation test method adopted but should occur at least once gravel fill has been placed and compacted.

8.11 Health & Safety

We recommend that 'Safety in Design' principles are included during the design of the proposed structure/development. It should be noted that all parties involved in construction, including the client have responsibilities under the current 'Health and Safety at Work Act 2015'. This includes ensuring that the chosen contractor is both competent and suitably qualified/experienced to undertake the commissioned works.

Specifically, with respect to earthworks and foundations for the site, consideration needs to be made with respect to the restriction of public access during construction.

EDC would be happy to provide geotechnical/geoenvironmental advice in relation to these issues at any workshops or design meetings for this project. In addition our Structural and Fire Safety Design Engineers can provide advice as appropriate.

9.0 REFERENCES

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APPENDIX A

SUBDIVSION PLAN

BC201209

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
ROADING
1
700m2
2
700m2
3
700m2
4
700m2
5
824m2 + Access
6
872m2 + Access
7
767m2
8
800m2
9
895m2
10
890m2
11
955m2
12
670m2
13
655m2
14
655m2
15
683m2
16
684m2
17
785m2
18
1038m2 + Access
19
610m2 + Access
20
739m2
21
740m2
22
739m2
23
731m2
TOWNSHEND RD
PENTECOST RD
WDC NEIGHBOURHOOD RESERVE

APPENDIX B

EXISTING REPORT

29 PENTECOST ROAD, RANGIORA

COMBINED GEOTECHNICAL & PRELIMINARY SITE INVESTIGATION REPORT

Prepared for Quintin Bruce

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Project 45895 - 18/02/2016

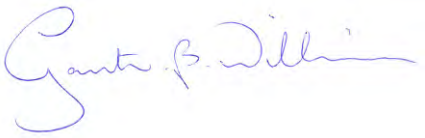
Engineering Design Consultants Ltd
W: www.edc.co.nz
E: team@edc.co.nz
Christchurch: 1st Floor, 39 Carlyle St, Sydenham Ph (03) 355 5559 PO Box 7534, Sydenham, 8240
Auckland: 1st Floor, Unit 1, 100 Bush Rd, Albany Ph (09) 451 9044 PO Box 118, Albany Village, 0755

Revision	Date	Engineer	Description
0	18/02/2016	GW	Original

REPORT PREPARED BY:

Delane Traber
Dip Civil Eng GIPENZ
Geotechnical/Geoenvironmental Engineer

REPORT CHECKED BY:



Gareth B Williams
MSc(Eng) CPEng MIPENZ IntPE(NZ) MInstD MEIANZ
Snr Geotechnical Engineer, Director

Limitations of Report

Except where required by law, the findings presented as part of this report are for the sole use of our client. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing. To the extent permitted by law, EDC expressly disclaims and excludes liability for any loss, damage, cost or expense suffered by any third party relating to or resulting from the use of, or reliance upon any information contained in this report. It is the responsibility of third parties to independently make enquiries or seek advice in relation to their particular requirements

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

EXECUTIVE SUMMARY

It is proposed to subdivide the lifestyle block at 29 Pentecost into a 23 lots residential subdivision.

This investigation has been conducted to: 1) determine if the land is potentially, or actually, affected by contaminants because of its historical and/or current use and the types of activities previously undertaken on it, and 2) assess the suitability of the site for subdivision through a Resource Management Act Section 106 assessment.

Geotechnical

Under Section 106 (1) of the RMA, there is no evidence, from a geotechnical perspective, that the site is unsuitable for the proposed development provided any development is undertaken with appropriate engineering design measures (see section 7.0).

The site generally consists of a grazing paddock with an area of eucalyptus tree stumps, grown for domestic fire wood located in the southwest corner of the site. A disused, concrete cased open well, approximately 1m wide and 3.6m deep is located centrally along the northern portion of the site. At the time of EDC's site visit the groundwater level was approximately 1.3m below the surrounding ground level. An approximately 2m wide and 1m deep drainage ditch runs adjacent to Pentecost Rd, on the eastern boundary of the site.

The established trees (both adjacent to the sheds and in the former plantation area) are likely to have large root systems that will need to be completely remove beneath any future building platform. Though not observed, there is a possibility for localised areas of fill relating to buried waste/foundations/septic tank associated with the historical dwelling.

The following is a generalised soil profile for the site:

General Depth to top of layer	Generalised Ground Description	Density/Consistency
0.0m	Fill & Topsoil	N/A
0.2m	Silty CLAY	stiff to very stiff
1.3m - 1.6m	Sand & clay layers	Medium dense / firm
1.2m – 3.0m	Sandy GRAVEL	Medium dense/dense

The depth to gravel generally decreased in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Wet silt and sand layers (0.4m to 1.1m thick above the gravel) were encountered in TP's 101, 102, 107 & 108. Available geological maps and nearby borehole information suggests that deep gravel deposits (>21m) are likely present on-site.

The site is located in an area of 'Low' liquefaction potential based on Geotech's Liquefaction Study for the Waimakariri District. EDC's review of aerial photos, did not identify any liquefaction ejecta following the 2010/2011 Canterbury Earthquake Sequence. EDC's qualitative liquefaction analysis is in line with this indicating a 'Low' risk of liquefaction related ground damage. However in the eastern half of the site (Area 2 of Figure 3), 0.4m to 1.1m of potentially liquefiable soils were encountered.

Future land performance of the site is likely to be within the limits of CERA land classification Technical Category 1 (TC1) for the west portion of the site (Area 1). However in the remainder of the site (Area 2) may be TC1/TC2 due to the thin layer of potentially liquefiable soils encountered. In order to confirm the Technical Category of 'Zone 2' on site, lot specific shallow CPT testing would be required to quantify the liquefaction potential of the shallow soils. This would also provide some of the information required for the building consent stage report. Alternatively 'Zone 2' could be assumed to be TC2.

In addition, the natural stiff silt or dense gravels encountered across the site are likely to meet the NZS: 3604 definition of 'Good Ground', provided that the Liquefaction potential of 'Area 2' is quantified and found to be within the TC1 limits. Shallow hand testing (Scala Penetrometers & hand augers are considered suitable for the entire site) should be undertaken in accordance with the MBIE Guidelines to confirm ground conditions in the area of specific building platforms to enable foundation design and obtain adequate information Building Consents.

Environmental

The existing and historical site uses are considered indicative of typical rural blocks with no significant sources of contamination identified. Several areas have been used for burning wood and timber. Although this is not a HAIL activity, the resulting ash is not considered suitable for the proposed residential development. The ash should be completely removed and disposed of at a suitable landfill site. Alternatively the ash could be tested for heavy metals and Polycyclic Aromatic Hydrocarbon (PAH), in order to prove that the ash is suitable for the proposed residential land use, however this is considered unlikely to be the case. All works should be appropriately documented and validated by an ECan registered Suitably Qualified and Experienced Person (SQEP).

Based on the qualitative contamination assessment it is considered more likely than not that HAIL activities have not occurred.

The qualitative contamination assessment suggests that it is highly unlikely, following the removal of the ash, that there will be an unacceptable risk to residential end-users or other identified potential receptors, with no significant potential sources identified. Therefore the site is considered suitable for the proposed residential development, with the above mentioned condition, and a Detailed Site Investigation (soil sampling) is not considered to be justified.

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These Appendices should be read in conjunction with the main part of the report and this report should not be considered complete without them.

1.0 INTRODUCTION

1.1 Terms of Reference

Engineering Design Consultants Ltd (EDC) was commissioned by Quinton Bruce to provide a Resource Consent Stage Geotechnical & Preliminary Site Investigation (PSI) Report for the purpose of subdividing the parcel of land at 29 Pentecost Road, Rangiora (Waimakariri District), henceforth referred to as 'the site'.

The Geotechnical aspect of this investigation was completed in accordance with the MBIE guidance document *'Guidelines for the investigation and assessment of subdivisions on the flat in Canterbury'* (Ministry of Business, Innovation and Employment, Dec 2012)

The Environmental sections have been prepared by suitably qualified practitioners, in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No 1 *'CLMG No. 1'* (Ministry for the Environment, 2001 (Revised 2011)) .

1.2 Proposed Subdivision

It is proposed to subdivide the site into 23 lots, with two roads that will be vested to the council. Proposed lot sizes range from 655m^2 to 1040m^2, with a total site area of 2.05Ha. A 'Proposed Subdivision' plan by Survus Consultants Ltd, dated 20 November 2015, was provided to EDC by the client. A copy of the proposed subdivision plan forms Appendix A.

1.3 Objective and Scope of Investigation

The objectives of this investigation are to: 1) determine if the land is potentially affected by contaminants because of its historical and/or current use, and 2) assess the suitability of the site for subdivision through a Resource Management Act Section 106 (1) assessment.

The following work has been undertaken as part of this investigation:

- A geotechnical desktop study.
- Assessment of historic activities and likelihood that these uses have resulted in ground contamination at the site.
- Document review of: Historic Certificate of Title, Council Property Files, Aerial Photos and Anecdotal Records.
- Site walkover.
- Excavation supervision of test pits.
- Resource Management Act Section 106 (1) assessment.
- Confirm the current development plan for site and associated soil disturbance activities.
- Define the conceptual site model.
- Characterisation of the site and determination if Detailed Site Investigation is required.

2.0 SITE IDENTIFICATION

2.1 Location and Legal Description

The legal description of the site is Part RS 569 and has an area of approximately 2.05Ha. The site is a rectangular shape and extends to the west of Pentecost Road, 250m north of its intersection with South Belt. The NZMG co-ordinates for the approximate centre of the site are Easting: 2476200, Northing: 5765483.

The site is accessed via a farm gate, over a concrete box culvert, used to bridge a drainage ditch running along the eastern site boundary. Additional features are shown on Figure 1, below.

Figure 1: Site Aerial Photo (Courtesy of Google Earth)

The Waimakariri District Plan indicates the site is zoned as Rural.

2.2 Site Walkover

The site generally consists of:

- A former domestic garden (associated with a previous on-site dwelling) located in the northeast corner of the site. This area is currently used for growing vegetable and contains a dilapidated hay shed and a garden shed. An irrigation well is located adjacent to the existing shed and feeds a small above ground water tank.
- A grazing paddock. A tree trimming and scrap wood burning area is located to the west of the dilapidated hay shed. Three smaller burning areas, used to burn felled trees, are located on the southwest portion of the site, adjacent to an area of eucalyptus tree stumps, grown for domestic fire wood.

A disused irrigation well and pump shed are located centrally along the northern portion of the site. This well is a concrete cased open well, approximately 1m wide and 3.6m deep. At the time of EDC's site visit the groundwater level was approximately 1.3m below the surrounding ground level.

An approximately 2m wide and 1m deep drainage ditch runs adjacent to Pentecost Rd, on the eastern boundary of the site.

No ground damage was evident at the time of EDC's site visits on 17 December 2015 & 22 Jan 2016.

A collection of site photos is included in Appendix B.

3.0 SITE HISTORY

Historical information relating to the site has been collected from a variety of sources including current and historical certificates of title, historic aerial photographs, and the Waimakariri District Council property file and contamination enquiry. The history focuses on on-site activities, except for the aerial photograph review, where comments are also provided on readily observable surrounding land use, and the council contamination enquiry, where a search is undertaken for consents issued within a 100m radius of the site.

3.1 Site Ownership

EDC conducted a review of available certificates of title. The information details the sale of the property to the current owner 30 September 2015. No commercial land uses are indicated on the certificates.

3.2 Council Property Files

The property file for the site was reviewed to identify potential HAIL activities or sources of contamination on site. The information mainly relates to service records for the previous dwelling, and building permits for the pump shed along the northern boundary and the existing storage shed. A plan in the file suggests that there may be a disused / backfilled septic tank in the former garden area. There is no indication of potential HAIL activities.

3.3 Listed Land Use Register

The Listed Land Use Register (LLUR) does not currently have any information about Hazardous Activities and Industries having occurred on or within 100m of the site.

3.4 Aerial Photos

Date - Source	Site Observations	Surrounding Land Features
1941 – LINZ	The site mainly consists of a bare field with a dwelling and associated sheds located in the northeast corner of the site. This area is fenced off in a similar manner to the existing site layout. What appears to be a large hay stack is located in the approximate centre of the field.	The surrounding area mainly consists of paddocks. A stream is evident to the southwest of the site. Several rural dwellings are visible in the area. The existing main roads in the area have been constructed.
1973 - LINZ	The dwelling appears to be overgrown, and the previous sheds have been demolished. The large existing hay shed and pump shed along the northern boundary have been constructed.	No significant changes visible.
1984 - LINZ	The previous dwelling has been demolished and the existing garden shed has been constructed.	No significant changes visible.

Date - Source	Site Observations	Surrounding Land Features
1994 - LINZ	A eucalyptus tree plantation in the southwest corner of the site has been planted.	Residential subdivision to the east of the site has begun.
2004 - LINZ	Trees surrounding the existing sheds and in the plantation are now well established.	The subdivision to the east of the site is now complete.
2015 – Google Earth	The eucalyptus tree plantation has been cut down with three burn areas adjacent. An additional large pile of plat waste is visible to the west of the existing shed.	No significant changes visible.

These historical aerial photos form Appendix C.

3.5 Anecdotal Evidence

The following information has been provided by Mr Quinton Bruce (the current land owner), with regards to the site:

- Mr Bruce has owned the property for three months during which the land has been used for sheep grazing.
- The land was previously owned by an elderly couple who used the land to graze sheep and grow personal fire wood (eucalyptus plantation in the southwest corner of the site).
- Mr Bruce has not applied any herbicide, pesticide of fertilizers to the land. He is also not aware of any potentially hazardous activities having occurred on-site or on adjacent sites.
- There are two wells on-site a disused irrigation well and pump shed located centrally on the northern boundary to the site and a smaller well located adjacent to the shed in the north east corner of the site.

3.6 Summary

The site appears to have been a lifestyle block mainly used for grazing since pre 1941 to present. It would be reasonable to assume that fertilisers have been applied to the pasture and possibly herbicides, however there is no indication that bulk storage of these chemical has occurred on-site.

The established trees (both adjacent to the sheds and in the former plantation area) are likely to have large root systems that will need to be completely remove beneath any future building platform. Though not observed, there is a possibility for localised areas of fill relating to buried waste/foundations/septic tank associated with the historical dwelling.

4.0 GEOTECHNICAL DESK STUDY

4.1 Geology

According to the GNS QMAP available on the Canterbury Geotechnical Database (Earthquake Commission, 2014) the site is underlain by 'Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (Possibly loess)'.

4.2 Nearby Ground Investigation Data

The following is a summary of information obtained from the Environment Canterbury (ECan) GIS Advanced Viewer (Environment Canterbury, 2014) and the Canterbury Geotechnical Database (Earthquake Commission, 2014) from previous drilling investigations within the local area:

Borehole Reference	Location	Depth	Summary
M35/6119	~50m N	11.3m	Earth 0.0m – 0.3m Clay 0.3m – 4.0m Sandy Gravel 4.0m – 11.3m
BH_49032	~140m S	11.5m	SILT, stiff 0.0m – 1.0m Sandy GRAVEL, medium dense 1.0m – 1.6m SAND, medium dense 1.6m – 2.5m Silty GRAVEL, medium dense to dense 2.5m – 11.5m
M35/9867	~540m W	21.0m	Topsoil 0.0m – 0.3m Hard clay 0.3m – 1.3m Gravel 1.3m – 21.0m

4.3 ECan Groundwater Information

The ECan database piezometric contours suggest a groundwater level of approximately 29m Above Mean Sea Level (AMSL). Land contours indicate the site has an approximate ground level of 26m AMSL. This suggests a groundwater depth of approximately 3m below ground level.

The piezometric contours indicate an approximate hydraulic gradient of approximately 1v:195h down to the southeast.

4.4 Springs

An artesian spring is located approximately 110m west of the site. This spring, labelled M35/7493 on the ECan GIS database, feeds the South Brook Stream.

4.5 Liquefaction

The following information has been collected in order to assess the risk to the site from liquefaction and lateral spreading in a future earthquake event:

4.5.1 CERA

The land status map from the CERA website indicates the subject site is classified "Green" in a "N/A – Rural & Unmapped" zone as at 22 December 2015.

4.5.2 ECan Liquefaction Assessment Area Map

ECan's Liquefaction Assessment Map is available on the Canterbury Geotechnical Database (CGD) and identifies areas where 'Damaging liquefaction (is) unlikely' and areas where 'Liquefaction assessment (is) needed'. The site is located in an area where damaging liquefaction is unlikely.

4.5.3 GNS Observed Liquefaction Maps

These maps were created by GNS Science to identify the rural areas affected by liquefaction during the 2010/2011 Canterbury earthquake sequence. Areas were mapped and tagged according to the features visually identified in the satellite images and aerial photography. These maps indicate that the majority of the site is covered by "possible" liquefaction ejecta following the 22 Feb 2011 Canterbury earthquake. Comments on this area state that there are possible remnants of liquefaction ejecta from the Darfield earthquake visible on a photo dated 27 Jan 2011 & 28 March 2011. EDC has reviewed these images, available on Google Earth, and cannot identify any potential signs of liquefaction ejecta on-site.

Important Notice
This section (Section 5.12) and information where CGD has been referenced in this report was created from maps and/or data extracted from the Canterbury Geotechnical Database (https://canterburygeotechnicaldatabase.projectorbit.com), which were prepared and/or compiled for the Earthquake Commission (EQC) to assist in assessing insurance claims made under the Earthquake Commission Act 1993. The source maps and data were not intended for any other purpose. EQC and its engineers, Tonkin & Taylor, have no liability for any use of the maps and data or for the consequences of any person relying on them in any way. This "Important notice" must be reproduced wherever this information or any derivatives are reproduced.

4.5.4 Waimakariri District Council Information

ECan commissioned Geotech Ltd to undertake a Liquefaction Study for the Waimakariri District Council (Geotech Consultants Ltd., 2008). The 'Map showing Liquefaction Potential' indicates that the site is located in Zone 2 (Areas of recent Holocene Age Alluvium, essentially the active flood plain and river bed area or the major rivers - Low liquefaction potential'.

4.6 Seismicity

4.6.1 Geological Fault-lines

The nearest active fault is the Ashley Fault, located approximately 4km north of the site.

4.6.2 Seismic Site Subsoil Classification

EDC consider that a seismic site subsoil classification 'Class D – Deep or soft soil sites', as defined in NZS:1170.5 is appropriate.

4.7 Flooding & Water Bodies

4.7.1 Waimakariri District Council

The Waimakariri District Council has produced a South West Rangiora Outline Development Planning Map (No. 173), which includes the site. This map indicates that the site is not located within a 'High Hazard Flood Area'. The South West Rangiora Outline Development Plan forms Appendix D.

The Waimakariri District Council (WDC) has supplied 100yr and 200yr average recurrence interval (ARI) flood maps for the site. These maps indicate minor ponding (<0.25m deep), in several areas on the edge of the site. These maps form Appendix E.

4.7.2 Nearest Water body/course

South Brook runs northwest to south east approximately 80m west of the site. The nearest major watercourse is the Ashley River, located approximately 3.8km north of the site.

5.0 SITE INVESTIGATION

It is proposed to subdivide the site into 23 residential lots. Therefore in accordance with the MBIE Subdivision Guidelines, one Test Pit (TP) per four lots was excavated, to total eight TP's for the Resource Consent stage of the subdivision. Additional hand testing was undertaken along the proposed road lines to assist with an assessment of road construction at Engineering Approval stage.

5.1 Site Work

The approximate investigation locations are indicated on Figure 2 below. Soils have been described generally in accordance with NZGS: Field Description of Soil and Rock.

5.1.1 Test Pits

TP excavation was undertaken on 17 December 2015. Eight Test Pits (TP 101 to 108) were excavated using a 6T digger, under the supervision of EDC. The TP's reached their target depths, which ranged from 3.2m to 3.6m below existing ground level (begl).

The TP logs are contained in Appendix F. Photos of the TP's are contained in Appendix B.

5.1.2 Hand Testing

EDC visited the site on the 22 January 2016 to undertake a shallow geotechnical investigation to determine the subsoil conditions. We undertook twelve hand augered exploratory holes (HA's) and twelve Scala Penetrometer (SC) tests (HA/SC 101 & 112). All HA's and SC's reached their target depth of 0.9m begl.

The results of these investigations are shown on the HA Log sheets attached in Appendix F.

5.2 Soil Profile

The general soil profile consists of a thin layer of:

General Depth to top of layer	Generalised Ground Description	Density/Consistency
0.0m	Topsoil	N/A
0.2m	Silty CLAY	stiff to very stiff
1.3m - 1.6m	Sand & silt layers	Medium dense / firm
1.2m – 3.0m	Sandy GRAVEL	Medium dense/dense

The depth to gravel generally decreased in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Wet silt and sand layers (0.4m to 1.1m thick above the gravel) were encountered in TP's 101, 102, 107 & 108. Available geological maps and nearby borehole information suggests that deep gravel deposits (>21m) are likely present on-site.

Figure 2: Intrusive Site Investigation Plan

6.0 GEOTECHNICAL COMMENT

6.1 Liquefaction

For liquefaction to occur there needs to be three preconditions:

- Young (Holocene or less than 10,000 years old) sediments;
- The soils include fine-grained and non-cohesive (silts and sands);
- The soils are saturated (below the water table).

The alluvial soils encountered onsite are expected to be of the Holocene Age. The general soil profile consists of a thin layer of topsoil overlying stiff to very stiff silty CLAY to approximately 1.2m to 1.6m begl, underlain by silt, sand & clay layers to the gravel. Medium dense/dense sandy GRAVEL was encountered at depth ranging from 1.2m to 3.0m, with the depth to the top of the gravel layer generally decreasing in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Available geological maps and nearby borehole information suggests that the gravel deposits are likely to extend to a depth in excess of 21m.

Although the soils encountered above the sandy gravel were not saturated, wet silt and sand layers (0.4m to 1.1m thick above the gravel) were encountered in TP's 101, 102, 107 & 108. Wet soils >0.3m thick were also encountered in TP's 105 & 106. This material is considered to be potentially liquefiable / prone to cyclic softening.

The risk of liquefaction related surface damage / settlement is generally considered Low, though there is a risk of soil liquefaction in Area 2 (Figure 3) for the following reasons:

- Non-liquefiable gravel is present at depth greater than 2m begl.
- The thickness of potentially liquefiable soils is limited (1m).

Based on the above and the desk study information we consider that:

- Future land performance of western portion of the site is likely to be within the limits of CERA land classification Technical Category 1 (**TC1**) (Area 1). However the remainder of the site (Area 2) may be TC1/TC2 due to the thin layer of potentially liquefiable soils encountered. These zones are shown on Figure 3, below.
- In order to confirm the Technical Category of 'Area 2' on site, lot specific shallow Cone Penetration Testing (CPT) to the top of the gravel layer would be required to quantify the liquefaction potential of the shallow soils. This would also provide some of the information required for the Building Consent stage report. Alternatively 'Area 2' could be assumed to be TC2.

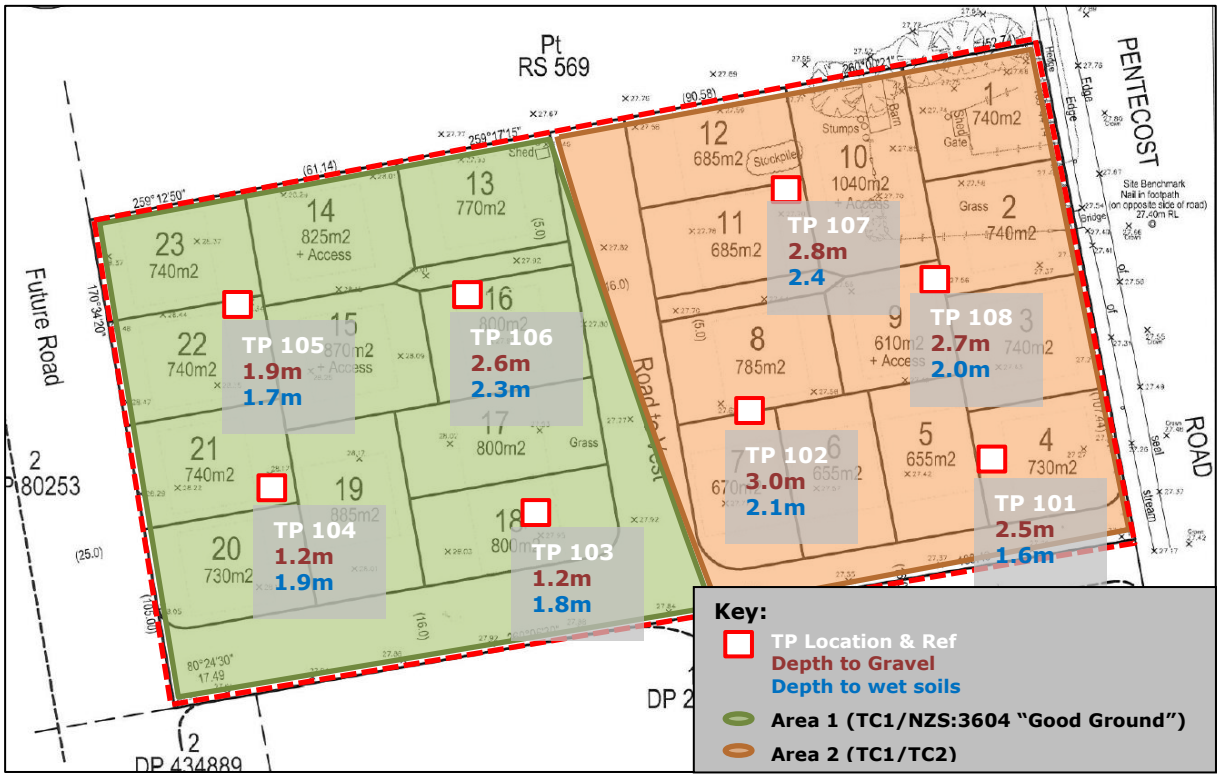

Figure 3: TC Zoning Plan

6.2 Bearing Capacity and Settlement

The intrusive site investigation indicated natural stiff to very stiff silt/clay in 'Area 1' is likely to meet the NZS: 3604 definition of 'Good Ground'. However this should be confirmed with site specific investigation (Scala Penetrometers, hand augers) in the specific building platforms.

Due to the presence of potentially liquefiable soils 'Area 2' cannot be confirmed to meet 'Good Ground'. CPT's could be undertaken, on the 'Area 2' lots to quantify the potential risk of liquefaction and possibly enable the use of NZS:3604 foundations (if it is confirmed to be within the TC1 limits).

This testing is required enable foundation design and Building Consent, in accordance with the MBIE Guidelines.

Provided that foundations are located on a suitable bearing stratum, and to an engineer approved design, the risk of unacceptable settlement of the building is low.

7.0 RESOURCE MANAGEMENT ACT ASSESSMENT

Section 106 (1) of the Resource Management Act (RMA) states:

'*A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—*

(a) the land in respect of which a consent is sought, or any structure on the land, is or is likely to be subject to material damage by erosion, falling debris, subsidence, slippage, or inundation from any source; or

(b) any subsequent use that is likely to be made of the land is likely to accelerate, worsen, or result in material damage to the land, other land, or structure by erosion, falling debris, subsidence, slippage, or inundation from any source; or

(c) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision'

Our assessment considers parts (a) and (b) of the above Section 106 1(c) is not relevant to a geotechnical assessment.

Hazard	**Potential Susceptibility**	
	Current (part a)	**Post Development (part b)**
Erosion	There are no signs of significant erosion on site.	It is not anticipated that the proposed development will accelerate or worsen the erosion rates if appropriate stormwater collection and disposal methods are implemented.
Falling Debris	N/A = Site and surrounds are relatively flat and therefore no issues are anticipated.	
Slippage	Site and surrounds are relatively flat with the exception of a 1m deep drainage ditch running along the eastern site boundary. No evidence of slippage was noted on site. Given the depth of the non-liquefiable material being twice that of the drainage ditch, the risk of liquefaction induced slippage are very low.	It is not anticipated that the proposed development will increase the risk of slippage.

Subsidence	Geotech Ltd's Earthquake Hazard Assessment suggests that the site is in an area of low liquefaction potential. EDC's qualitative assessment supports this conclusion and the future land performance is likely to be within the limits of CERA land classification 'TC1 Zone', however 'Area 2' may fall within the TC2 category. There was no evidence of highly compressible soils. In view of the above the risk of ground subsidence is considered low.	Provided that foundations are located on a suitable bearing stratum, and to an engineered design, the risk of subsidence is unlikely to be worsened. Specific geotechnical testing will be required on the finalised building platform to confirm suitable available bearing capacities, foundation types and depths.
Inundation - Liquefaction	The site is considered to be within the limits of CERA land classification 'TC1/TC2 Zone'. However an approximately 2m thick crust of non-liquefiable soil has been identified on-site. As such the risk of inundation from liquefaction is considered negligible.	There is no anticipated change to the inundation risk as a result of the proposed development.
Inundation - Flooding	100yr and 200yr average recurrence interval (ARI) flood maps for the site. These maps indicate minor ponding (<0.25m), in several areas on the edge of the site, as shown on Appendix A.	It is likely that these areas of minor ponding will be remediated as part of the subdivision earthworks. Notwithstanding this the anticipated flood levels are relatively low and lot specific remediation could reasonably be undertaken as part of the detailed drainage design.

It is considered, under Section 106 (1) of the RMA, that there are no reasons from a geotechnical perspective that the site is considered unsuitable for the proposed development, provided any development is undertaken with appropriate engineering design measures and takes consideration of the above comments.

A Geotechnical Statement of Professional Opinion forms Appendix G.

8.0 REGULATORY FRAMEWORK IN RESPECT OF CONTAMINATION ASSESSMENT

8.1 Regulatory Framework

The key legislation and planning controls around this site include:

- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).
- Waimakariri District Plan.

These regulatory requirements form the basis of our contamination assessment and contamination related consents that may be relevant to the site development.

8.2 NES

The NES came into effect on 1 January 2012. Each Territorial Authority implements the NES in accordance with their Section 31 functions under the Resource Management Act 1991 (RMA).

The NES applies to assessing and managing the actual or potential adverse effects of contaminants in soil on human health from five activities: subdivision, land-use change, soil disturbance, soil sampling, and removing fuel storage systems. The NES only applies to land affected by or potentially affected by soil contaminants. This is if an activity or industry on the Hazardous Activities or Industries List (HAIL) has been, is, or is more likely than not to have been undertaken on that land.

If the NES applies then consent may be required if any of the activities listed above are proposed to take place on the site.

8.3 Waimakariri District Plan

The NES supersedes the District Plan except where the District Plan has rules regarding effects not covered in the NES.

Section 32.1.3 (Subdivision – Rules) of the Waimakariri District Plan – Consent is required as a controlled activity for subdivisions which have been historically contaminated by a HAIL activity.

Therefore, if a potential HAIL activity has been identified a Resource Consent will be required.

9.0 CONCEPTUAL SITE MODEL

This section provides a qualitative risk assessment of the risk posed from potential on and off-site contamination sources, identified by the information presented in the previous sections.

The conceptual model below has been developed based on the commonly adopted source-pathway-receptor model.

9.1 Potential Sources of Contamination

The term contaminant refers to a substance that is not normally present in the environment (or exceeding naturally occurring soil/water concentrations). This report cannot confirm if contamination exists, merely it comments on the likelihood that a potentially contaminating HAIL activity has occurred. If such an activity has occurred, a DSI would be undertaken to qualify and quantify if soil contamination has occurred.

No potential HAIL activities have been identified a part of the desk study. Although not identified it is considered likely that fertiliser and possibly herbicide have been applied to the grazing land in relatively low concentrations. These naturally degrade over time. The main risks associated with these chemicals are: localised 'hot spots' where these chemicals were stored or loaded; intensive use in vineyards or orchards and potential harm to aquatic life (which are very sensitive to these chemicals). There is no evidence to suggest bulk storage of any of these chemicals has occurred on-site and the site was not a vineyard or orchard.

Several areas used for burning wood and timber have been identified on site. Although this is not considered a significant source of contamination, it is considered potentially contaminated material.

In summary the only potential contamination identified source is related to the ash from the tree/timber burning.

9.2 Potential Pathways

Pathways may exist via dermal contact, ingestion or inhalation of soil particles.

9.3 Potential Receptors

Receptor		Additional Information
Human Health	Future site users	A female child will be regarded as the critical receptor; a female child being generally lower body weight than a male of the same age.
Human Health	Construction workers	A female worker will be regarded as the critical receptor.
Groundwater	Unconfined/semi-confined aquifer	Irrigation supply wells are located on site.
Watercourse	Aquatic life	A drainage ditch runs along the eastern site boundary and flows into south brook.

Receptor		Additional Information
Human Health	Neighbouring site users	The adjacent sites consist of farm land to the west, lifestyle blocks to the south & north and residential properties to the east.

9.4 Pollutant Linkages

The table below summarises the contamination risk matrix for the site.

Pollutant Linkage	Source	Pathway	Receptor	Probability of risk	Potential Severity	Risk
1	Contaminated Soils	Ingestion of soil, dermal contact, inhalation of dust, ingestion of home grown produce	Humans – end users	Unlikely	Medium	Low
2	Contaminated Soils	Ingestion of soil, Dermal contact; Inhalation of dust.	Construction workers	Unlikely	Medium	Low
3	Contaminated Soils	Inhalation of soil dust	Members of the public adjacent to the site during construction	Unlikely	Medium	Low
4	Contaminated Water Supplies	Ingestion of water, Migration of organic contaminants via pipes	Humans – end users	Unlikely	Medium	Low
5	Contaminated Soils	Overland flow	Drainage ditch / South Brook	Unlikely	Mild	Negligible

The terms used for probability of risk, potential severity and risk are explained in full in Appendix H.

9.5 Model Summary

Source – There is no evidence to suggest that bulk storage of any agricultural chemicals has occurred on-site. It is considered more likely that not that **no HAIL activities have occurred on-site.** Notwithstanding this the ash from the timber burn area identified in Section 9.1, poses a potential risk.

Pathway - Direct contact with soil during construction or residence including oral ingestion/dermal exposure/inhalation by humans. In addition overland flow paths and potential for leaching to ground water are considered valid. **Pathways present.**

Receptor - The land is to be used for residential purposes and the surrounding land includes other residential dwellings and non-potable water. **Receptor present.**

Given the site specific information outlined above, we consider that as no HAIL activities have been identified on-site, in accordance with the NES, a Detailed Site Investigation (DSI) is not warranted at the subject site.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Geotechnical

Under Section 106 (1) of the RMA, there is no evidence, from a geotechnical perspective, that the site is unsuitable for the proposed development provided any development is undertaken with appropriate engineering design measures (see section 7.0).

The site generally consists of a grazing paddock, and a former domestic garden (associated with a previous on-site dwelling) located in the northeast corner of the site. An area of eucalyptus tree stumps, grown for domestic fire wood are located in the southwest corner of the site. A disused, concrete cased open well, approximately 1m wide and 3.6m deep is located centrally along the northern portion of the site. At the time of EDC's site visit the groundwater level was approximately 1.3m below the surrounding ground level. An approximately 2m wide and 1m deep drainage ditch runs adjacent to Pentecost Rd, on the eastern boundary of the site.

The established trees (both adjacent to the sheds and in the former plantation area) are likely to have large root systems that will need to be completely remove beneath any future building platform. Though not observed, there is a possibility for localised areas of fill relating to buried waste/foundations/septic tank associated with the historical dwelling.

WDC 100yr and 200yr ARI flood maps for the site indicate minor ponding (<0.25m), in several areas on the edge of the site, as shown on Appendix E.

The following is a generalised soil profile for the site:

General Depth to top of layer	Generalised Ground Description	Density/Consistency
0.0m	Fill & Topsoil	N/A
0.2m	Silty CLAY	stiff to very stiff
1.3m - 1.6m	Sand & clay layers	Medium dense / firm
2.4m – 3.0m	Sandy GRAVEL	Medium dense/dense

The depth to gravel generally decreased in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Wet silt and sand layers (0.4m to 1.1m thick above the gravel) were encountered in TP's 101, 102, 107 & 108. Available geological maps and nearby borehole information suggests that deep gravel deposits (>21m) are likely present on-site.

The site is located in an area of 'Low' liquefaction potential based on Geotech's Liquefaction Study for the Waimakariri District. EDC's review of aerial photos, did not identify any liquefaction ejecta following the 2010/2011 Canterbury Earthquake Sequence. EDC's qualitative liquefaction analysis is in line with this indicating a 'Low' risk

of liquefaction related ground damage. However in the eastern half of the site (Area 2 of Figure 3), 0.4m to 1.1m of potentially liquefiable soils were encountered.

Future land performance of the site is likely to be within the limits of CERA land classification Technical Category 1 (**TC1**) for the west portion of the site (Area 1). However in the remainder of the site (Area 2) may be TC1/TC2 due to the thin layer of potentially liquefiable soils encountered. In order to confirm the Technical Category of 'Zone 2' on site, lot specific shallow CPT testing would be required to quantify the liquefaction potential of the shallow soils. This would also provide some of the information required for the building consent stage report. Alternatively 'Zone 2' could be assumed to be TC2.

In addition, the natural stiff silt or dense gravels encountered across the site are likely to meet the NZS: 3604 definition of 'Good Ground', provided that the Liquefaction potential of 'Area 2' is quantified and found to be within the TC1 limits. Shallow hand testing (Scala Penetrometers & hand augers are considered suitable for the entire site) should be undertaken in accordance with the MBIE Guidelines to confirm ground conditions in the area of specific building platforms to enable foundation design and obtain adequate information Building Consents.

10.2 Environmental

The existing and historical site uses are considered indicative of typical rural blocks with no significant sources of contamination identified. Several areas have been used for burning wood and timber. Although this is not a HAIL activity, the resulting ash is not considered suitable for the proposed residential development. The ash should be completely removed and disposed of at a suitable landfill site. Alternatively the ash could be tested for heavy metals and Polycyclic Aromatic Hydrocarbon (PAH), in order to prove that the ash is suitable for the proposed residential land use, however this is considered unlikely to be the case. All works should be appropriately documented and validated by an ECan registered Suitably Qualified and Experienced Person (SQEP).

Based on the qualitative contamination assessment it is considered more likely than not that HAIL activities have not occurred.

The qualitative contamination assessment suggests that it is highly unlikely, following the removal of the ash, that there will be an unacceptable risk to residential end-users or other identified potential receptors, with no significant potential sources identified. Therefore the site is considered suitable for the proposed residential development, with the above mentioned condition, and a Detailed Site Investigation (soil sampling) is not considered to be justified.

11.0 REFERENCES

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ENGINEERING DESIGN CONSULTANTS

Oakville Estate - Stage 1, 29 Pentecost Road, Rangiora

Geotechnical Report

Prepared for: Oakville Estates Ltd
C/- Quintin Bruce

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Project 45895 - Rev.0 - 17/12/2018

Engineering Design Consultants Ltd
W: www.edc.co.nz
E: team@edc.co.nz
Christchurch: 1st Floor, 39 Carlyle St, Sydenham Ph (03) 355 5559 PO Box 7534, Sydenham, 8240
Auckland: 1st Floor, Unit 1, 100 Bush Rd, Albany Ph (09) 451 9044 PO Box 118, Albany Village, 0755

Revision	Date	Engineer	Description
0	17/12/2018	DT	Original

REPORT PREPARED BY:

Delane Traber
BEng Tech MEngNZ
Geotechnical/Geoenvironmental Engineer

REPORT CHECKED BY:

Gareth B Williams
MSc(Eng) CPEng CMEngNZ IntPE(NZ) MInstD MEIANZ
Snr Geotechnical Engineer, Director

Limitations of Report

Except where required by law, the findings presented as part of this report are for the sole use of our client, as noted above. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing.

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Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

The Appendices should be read in conjunction with the main part of the report and this report should not be considered complete without them.

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1.0 INTRODUCTION

1.1 Terms of Reference

Engineering Design Consultants (EDC) was commissioned in October 2018 by Oakville Estates Ltd to provide a Building Consent stage geotechnical report for Lots 1-11 of the proposed subdivision at 29 Pentecost Road, Rangiora, henceforth referred to as 'the site'.

1.2 Proposed Development

Stage 1 of the Oakville Estates Subdivision comprises 11 residential lots (Lots 1-11), as per the Oakville Masterplan provided by the client, which forms Appendix A.

1.3 Objective/Scope

The objective of this report was to describe lot specific ground conditions (for Lots 1-11) and advise on appropriate foundation types for the proposed residential subdivision development to assist with Building Consent applications. In order to achieve the outlined objectives this geotechnical investigation comprised the following scope:

- An updated desk study to review available geological mapping, as well as borehole and flooding records.
- A site walkover.
- A shallow hand investigation across the overall site, comprising 18 hand auger boreholes and corresponding Scala Penetrometer tests with in-hole Shear Vane tests.
- Laboratory expansivity analysis of surface clays.
- Production of an interpretive report summarising the above and providing lot-by-lot foundation recommendations for the proposed residential development.
- Provision of a Statement of Professional Opinion on the Suitability of Land for Subdivision.

This report assesses the condition of the land only.

2.0 SITE DESCRIPTION

2.1 Site Location

The Oakville Estates Subdivision is roughly rhomboidal in shape, extending west from Pentecost Road and covering a total area of approximately 2.1 hectares. The subdivision can be accessed from Pentecost Road to the east and Townsend Road to the south.

'The site', as relates to this report, consists of the western part of the Oakville Estates Subdivision (see Figure 1 below). The coordinates of the approximate centre of the site are: 43°19'2.02"S, 172°34'57.22"E.

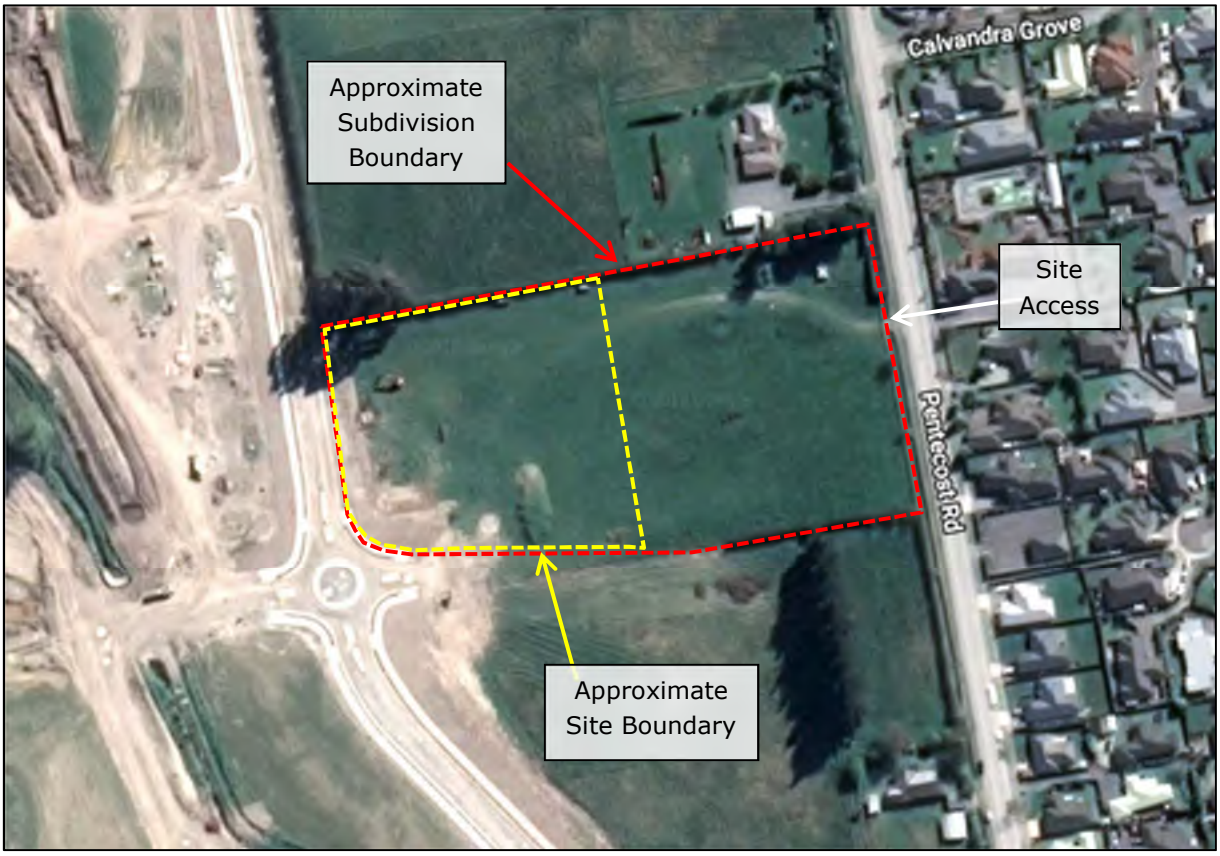

Figure 1: Site Aerial Photo (Courtesy of Google Maps)

The lot numbers are shown in detail in the proposed subdivision plan, which is enclosed in Appendix A.

2.2 Site Walkover

The site and surrounding land is generally flat, with grass cover and a large soil stockpile in the southeast portion of the site (proposed Lot 10). The proposed subdivision road which forms the site boundary along the western and southern edges of the site is under construction (Figure 1).

A disused, concrete cased open well, approximately 1m wide and 3.6m deep is located centrally along the northern portion of the site (proposed Lot 7). The adjacent pump shed also remains in place. At the time of EDC's site visits the groundwater level in the open well was approximately 1.3m below the surrounding ground level. An approximately 2m

wide and 1m deep drainage ditch runs adjacent to Pentecost Rd, on the eastern boundary of the site.

Figures 2-4 give an overview of the site, and were taken during EDC's site walkover:

Figure 2: View along the west boundary of the site looking south

Figure 3: View along the north boundary of the site looking east

Figure 4: Panoramic photograph of the site from the northwest corner

3.0 SITE HISTORY

3.1 Resource Consent Stage Geotechnical & Environmental Works

EDC has previously produced a 'Combined Geotechnical & Preliminary Site Investigation Report' for resource consent of the proposed subdivision (EDC Ref. 45895, dated 18 February 2018), of which the site forms the western half. The following forms a summary of the resource consent report which is relevant to the site.

3.1.1 Geotechnical Summary

An area of eucalyptus tree stumps was identified as a potential earthworks constraint in the southwest corner of the site. The stumps were later removed as detailed in Section 3.2.

'*Under Section 106 (1) of the RMA, there is no evidence, from a geotechnical perspective, that the site is unsuitable for the proposed development provided any development is undertaken with appropriate engineering design measures (see section 7.0).*

The depth to gravel generally decreased in the southwest corner of the site. Groundwater was only encountered in the sandy gravel and at depths ranging from 1.9m to 3.0m, however several TP's encountered significant water ingress, with short term static water levels rising as high as 1.8m begl. Available geological maps and nearby borehole information suggests that deep gravel deposits (>21m) are likely present on-site.

The site is located in an area of 'Low' liquefaction potential based on Geotech's [Geotech Consultants Ltd] *Liquefaction Study for the Waimakariri District. EDC's review of aerial photos, did not identify any liquefaction ejecta following the 2010/2011 Canterbury Earthquake Sequence. EDC's qualitative liquefaction analysis is in line with this indicating a 'Low' risk of liquefaction related ground damage.'*

Future land performance of the site is likely to be within the limits of CERA land classification Technical Category 1 (TC1). In addition, the natural stiff clay or dense gravels encountered across the site are likely to meet the NZS: 3604 definition of 'Good Ground'. Shallow hand testing was recommended, in accordance with the MBIE Guidelines, to confirm ground conditions in the area of specific building platforms to enable foundation design and obtain adequate information Building Consents.

3.1.2 Environmental Summary

"The existing and historical site uses are considered indicative of typical rural blocks with no significant sources of contamination identified. Several areas have been used for burning wood and timber… The qualitative contamination assessment suggests that it is highly unlikely, following the removal of the ash, that there will be an unacceptable risk to residential end-users or other identified potential receptors, with no significant potential sources identified. Therefore, the site is considered suitable for the proposed residential development, with the above-mentioned condition, and a Detailed Site Investigation (soil sampling) is not considered to be justified."

3.2 Certified Filling Works

EDC monitored the removal of the tree stumps in the southwest portion of the site (Figure 2), conducting four inspections from June 2016 to February 2017. The area, which encompasses proposed Lots 3 & 4, was excavated 0.7m to 0.9m to remove all tree stumps and large roots, before being backfilled with compacted AP65, to a level approximately 0.3m below ground level. The earthworks signoff letter forms Appendix B and is summarised below.

Figure 5: Identification of Earthfill Certified Area

Construction monitoring of excavations and hardfill compaction indicated that earthworks were constructed in accordance with NZS 4431:1989. Compaction quality control indicated that the hardfill material can be considered to have achieved the required compaction under NZS 4431. The non-certified area was to be beneath the existing road/berm and certification was therefore not required.

The area of certified hardfill (from 0.25m – 0.30m below existing ground level) is considered appropriate for NZS 3604 type foundations for future residential buildings and NZS 3604 'Good Ground' can be assumed for the gravel hardfill.

It is noted that future buildings foundation must be entirely located on this hardfill in order to assume NZS 3604 conditions; however, this has been achieved by matching proposed lot boundaries with the edge of the hardfill.

4.0 GEOLOGICAL DESK-BASED INFORMATION

4.1 Geological Mapping

According to the GNS Geological Unit QMap, available on the New Zealand Geotechnical Database (Earthquake Commission / Ministry of Business, Innovation & Employment, 2016), the site is underlain by Late Pleistocene (12,000 to 24,000-year-old) river deposits, comprising *'Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (loess) cap'* (Q2a).

4.2 Geological Investigation Data

Table 1 below is a summary of information obtained from the New Zealand Geotechnical Database (NZGD) and ECan Well Records from a previous investigation holes within the local area:

Hole Reference	Location	Depth	Summary
M35/6119	~50m N	11.3m	Earth to 0.3m Clay 0.3m – 4.0m Sandy Gravel 4.0m – 11.3m
BH-49032	~130m S 11 Pentecost Rd	10.5m	SILT with trace gravel to 1.0m Sandy GRAVEL 1.0m to 1.6m SAND with some gravel 1.6m to 2.5m GRAVEL with variable silt content 2.5m to 10.5m
M35/9867	~540m W	21.0m	Topsoil to 0.3m Hard clay 0.3m – 1.3m Gravel 1.3m – 21.0m

Table 1: Nearby Geological Investigation Summary

4.3 ECan Groundwater Information

The ECan database piezometric contours suggest a groundwater level of approximately 29m Above Mean Sea Level (AMSL). Land contours indicate the site has an approximate ground level of 26m AMSL. This suggests a groundwater depth of approximately 3m below ground level.

The piezometric contours indicate an approximate hydraulic gradient of approximately 1v:195h down to the southeast.

4.4 Springs

An artesian spring is located approximately 110m west of the site. This spring, labelled M35/7493 on the ECan GIS database, feeds the South Brook Stream.

4.5 Seismic Zoning

4.5.1 Environment Canterbury – Canterbury Maps

The Canterbury Maps website indicates the site is located in an area labelled 'Green Zone N/A – Rural & Unmapped' as at 27 November 2018.

4.5.2 Geological Fault-lines

The nearest active fault is the Ashley Fault, located approximately 4km north of the site.

4.5.3 Seismic Site Subsoil Classification

EDC consider that a seismic site subsoil classification 'Class D – Deep or soft soil sites', as defined in NZS:1170.5 is appropriate.

4.5.4 Liquefaction Assessment Area Map

ECan's Liquefaction Assessment Maps is available on the New Zealand Geotechnical Database (NZGD), identifies areas where 'Damaging liquefaction (is) unlikely' and areas where 'Liquefaction assessment (is) needed'. The site is located in an area where damaging liquefaction is unlikely.

4.6 Seismic History

4.6.1 Waimakariri District Council Information

ECan commissioned Geotech Ltd to undertake a Liquefaction Study for the Waimakariri District Council (Geotech Consultants Ltd., 2008). The 'Map showing Liquefaction Potential' indicates that the site is located in Zone 2 (Areas of recent Holocene Age Alluvium, essentially the active flood plain and river bed area or the major rivers - Low liquefaction potential'.

4.6.2 GNS Observed Liquefaction Maps

These maps were created by GNS Science to identify the rural areas affected by liquefaction during the 2010/2011 Canterbury earthquake sequence. Areas were mapped and tagged according to the features visually identified in the satellite images and aerial photography. These maps indicate that the majority of the site is covered by "possible" liquefaction ejecta following the 22 Feb 2011 Canterbury earthquake. Comments on this area state that there are possible remnants of liquefaction ejecta from the Darfield earthquake visible on a photo dated 27 Jan 2011 & 28 March 2011. EDC has reviewed these images, available on Google Earth, and cannot identify any potential signs of liquefaction ejecta on-site.

4.6.3 Recorded peak Ground accelerations

GNS records indicate that the nearest Strong Motion Seismograph location is at Ashley School (approximately 4.9km north-northeast of the site). The following table shows the recorded Peak Ground Accelerations (PGA's) observed at this sensor and the two next closest sensors during the significant earthquakes in the area during 2010 and 2011:

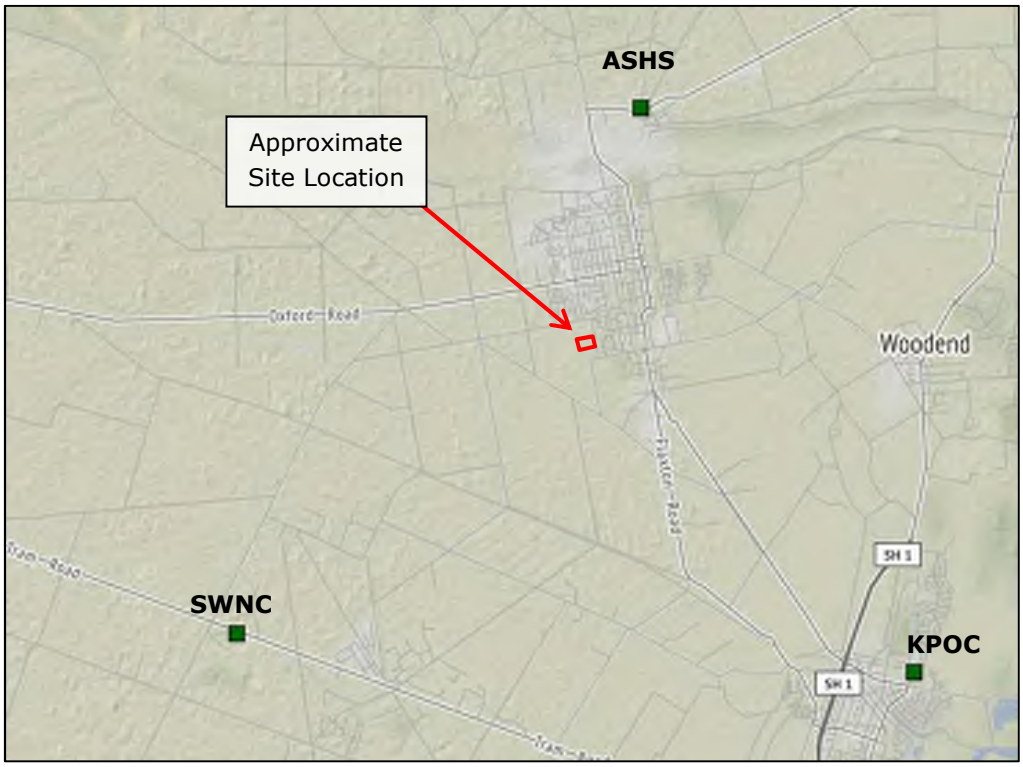

Figure 6: GNS Strong Motion Seismograph Locations

Earthquake event	ASHS	SWNC	KPOC
04 Sept 2010	0.17	0.25	0.36
22 Feb 2011	0.09	0.21	0.21
13 June 2011	0.05	0.06	0.10
23 Dec 2011	0.04	0.16	N/A

Table 2: Peak Ground Acceleration Records

Notes: These PGA's were measured at the seismograph locations, and as such it is possible that the site could have been affected by PGA's that were lower or higher.

4.7 Flooding

4.7.1 Waimakariri District Council

The Waimakariri District Council (WDC) Natural Hazards GIS database (Waimakariri District Council, 2018) includes an assessment of Flood Hazard. The flood hazard is calculated based on flood water depths and velocity using ground contours and computer models for a 0.5% Annual Exceedance Probability (1 in 200 year) storm event. The following is an excerpt of this WDC Flood Hazard Map.

Figure 7: WDC Flood Hazard Map Excerpt

The above indicates that the site is within a 'Low' flood hazard area (with expected ponding of <100mm). It should be noted that subdivision earthworks have not yet been completed and are likely to affect the flood risk of the subdivision. It is therefore recommended that floor level requirements for the proposed dwellings are assessed based on the finalised earthworks and storm water control design.

4.7.2 Nearest Water body/course

South Brook runs northwest to south east approximately 80m west of the site. The nearest major watercourse is the Ashley River, located approximately 3.8km north of the site.

5.0 SITE INVESTIGATION

5.1 Rationale

As determined by EDC's 2016 geotechnical report, further lot specific shallow hand testing was required on-site to provide sufficient information for a Building Consent application.

In view of the number of lots and the relatively small size of lots it is considered that three to four hand auger (HA) boreholes per lot is sufficient to provide ground conditions for a dwelling on each lot. Each test is accompanied by Scala Penetrometer (SC) testing and Shear Vane measurements in the silty/clayey intervals.

In addition, due to the presence of desiccated clay soils identified in the 2016 report, it was considered necessary to undertake laboratory analysis to determine if the soils can be considered to meet the definition of 'Good Ground' under NZS 3604. Four tests were considered sufficient for the site and consisted of Atterberg Limits and Linear Shrinkage.

5.2 2016 EDC Intrusive Investigation Summary

As part of the Resource Consent stage geotechnical investigation conducted in 2016, EDC undertook eight test pits and 12 hand auger boreholes (Figure 8).

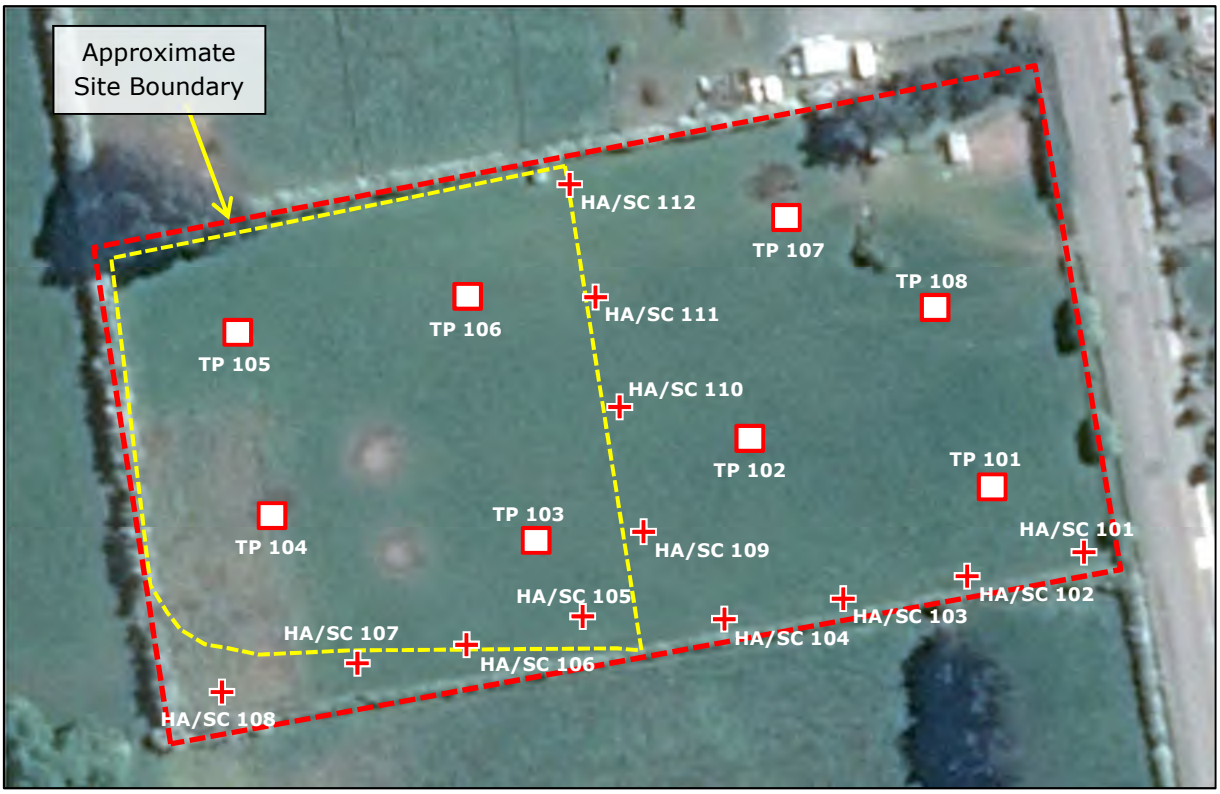

Figure 8: 2016 Intrusive Site Investigation Plan

Four of the test pits were in the site area that is the subject of this report (TP's 103 to 106). These four test pit logs are attached as Appendix C. A summary of ground conditions encountered in these four test pits is given below:

General Depth to top of layer	Generalised Ground Description	Density/Consistency
0.0m	Topsoil	N/A
0.2m	Silty CLAY	Stiff to very stiff
1.2m - 1.7m	Sand & silt layers	Medium dense / firm
1.2m – 2.6m	Sandy GRAVEL	Medium dense / dense

Table 3: Generalised Soil Profile of Site Area (TP's 103-106)

5.3 2018 EDC Intrusive Investigation Summary

5.3.1 Shallow Hand Testing

EDC visited the site on 7th and 8th November 2018 to undertake a further shallow geotechnical investigation to determine the subsoil conditions on specific lots. We undertook a total of 18 hand auger boreholes with accompanying Scala Penetrometer (SC) testing and Shear Vane measurements (HASC 201-218). Soil samples were undertaken at depth ranging from 0.5m to 0.8m in HA's 201, 207, 209 & 214 to be tested for Atterberg Limits and Linear Shrinkage (NZS 3604 'Good Ground' requirements).

Soils have been described generally in accordance with NZGS: Field Description of Soil and Rock. The results of these investigations are shown on the HA Log sheet attached in Appendix C.

All hand tests refused on inferred natural gravel at depths ranging from 1.15m to 2.65m begl, generally increasing in depth towards the northeast of the site. Further testing of the Certified Hardfill area present in the southwest of the site was not considered necessary. The approximate investigation locations for all shallow tests undertaken in November 2018 are shown on Figure 9 below:

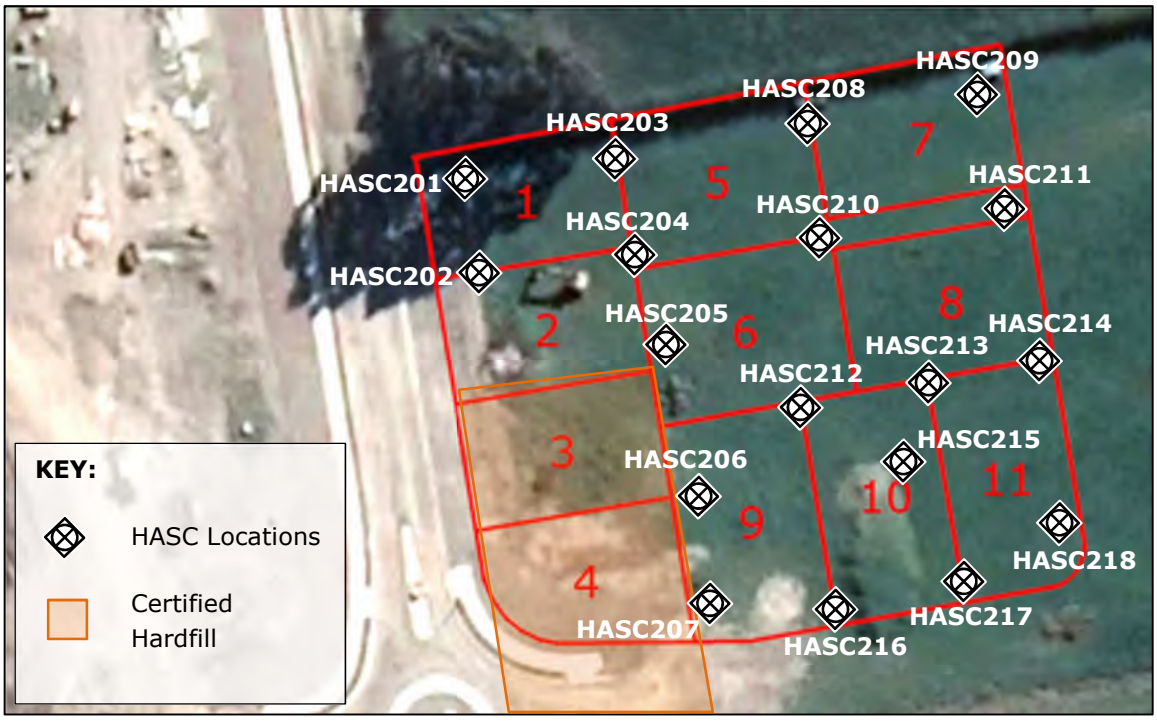

Figure 9: Intrusive Investigation Approximate Locations with Lot Numbers

5.4 Summary of Ground Conditions

This investigation indicates the following approximate soil section across the site (refer to Section 6.6 for individual lot summaries):

General Depth to top of layer (m)	Generalised Ground Description	Density/Consistency
0.0	Topsoil	Soft to firm
0.20-0.35	SILT	Soft to stiff
0.40-0.50	CLAY with variable silt and sand	Stiff to very stiff
1.20-1.70	Sand & silt layers	Medium dense / firm
1.15-2.75	Sandy GRAVEL	Medium dense to very dense

Table 4: Generalised Soil Profile Across the Site

Groundwater was not encountered during hand auger excavation. Test pits excavated in 2016 encountered groundwater within the natural gravel at depths of 1.9m to 2.6m begl.

6.0 GEOTECHNICAL ASSESSMENT

6.1 Static Ultimate Bearing Capacity Assessment

6.1.1 Shear Vane Tests

The peak shear strengths, as measured using the Shear Vane, have been used to establish ultimate bearing capacities (UBC) for the shallow, cohesive silty clay soils using the multiplication factor of 5.14 outlined by Verification Method B1/VM4 Foundations (Department of Building and Housing, 2008).

The results indicate that a UBC of >300kPa is achieved in the natural clay observed across the site at a general depth range of 0.40m to 1.20m begl.

6.1.2 Scala Penetrometer Tests

Scala Penetrometer tests are considered to be highly conservative in clay soils (where the shear vane take precedence), however have been used to assess the strength of the underlying silts and sands. The Scala Penetrometer results have been assessed using a correlation between Scala blow count and allowable bearing capacity by Stockwell (Stockwell, 1977). Using this correlation, the Scala Penetrometer results indicate that the following Geotechnical Ultimate Bearing Capacities (UBC's) can be inferred:

A geotechnical UBC of 300kPa is generally be achieved, with isolated layers of >200kPa, in the natural inorganic silt/sands underlying the clay soils discussed in Section 6.1.1. A geotechnical UBC of >300kPa can be assumed in the underlying gravels, encountered at depths between 1.00m and 2.65m begl.

Lot specific Scala Penetrometer UBC Graphs from Appendix D.

6.2 Expansivity

The shallow silty clay soils were identified as potentially expansive, based on site observations. As such, in accordance with NZS 3604:2011, laboratory testing of soil samples was required to confirm if the clays meet the expansivity requirements of 'Good Ground'. A total of four soils samples were taken by EDC on 08 November 2018 and were tested by Geo Civil Ltd.'s IANZ accredited Laboratory for the Determination of the Linear Shrinkage (NZS 4402:1986 Test 2.6) and Determination of the liquid & plastic limits, Plasticity index and water content (NZS 4402:1986 Tests 2.2,2.3,2.4). The following is a summary of these tests:

Sample Location	Sample Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Linear Shrinkage (%)
HA 201	0.5-0.8	44	22	22	7
HA 207	0.5-0.7	51	22	29	10
HA 209	0.5-0.8	47	23	24	9
HA 214	0.6-0.8	43	22	21	11

Table 5: Expansivity Test Results

In accordance with NZS 3604 *'…clays shall be treated as expansive clays if their soil properties in soil mechanics terms exceed the values listed in the definition of good ground… Expansive soils being those that have a liquid limit of more than 50% when tested in accordance with NZS 4402 Test 2.2, and a linear shrinkage of more than 15 % when tested from the liquid limit in accordance with NZS 4402 Test 2.6.'*

The soil laboratory results discussed in Table 5 indicate that the silty clays encountered on-site are not expansive, in accordance with NZS 3604.

6.3 Sensitivity

Sensitivity is defined as the ratio of the undisturbed shear strength of a cohesive soil to the remoulded shear strength at the same moisture content, which is an indication of the materials sensitivity to disturbance. The higher the sensitivity of the soil, the more difficult it is to re-use for engineered fill. The sensitivity measurements made in the exploratory holes indicate that the silty clay soils on-site range from insensitive to medium sensitivity. Based on our experience, we recommend that such soils are conservatively considered moderately sensitive for design purposes.

In view of the above, the natural soils onsite are considered suitable for bulk earthworks, subject to; moisture control, appropriate compaction, and geotechnical confirmation of its suitability in accordance with NZS 4431. Any organic-rich soils are not suitable for use engineered fill.

6.4 ECan Technical Category Classification

Based on the information available to date and referenced above, we consider that future land performance is likely to be within the limits of ECan land classification Technical Category 1 (TC1).

6.5 NZS 3604 "Good Ground" Assessment

NZS 3604: 2011 indicates "Good Ground" is ground where "*Any soil or rock capable of permanently withstanding an ultimate bearing capacity of 300kPa (i.e. an allowable bearing pressure of 100kPa using a factor of safety 3.0),…*", but excludes; potentially compressible soils, expansive soils, and any ground which could foreseeably experience movement of 25 mm or greater for any reason.

The assessment of 300kPa UBC has been based on both Shear Vane testing in the upper silty clays (0.4m to 1.2m), and Scala Penetrometer testing below. In accordance with NZS 3604 soils can be assumed to have 300kPa, where 'the number of blows per 100 mm depth of penetration below the underside of the proposed footing at each test site exceeds:

- Five down to a depth equal to twice the width of the widest footing below the underside of the proposed footing;
- Three at greater depths; and
- Providing the set blow is relatively uniform, the number of blows per 100 mm may be obtained by averaging the number of blows for depths not exceeding 300 mm.

Based on EDC's assessment of the ground conditions, the natural clays encountered from a depth of approximately 0.4m across the site are considered to meet the NZS 3604 definition of 'Good Ground'.

6.6 Summary of Ground Conditions by Lot

The following table (Table 6) shows depth to natural clay, natural gravel and recommended design UBC's for each lot in Stage 1 of the subdivision:

Lot Number	Depth to Natural Clay (m)	Design UBC (kPa)	Depth to Gravel UBC >300kPa (m)	Notes
1	0.35-0.45	300	1.10-1.30	
2	0.35-0.45	300	1.15-1.65	
3	-	300	-	Certified Hardfill from a depth of approximately 0.3m
4	-	300	-	
5	0.30-0.40	300	1.15-2.60	
6	0.30-0.40	300	1.15-2.60	
7	0.30-0.40	300	2.30-2.65	An appx. 1.0m wide and 3.6m deep concrete lined well is located in the northeast corner of the lot.
8	0.30-0.50	300	1.00-2.65	
9	0.25-0.40	300	1.05-1.35	
10	0.25-0.40	300	1.00-1.40	
11	0.30-0.50	300	1.00-1.80	

Table 6: Depths to Natural Soil and Gravel and Recommended Design UBC's

The clay encountered between approximately 0.40m to 1.20m begl across the site is considered a suitable bearing stratum upon which a UBC of 300kPa can be assumed.

Any topsoil/fill, very soft, organic or otherwise unsuitable material encountered is not considered a suitable bearing stratum and will require removal beneath the building platform.

Copies of the Lot-specific Scala Penetrometer Ultimate Bearing Capacity Graphs form Appendix D.

7.0 CONCLUSIONS & RECOMMENDATIONS

7.1 Ground Description

Our intrusive investigations indicate the following approximate shallow soil profile across the site:

General Depth to top of layer (m)	Generalised Ground Description	Density/Consistency
0.0	Topsoil	Soft to firm
0.20-0.35	SILT	Soft to stiff
0.40-0.50	CLAY with variable silt and sand	Stiff to very stiff
1.20-1.70	Sand & silt layers	Medium dense / firm
1.15-2.65	Sandy GRAVEL	Medium dense to very dense

Table 7: Generalised Soil Profile Across the Site

All hand tests refused at shallow depths, generally on inferred natural gravel at depths ranging from 1.15m to 2.65m begl. A nearby geotechnical investigation borehole indicates that the gravel layer is likely to extend to >21.0m depth.

Groundwater was not encountered in the hand auger boreholes; however, test pits excavated in 2016 encountered groundwater within the natural gravel at depths of 1.9m to 2.6m begl. In addition groundwater was observed in the onsite open well at a depth of approximately 1.3m begl.

7.2 Geotechnical Assessment

The soil laboratory test results discussed in Section 6.2, indicate that the silty clays encountered onsite are not expansive, in accordance with NZS 3604.

Based on the information available to date and referenced above, we consider that future land performance is likely to be within the limits of ECan land classification Technical Category 1 (TC1).

The bearing capacity assessment has been based on both Shear Vane testing in the upper silty clays (0.4m to 1.2m), and Scala Penetrometer testing below. Based on EDC's assessment of the ground conditions, the natural clays encountered from a depth of approximately 0.4m across the site and the certified hardfill are considered to meet the NZS 3604 definition of 'Good Ground' and a Geotechnical UBC of 300kPa (i.e. following application of the strength reduction factor Φ = 0.5, providing a dependable bearing capacity of 150kPa) can be assumed for design.

Any topsoil/uncertified fill, very soft, organic, or otherwise unsuitable materials encountered are not considered a suitable bearing stratum and will require removal beneath the building platform.

7.3 Earthworks Comment

The natural soils onsite are considered suitable for bulk earthworks, subject to; moisture control, appropriate compaction, and geotechnical confirmation of its suitability. Any organic-rich soils are not suitable for use engineered fill.

7.4 Flood Risk

The WDC Flood Hazards Maps indicate that the site is within a 'Low' flood hazard area (with expected ponding on <100mm). It should be noted that subdivision earthworks have not yet been completed and are likely to affect the flood risk of the subdivision. It is therefore recommended that floor level requirements for the proposed dwellings are assessed based on the finalised earthworks and storm water control design.

7.5 Dwelling Foundation Options

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

7.5.1 Concrete Floor

Type C concrete slab-on-grade foundations in accordance with NZS 3604 (with B1/AS1 modifications) are considered suitable for site conditions. Any hardfill to be placed beneath the slab should consist of an appropriately compacted, well-graded gravel (AP40 or AP65), with a layer of geotextile (DuraForce AS280 or Bidim A19 or engineer approved equal) at the base.

The foundation can be founded in the natural inorganic clay generally encountered from 0.4m begl, where a Geotechnical UBC of 300kPa can be used for design. See Section 7.5.3 for lot specific information.

7.5.2 Timber Floor

Timber floor pile foundations with either a pile perimeter or reinforced concrete perimeter footing, in accordance with NZS 3604 (with B1/AS1 modifications) would also be suitable.

The foundation can be founded in the natural inorganic clay generally encountered from 0.4m begl, where a Geotechnical UBC of 300kPa can be used for design. See Section 7.5.3 for lot specific information.

7.5.3 Approved Bearing Strata

Lot Number	Bearing Stratum	Depth to bearing stratum (Pre Subdivision Earthworks)	Notes
1	Natural Inorganic Clay	0.35-0.45	-
2	Natural Inorganic Clay	0.35-0.45	-
3	Certified Gravel Hardfill	~0.3m	Certified Gravel Hardfill has been placed across these Lots. See Section 3.2 for more details.
4	Certified Gravel Hardfill	~0.3m	

Lot Number	Bearing Stratum	Depth to bearing stratum (Pre Subdivision Earthworks)	Notes
5	Natural Inorganic Clay	0.30-0.40	-
6	Natural Inorganic Clay	0.30-0.40	-
7	Natural Inorganic Clay	0.30-0.40	An appx. 1.0m wide and 3.6m deep concrete lined well is located in the northeast corner of the lot. This should be appropriately backfilled prior to the construction of any dwelling on this Lot.
8	Natural Inorganic Clay	0.30-0.50	-
9	Natural Inorganic Clay	0.25-0.40	-
10	Natural Inorganic Clay	0.25-0.40	-
11	Natural Inorganic Clay	0.30-0.50	-

Table 8: Approved Bearing Strata

It should be noted that the depths provided are below existing ground level and may be altered by subdivision earthworks.

7.6 General

If gravel hardfill is required, it should be compacted in accordance with NZS 4431:1989 Code of Practice for Earthfill for Residential Development and MBIE Module 5A: Specification of ground improvement for residential properties in the Canterbury region (MBIE & NZGS, 2015).

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

7.7 Construction Inspections

It is recommended that a Chartered Professional Engineer with appropriate geotechnical experience be engaged to supervise any foundation works. This is in accordance with normal council practice at the Building Consent stage. It should also be noted that under the Building Act (2004), there are specific requirements for supervision by appropriately qualified personnel.

All inspections will require a minimum of 24 hours' notice and it should be noted that unless we are given the chance to undertake all appropriate inspections for the items specified in the Building Consent, a Producer Statement (PS4) will not be issued.

7.7.1 Foundation Inspections

The geotechnical engineer should inspect earthworks and foundation construction at the following stages, and pursuant to any Building Consent Conditions:

1. Formation level of any new foundations; and
2. If gravel hardfill is required and is >600mm thick, compaction testing should be undertaken. Frequency will be dependent on the validation test method adopted but should occur at least once gravel fill has been placed and compacted.

7.8 Health & Safety

We recommend that 'Safety in Design' principles are included during the design of the proposed structure/development. It should be noted that all parties involved in construction, including the client have responsibilities under the current 'Health and Safety at Work Act 2015'. This includes ensuring that the chosen contractor is both competent and suitably qualified/experienced to undertake the commissioned works.

Specifically, with respect to earthworks and foundations for the site, consideration needs to be made with respect to the restriction of public access during construction.

EDC would be happy to provide geotechnical/geoenvironmental advice in relation to these issues at any workshops or design meetings for this project. In addition our Structural and Fire Safety Design Engineers can provide advice as appropriate.

REFERENCES

Department of Building and Housing. (2008). *Verification Method B1/VM4 Foundations.*

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Stockwell, M. (1977). *Determination of allowable bearing pressure under small structures.* New Zealand Engineering, Volume 32 Issue 6.

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APPENDIX C

INTRUSIVE INVESTIGATION LOG SHEETS

ENGINEERING DESIGN CONSULTANTS

DRILLED: 20/01/2020 **FILE: 45895 - Stage 2**

HAND AUGER NO.:

HA/SC 301

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT: Oakville Estate Ltd**

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments
0.0	TOPSOIL - Soft, light brown organic silt, dry	
0.2	Firm to stiff, light grey mottled light brown silty CLAY, dry	
1.2	End of hand auger (equipment refusal)	

LEGEND | GROUND WATER | SCALA BLOWS (PER 50 mm) 5 10 15

EOH @ 1.60 m

NOTES:

Groundwater not encountered during hand auger drilling.
Hand auger terminated at 1.3m due to equipment refusal on assumed 'iron pan'.

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team@edc.co.nz

15B LESLIE HILLS DRIVE
RICCARTON 8011
CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD,
ALBANY, AUCKLAND

PH (09) 451 9044

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DRILLED: 21/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 302

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

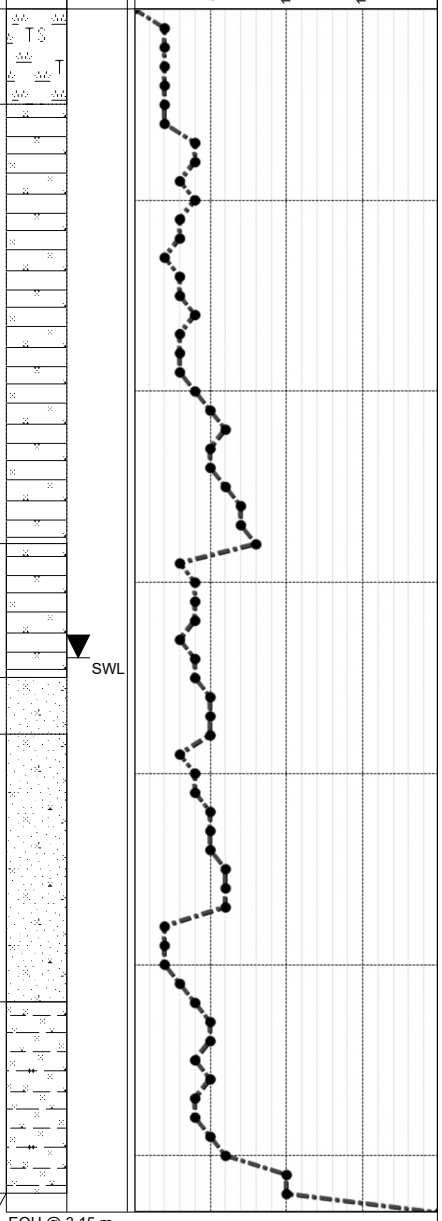
ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION (Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments)
0.2	TOPSOIL - Soft to firm, light brown organic silt, dry
0.4	Firm to stiff, light grey mottled light orange silty CLAY, dry, friable
1.4	becoming silty CLAY with some fine sand.
1.8	Dense, dark grey silty fine SAND, moist to wet
2.0	becoming saturated
2.6	Stiff to very stiff, light bluish green mottled orange brown clayey SILT, wet.
3.0	End of hand auger (equipment refusal on assumed gravel)

LEGEND | GROUND WATER | SCALA BLOWS (PER 50 mm)



EOH @ 3.15 m

NOTES:

Groundwater encountered at 1.70m during hand auger drilling.
Hand auger terminated at 2.1m due to equipment refusal on assumed gravel.

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CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

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DRILLED: 20/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: **HA/SC 303**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.0	TOPSOIL - Soft, light brown organic silt, dry		TS		
0.2	Firm to stiff, light grey mottled light orange CLAY, dry, friable				
0.4					
0.6					
0.8					
1.0					
1.2					
1.4	becoming CLAY with some silt and some fine sand				
1.6					
1.8	Dense, dark grey silty fine SAND, moist to wet			SWL	
	becoming saturated				
2.0					
2.2	Firm to stiff, dark grey mottled orange brown SILT, wet to saturated				
2.4					
2.6	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.60 m		

SCALA BLOWS (PER 50 mm): 5, 10, 15

NOTES:

Groundwater encountered at 1.8m during hand auger drilling.
Hand auger terminated at 2.6m due to equipment refusal on assumed gravel.

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CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

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HAND AUGER NO.: **HA/SC 304**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION (Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments)
0.2	TOPSOIL - Soft, light brown organic silt, dry
0.4	Firm to stiff, light grey mottled light orange CLAY, dry, friable
0.6	
0.8	
1.0	
1.2	
1.4	becoming dark grey mottled orange brown silty CLAY, moist
1.6	Dense, dark yellowish brown silty fine SAND, moist
1.8	
2.0	
2.2	Stiff, light grey mottled orange brown SILT with some clay, moist
2.4	becoming light bluish grey
2.6	becoming saturated
2.8	End of hand auger (equipment refusal on assumed gravel)

LEGEND: TS, T

GROUND WATER: SWL

EOH @ 2.80 m

SCALA BLOWS (PER 50 mm): 5, 10, 15

NOTES:

Groundwater encountered at 2.6 during hand auger drilling.

Hand auger terminated at 2.6m due to equipment refusal on assumed gravel. After 30mins, ground water is recorded at 2.5m.

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CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

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HAND AUGER NO.: HA/SC 305

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.0	TOPSOIL - Soft, light brown organic silt, dry		TS T		
0.2	Firm to stiff, light grey mottled light orange CLAY, dry, friable				
0.4					
0.6					
0.8					
1.0	becoming moist				
1.2					
1.4	becoming firm, dark grey CLAY with some silt and some fine sand				
1.6					
1.8	Medium dense, dark yellow silty fine SAND, saturated			SWL	
2.0					
2.2					
2.4					
2.6	Firm to stiff, light grey mottled orange brown SILT with some clay, moist				
2.8	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.80 m		

5 10 15

NOTES:

Groundwater encountered at 1.8m during hand auger drilling.
Hand auger terminated at 2.8m due to equipment refusal on assumed gravel.

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RICCARTON 8011
CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD,
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DRILLED: 20/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 306

SHEET 1 OF 1

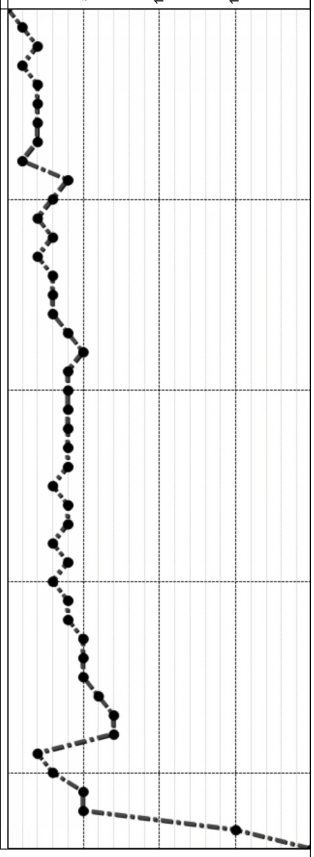
PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION (Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments)	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.0	TOPSOIL - Firm, light brown organic silt, dry	TS T TS T		
0.4	Firm to stiff, light grey mottled light orange CLAY, dry, friable			
1.4	becoming dark grey CLAY with some silt and some fine sand, moist			
1.8	Dense, dark grey mottled orange brown silty fine SAND, moist			
2.0	Stiff, dark grey mottled orange brown SILT, moist to wet		SWL	
2.2	End of hand auger (equipment refusal on assumed gravel)	EOH @ 2.20 m		



NOTES:

Groundwater encountered at 2.2m during hand auger drilling.
Hand auger terminated at 2.2m due to equipment refusal on assumed gravel. After 15mins, ground water is recorded at 2.1m.

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RICCARTON 8011
CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD,
ALBANY, AUCKLAND

PH (09) 451 9044

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DRILLED: 21/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: **HA/SC 307**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION (Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments)
0.2	TOPSOIL - Firm, light brown organic silt with trace medium gravels, dry
0.4	Firm to stiff, light grey mottled light orange CLAY, dry, friable
0.6	
0.8	
1.0	becoming moist
1.2	becoming CLAY with some silt and some fine sand, moist
1.4	
1.6	becoming soft to firm
1.8	Medium dense to dense, dark grey silty fine SAND, moist
2.0	becoming wet
2.2	
2.4	Firm to stiff, dark yellowish grey with trace fine SAND, wet to saturated
	End of hand auger (equipment refusal on assumed gravel)
2.6	
2.8	

LEGEND | GROUND WATER | SCALA BLOWS (PER 50 mm) 5 10 15

SWL

EOH @ 2.90 m

NOTES:

Groundwater encountered at 2.0m during hand auger drilling.
Hand auger terminated at 2.4m due to equipment refusal on assumed gravel. After 15mins, ground water is recorded at 1.6m.

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team@edc.co.nz

15B LESLIE HILLS DRIVE
RICCARTON 8011
CHRISTCHURCH

PH (03) 355 5559
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD,
ALBANY, AUCKLAND

PH (09) 451 9044

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DRILLED: 21/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 308

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.0	TOPSOIL - Firm, light brown organic silt, dry		TS		
0.2	Firm to stiff, light grey CLAY, dry, friable				
1.0	becoming light grey mottled orange brown CLAY with some silt and some fine sand, moist				
2.0	Medium dense to dense, light yellowish grey silty fine SAND, wet			SWL	
2.2	Firm to stiff, dark yellowish grey SILT, wet				
2.8	becoming very stiff to hard, moist to wet				
3.0	End of hand auger (equipment refusal on assumed gravel)		EOH @ 3.00 m		

SCALA BLOWS (PER 50 mm): 5, 10, 15

NOTES:

Groundwater encountered at 2.0m during hand auger drilling.

Hand auger terminated at 3.0m due to equipment refusal on assumed gravel. After 15mins, ground water is recorded at 2.35m

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DRILLED: 22/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: **HA/SC 309**

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

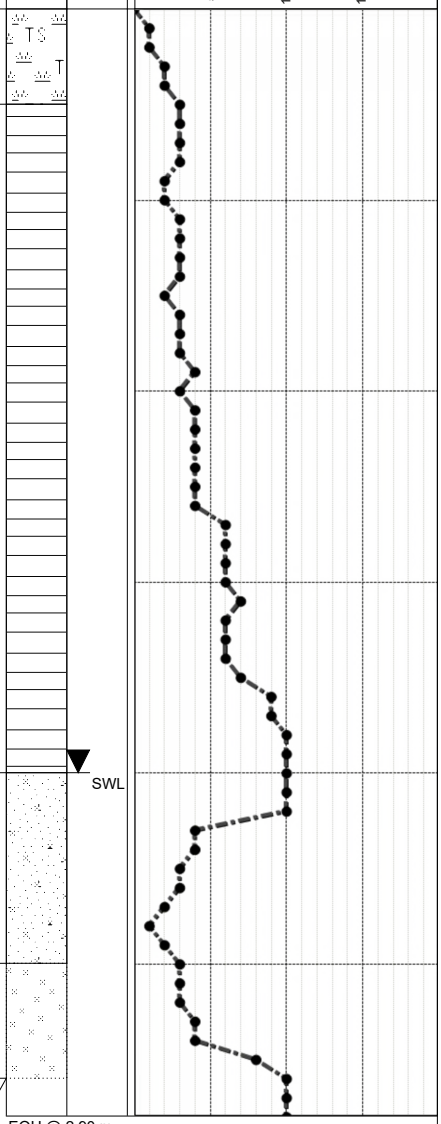
ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments
0.2	TOPSOIL - Firm, light brown organic silt, dry	
	Firm to stiff, light grey CLAY, dry, friable	
2.0	Dense, dark grey mottled orange brown silty fine SAND, wet	
2.6	Stiff to very stiff, dark yellowish grey mottled orange brown SILT, wet to saturated	
2.8	End of hand auger (equipment refusal on assumed gravel)	

LEGEND | GROUND WATER | SCALA BLOWS (PER 50 mm)



EOH @ 2.90 m

NOTES:

Groundwater encountered at 2.0m during hand auger drilling.
Hand auger terminated at 3.0m due to equipment refusal on assumed gravel. After 15mins, ground water is recorded at 2.0m

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ENGINEERING DESIGN CONSULTANTS

DRILLED: 22/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 310

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.2	TOPSOIL - Firm, light brown organic silt, dry		TS		
0.4	Firm to stiff, light grey mottled orange brown CLAY, dry, friable				
1.2	becoming silty CLAY with some fine sand, dry to moist				
1.8	Medium dense to dense, light yellowish grey mottled orange brown silty fine SAND, moist			SWL	
2.2	Stiff, light yellowish grey mottled orange brown SILT, moist to wet				
2.8	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.90 m		

SCALA BLOWS (PER 50 mm): 5, 10, 15

NOTES:

Groundwater encountered at 2.75m during hand auger drilling.
Hand auger terminated at 2.9m due to equipment refusal on assumed gravel. After 15mins, ground water is recorded at 2.75m

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DRILLED: 22/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: HA/SC 311

SHEET 1 OF 1

PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.2	TOPSOIL - Firm, light brown organic silt, dry		TS		
0.4	Firm to stiff, light grey mottled orange brown CLAY, dry, friable				
0.6					
0.8					
1.0					
1.2	becoming CLAY with some silt and some fine sand, dry to moist				
1.4					
1.6	becoming moist				
1.8					
2.0	Medium dense to dense, light yellowish grey silty fine SAND, moist				
2.2	Stiff, dark brownish grey mottled orange brown SILT, moist to wet				
2.4	becoming soft to firm				
	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.50 m		

SCALA BLOWS (PER 50 mm): 5, 10, 15

NOTES:

Groundwater not encountered during hand auger drilling.
Hand auger terminated at 2.9m due to equipment refusal on assumed gravel.

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DRILLED: 22/01/2020 **FILE:** 45895 - Stage 2

HAND AUGER NO.: **HA/SC 312**

SHEET 1 OF 1

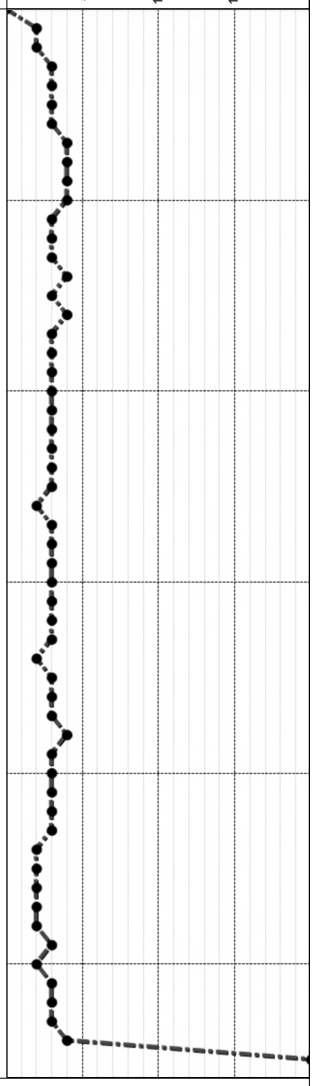
PROJECT: Geotechnical Investigation **CLIENT:** Oakville Estate Ltd

ADDRESS: 29 Pentecost Road - Stage 2

LOGGED	PROCESSED	CHECKED
DP	DP	GL

BH LOCATION: COORDS: RL GROUND:

DEPTH (m) GL	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
0.0	TOPSOIL - Firm, light brown organic silt, dry		TS		
0.2	Firm to stiff, light brown mottled orange brown CLAY, dry, friable				
1.2	becoming CLAY with some silt and some fine sand, moist				
2.0	Medium dense to dense, dark yellow silty fine SAND, moist				
2.4	Firm to stiff, light brownish grey SILT, moist				
2.8	becoming very stiff				
	End of hand auger (equipment refusal on assumed gravel)		EOH @ 2.80 m		



NOTES:

Groundwater not encountered during hand auger drilling.
Hand auger terminated at 2.8m due to equipment refusal on assumed gravel.

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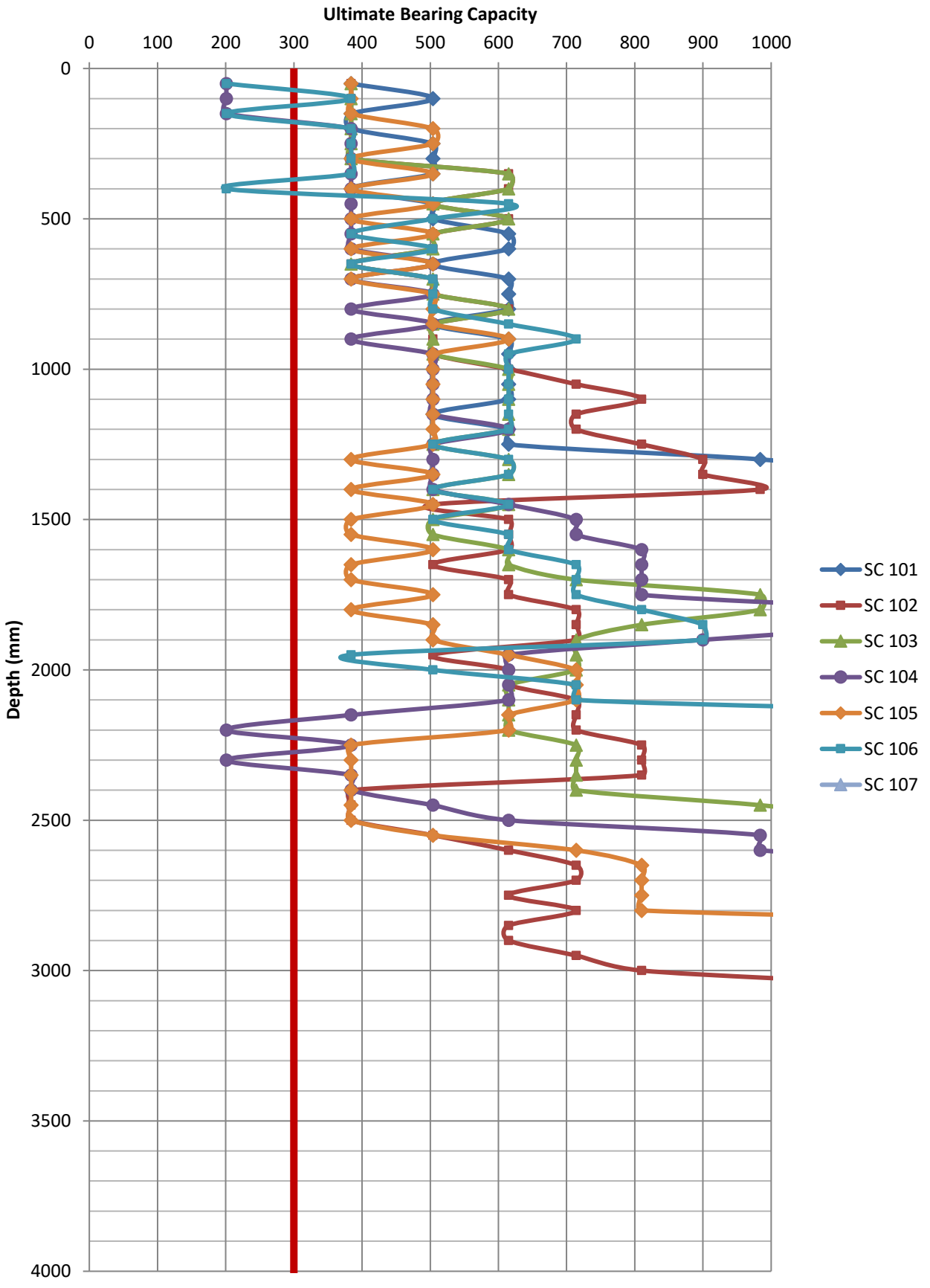
APPENDIX D

SCALA PENETROMETER UBC GRAPHS

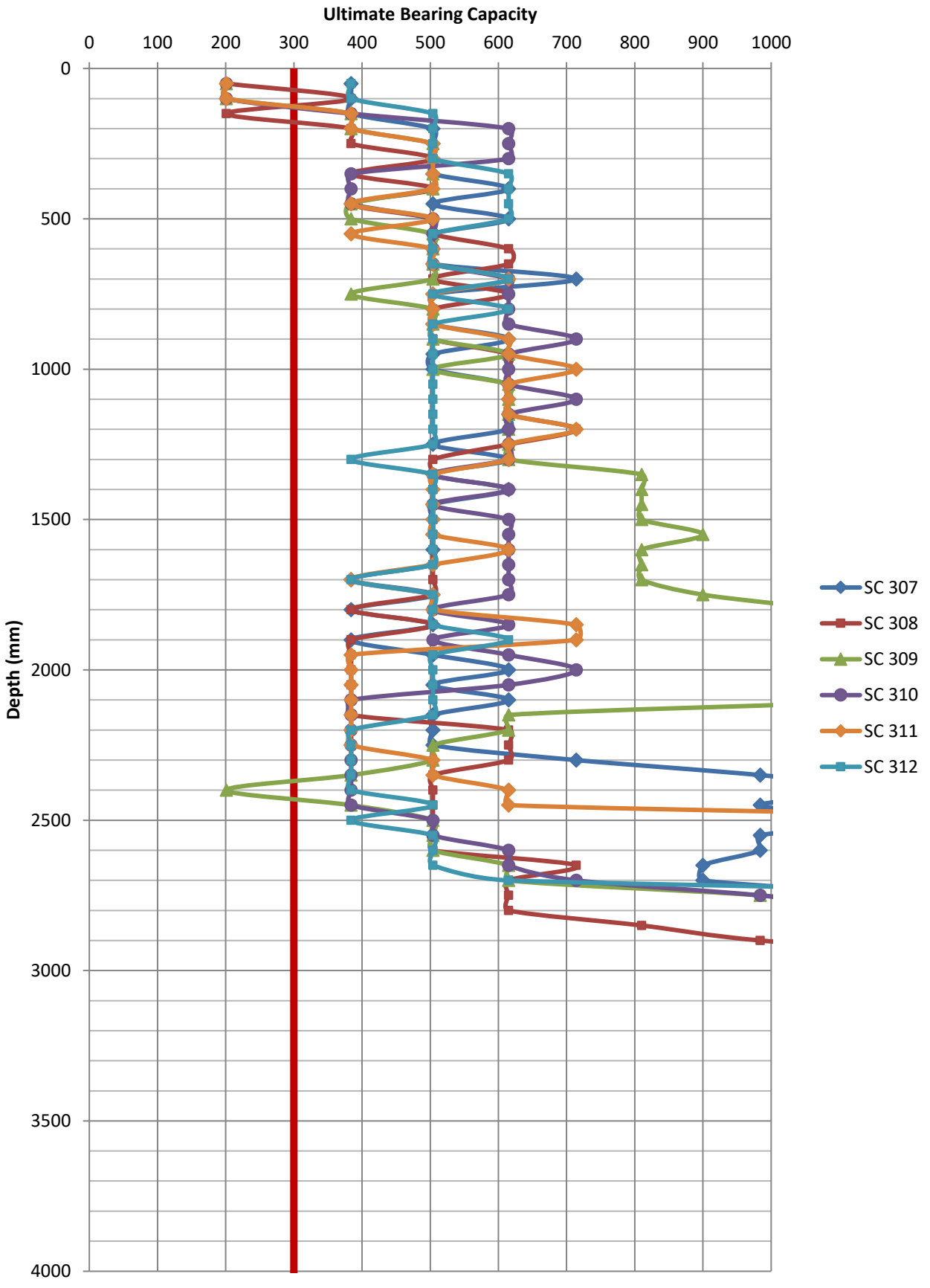
Summary of Ultimate Bearing Capacity vs Depth



NOTES

1. Based on Stockwell, M.J., 1977: Determination of allowable bearing pressure under small structures. New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.

Summary of Ultimate Bearing Capacity vs Depth



NOTES

1. Based on Stockwell, M.J., 1977: Determination of allowable bearing pressure under small structures. New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.

APPENDIX E

LIQUEFACTION ANALYSIS

EDC
15B Leslie Hills DriveRiccarton, Christchurch 8011
Riccarton, Christchurch 8011
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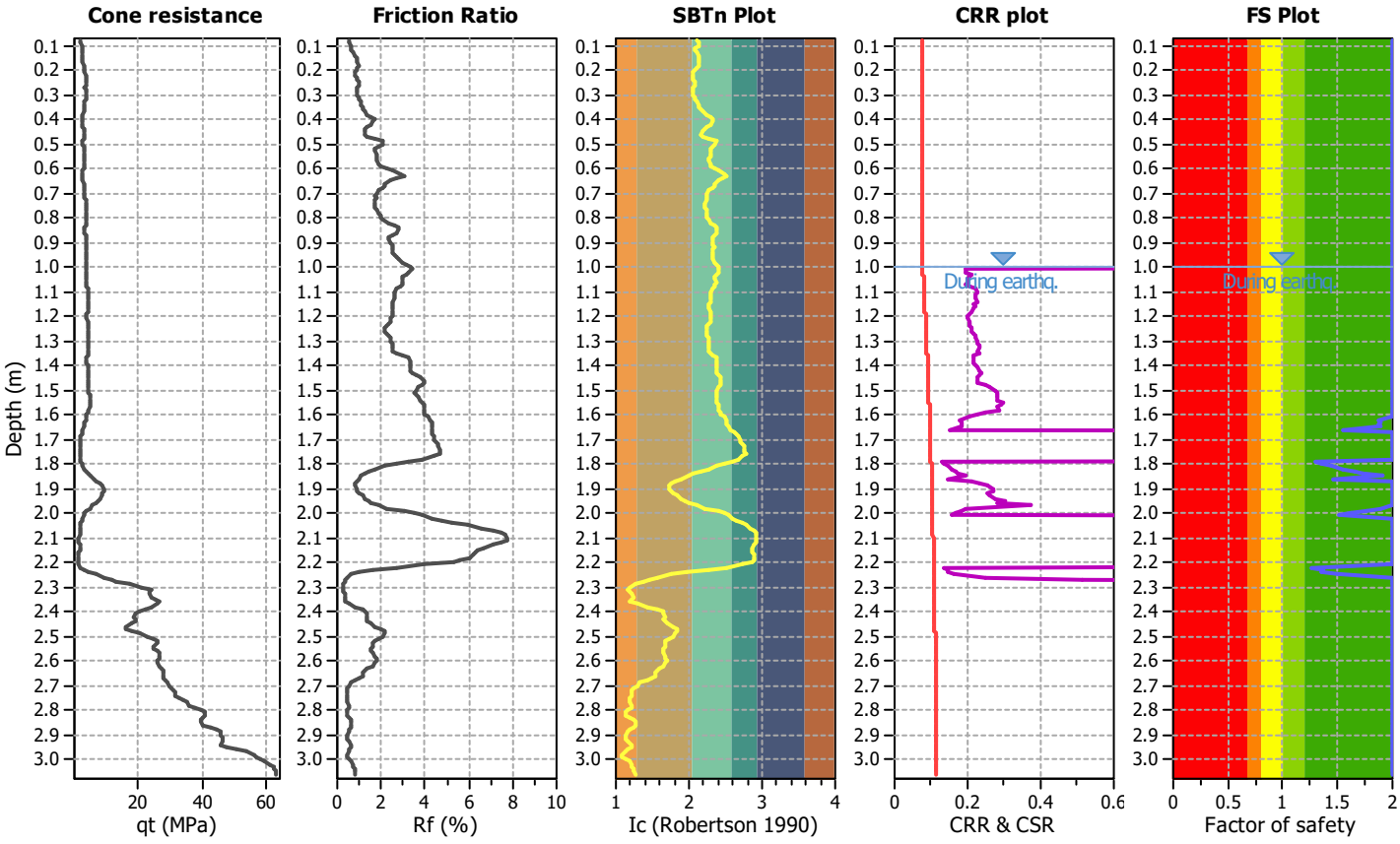
LIQUEFACTION ANALYSIS REPORT

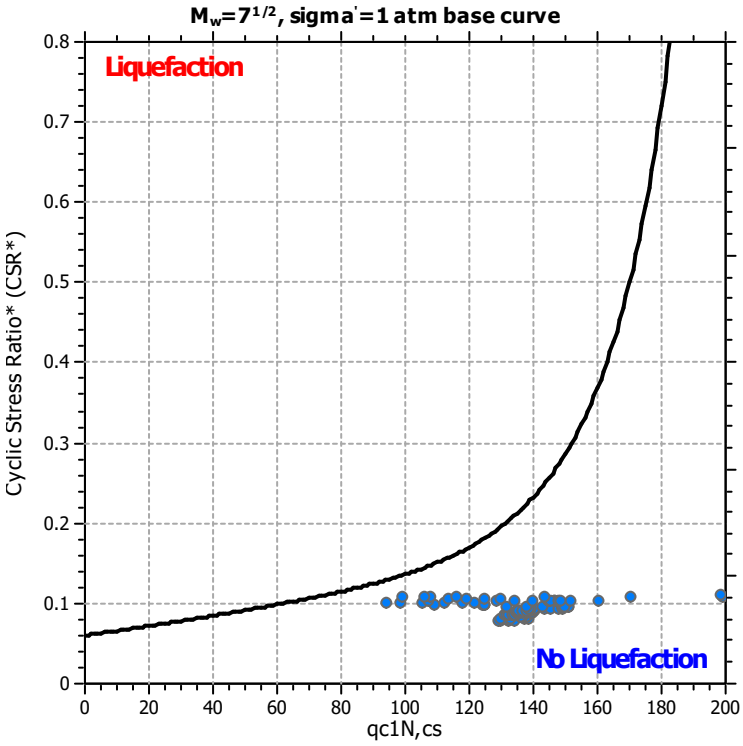
Project title : 29 Pentecost Road - Stage 2 **Location : 29 Pentecost Road**

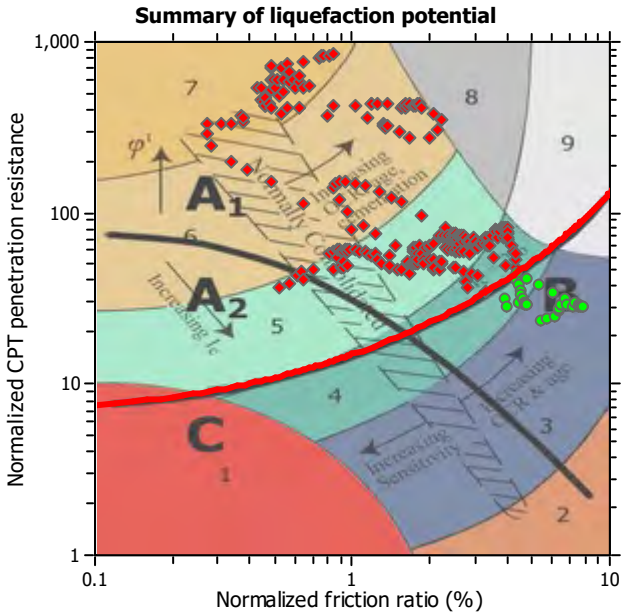
CPT file : CPT301 - SLS A

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

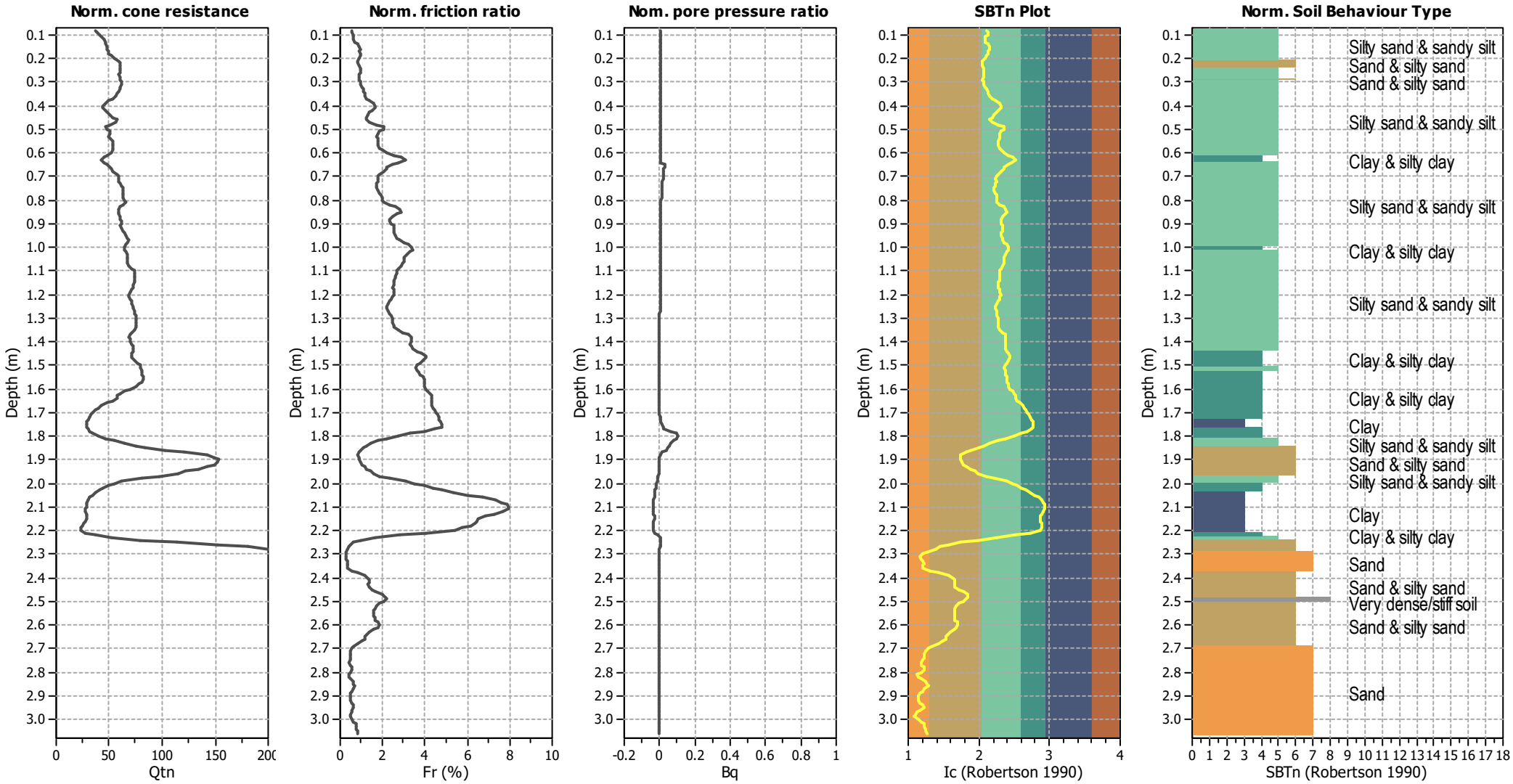






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



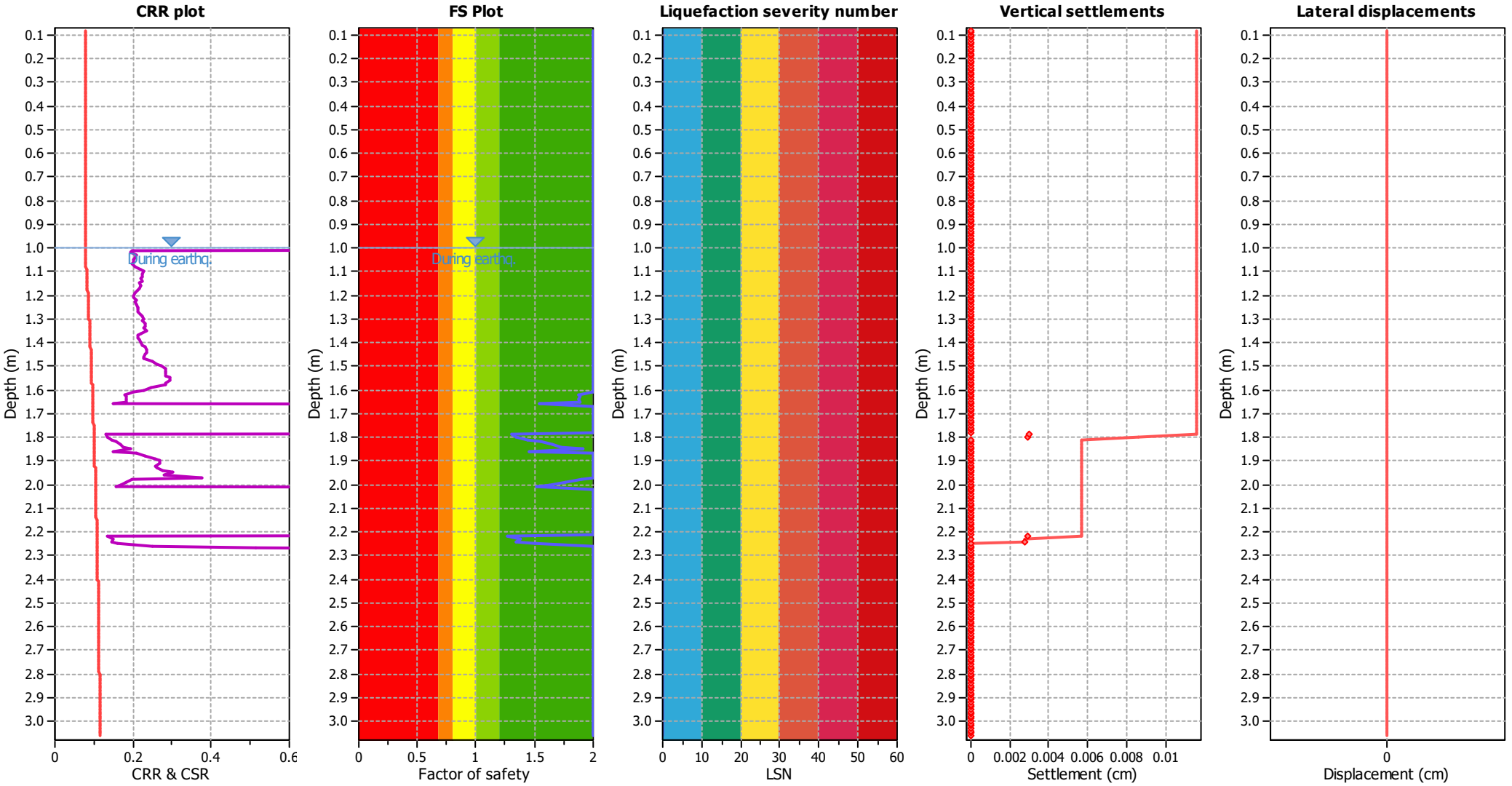
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

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15B Leslie Hills DriveRiccarton, Christchurch 8011
Riccarton, Christchurch 8011
EDC.co.nz

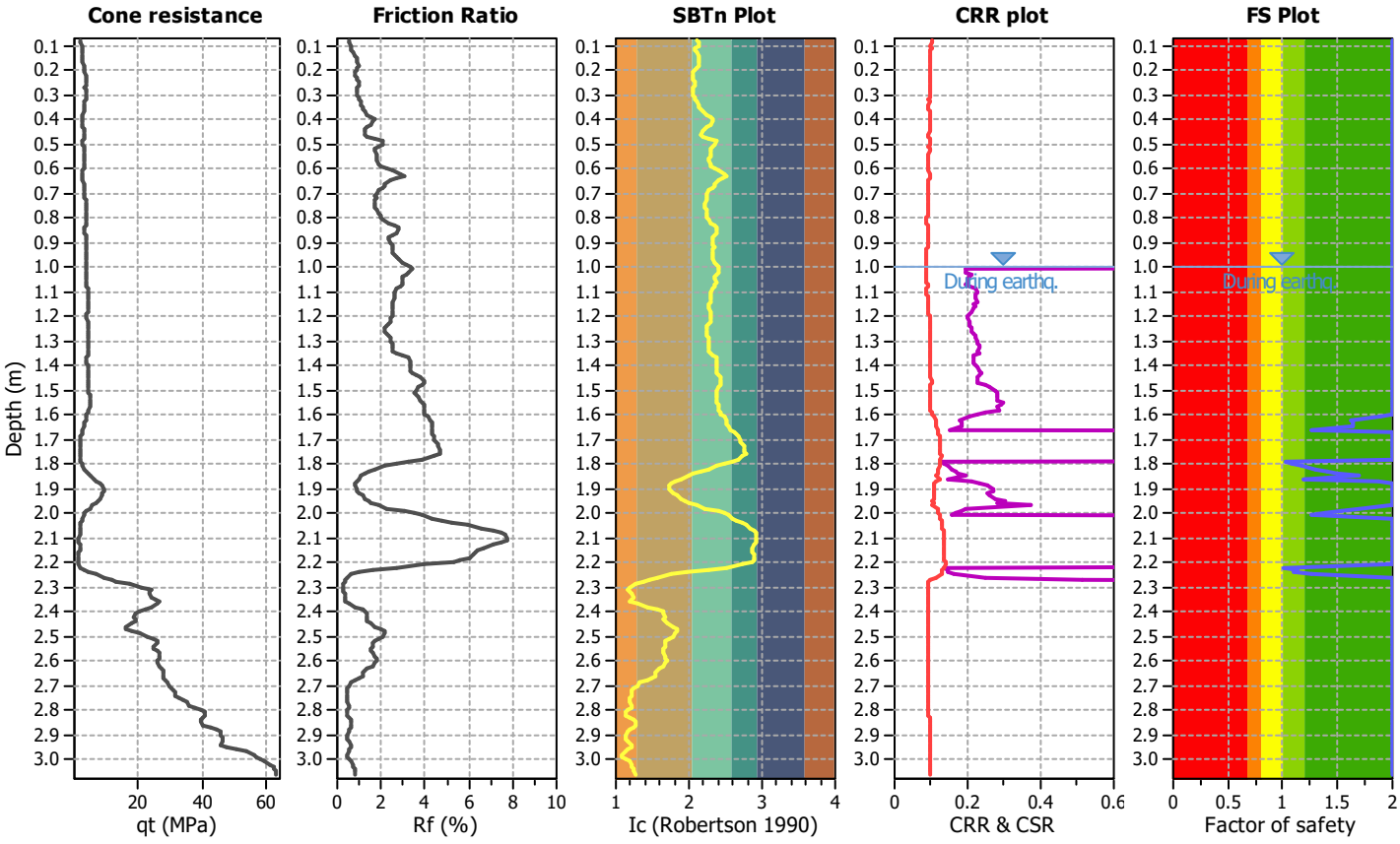
LIQUEFACTION ANALYSIS REPORT

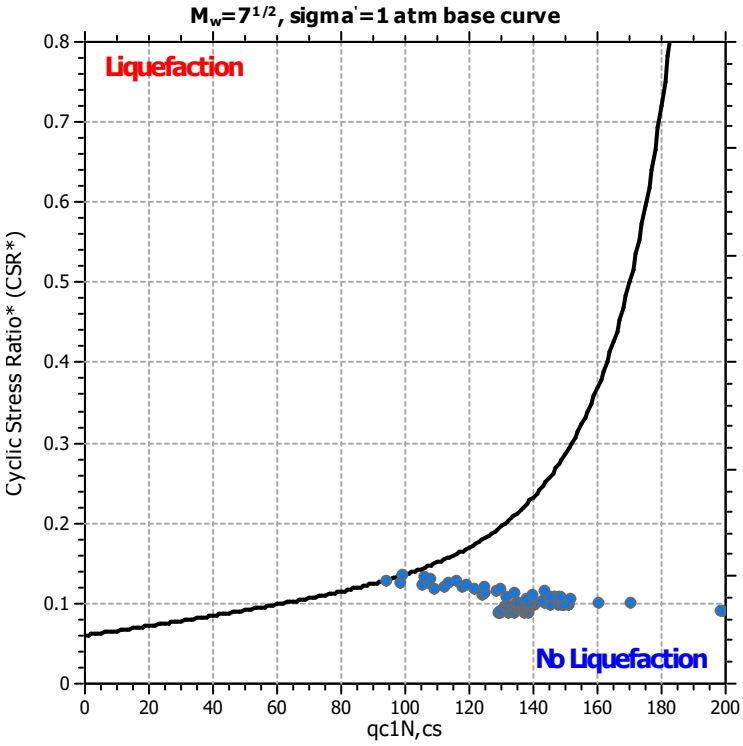
Project title : 29 Pentecost Road - Stage 2 **Location : 29 Pentecost Road**

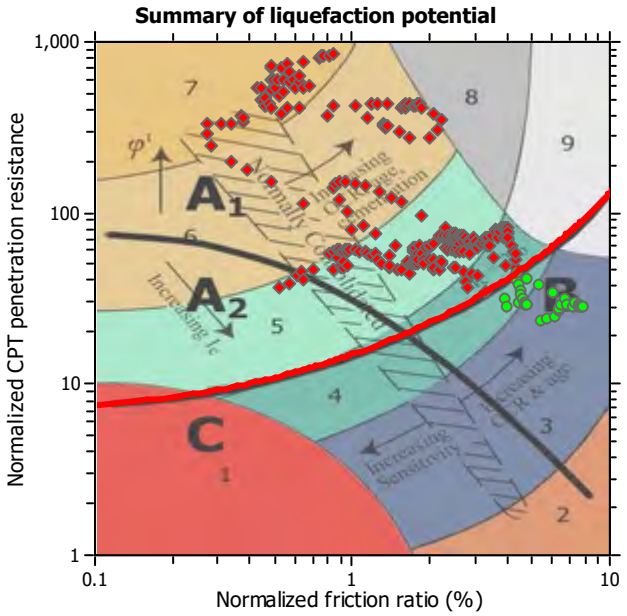
CPT file : CPT301 - SLS B

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

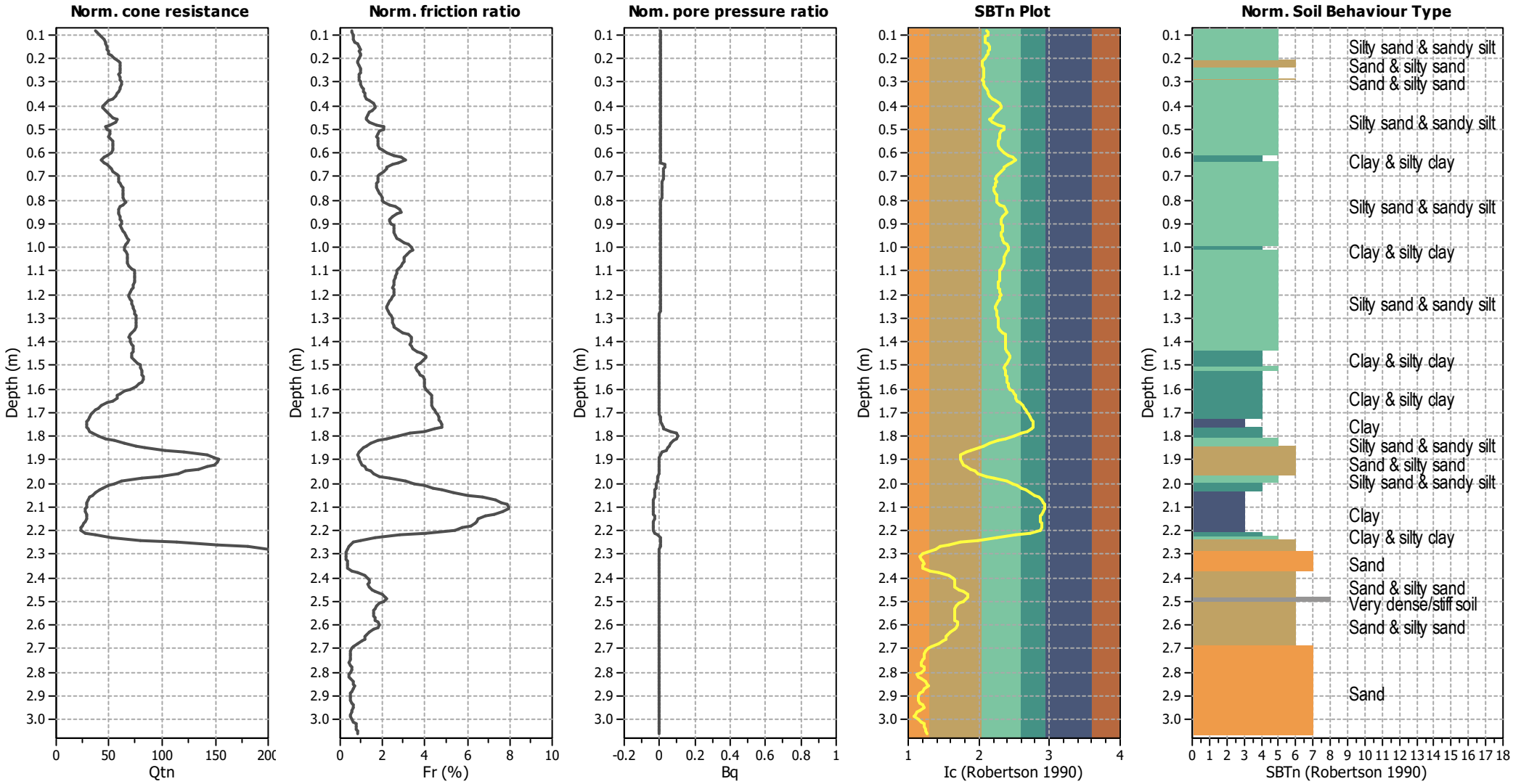






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



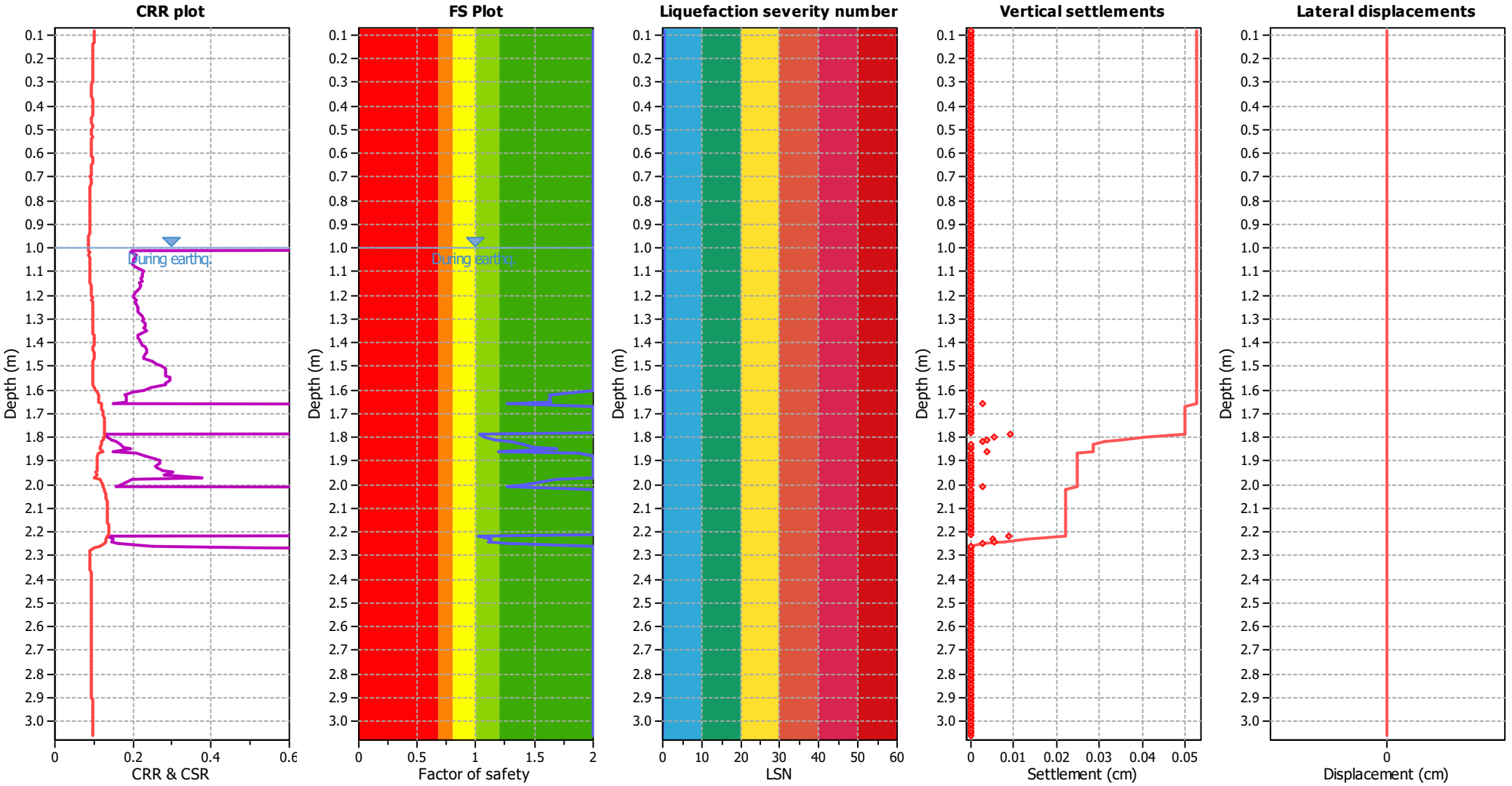
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

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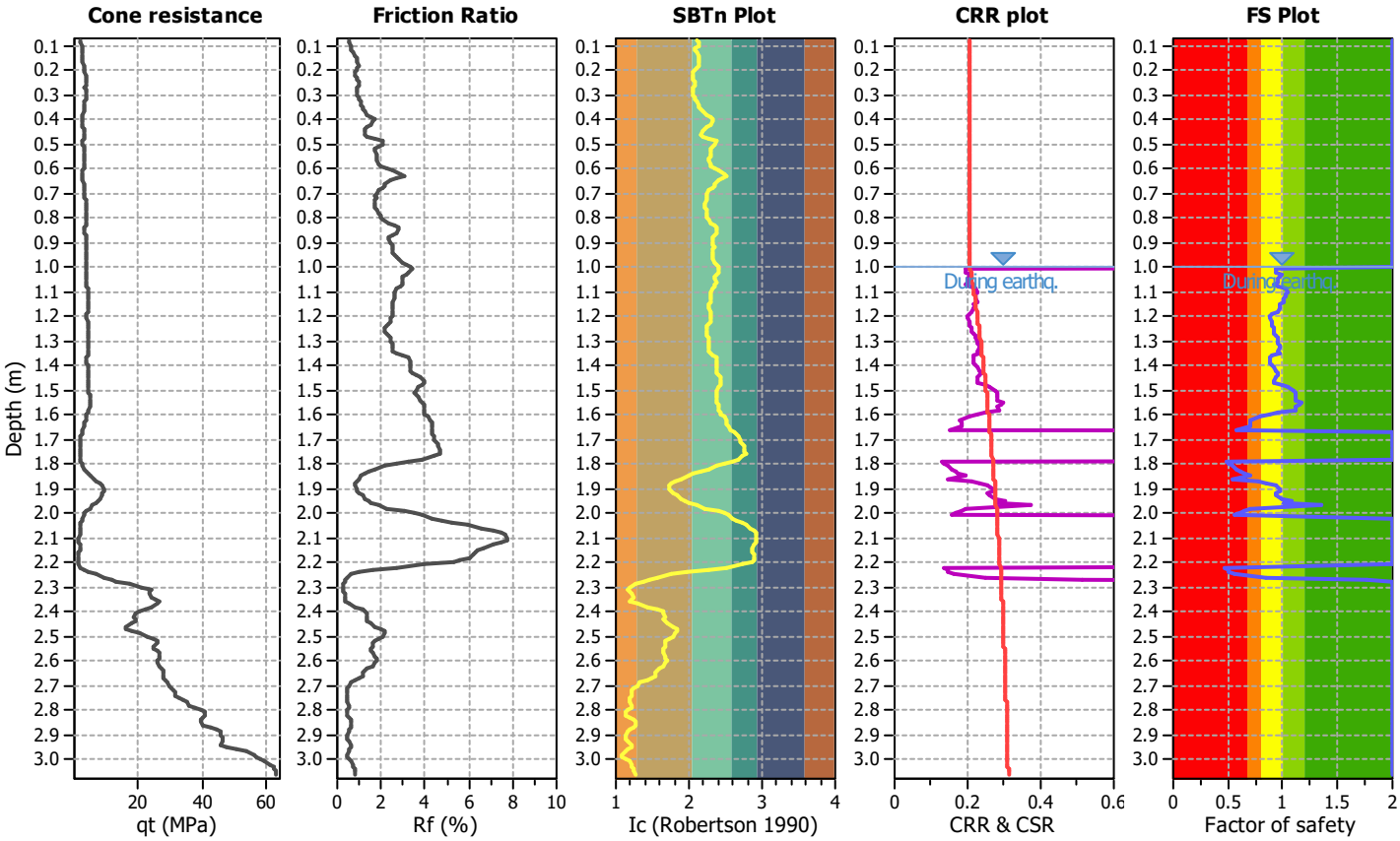
LIQUEFACTION ANALYSIS REPORT

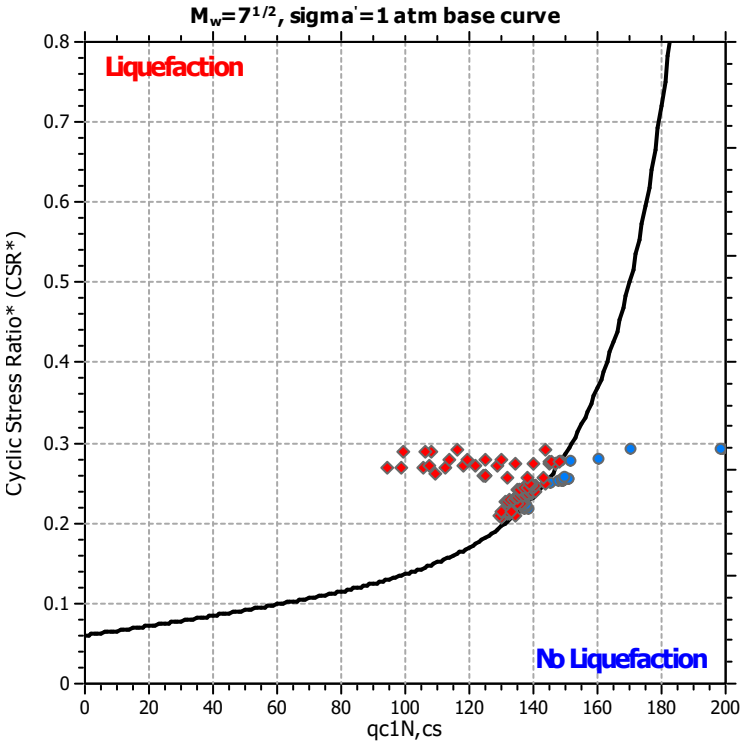
Project title : 29 Pentecost Road - Stage 2 **Location : 29 Pentecost Road**

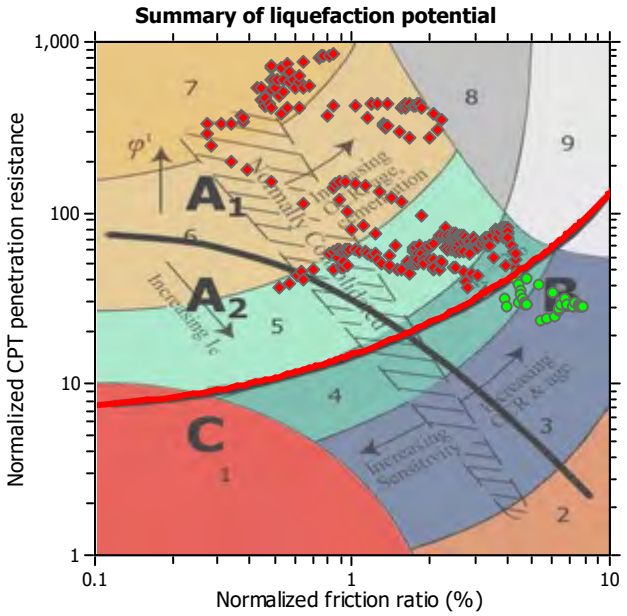
CPT file : CPT301 - ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

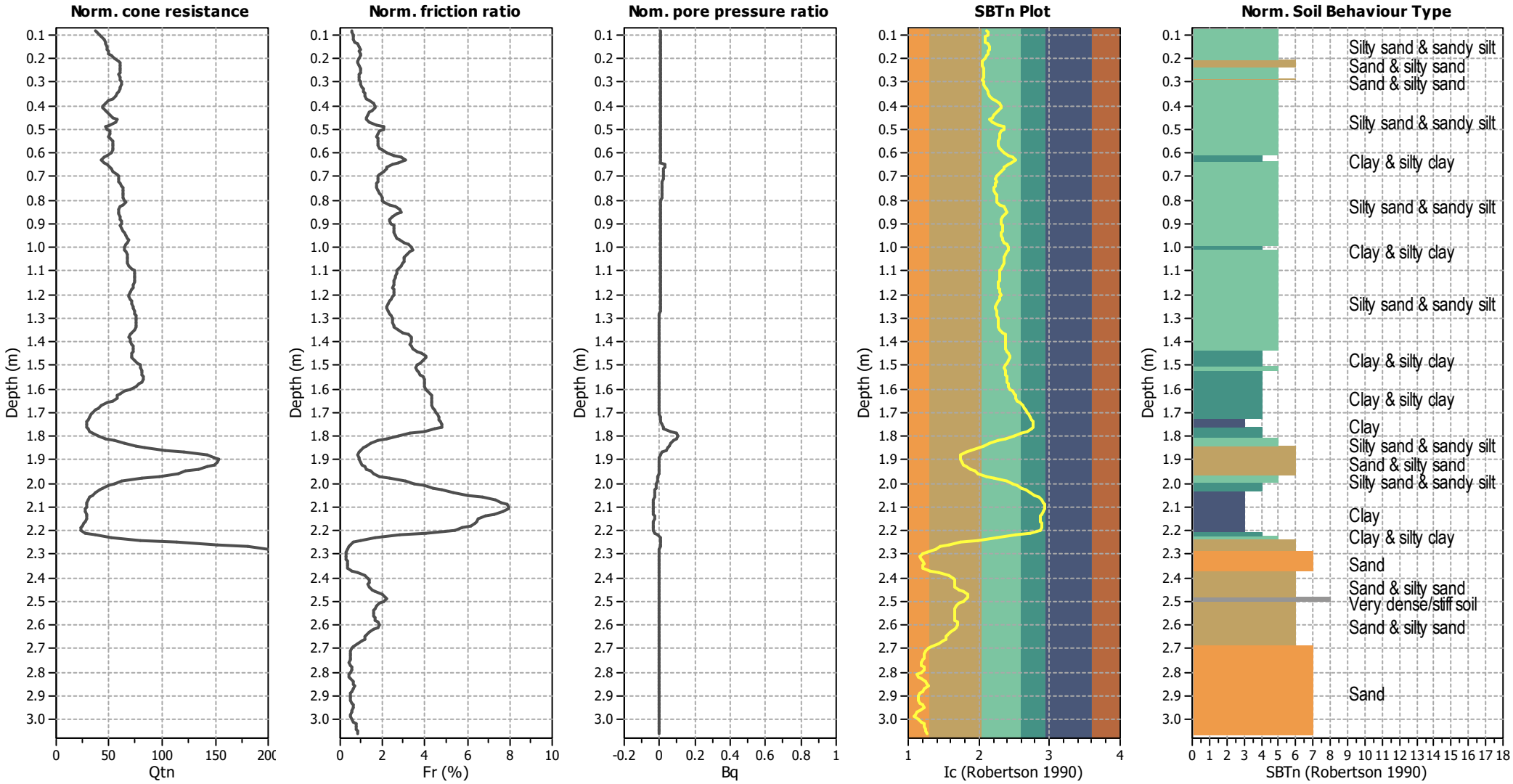






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



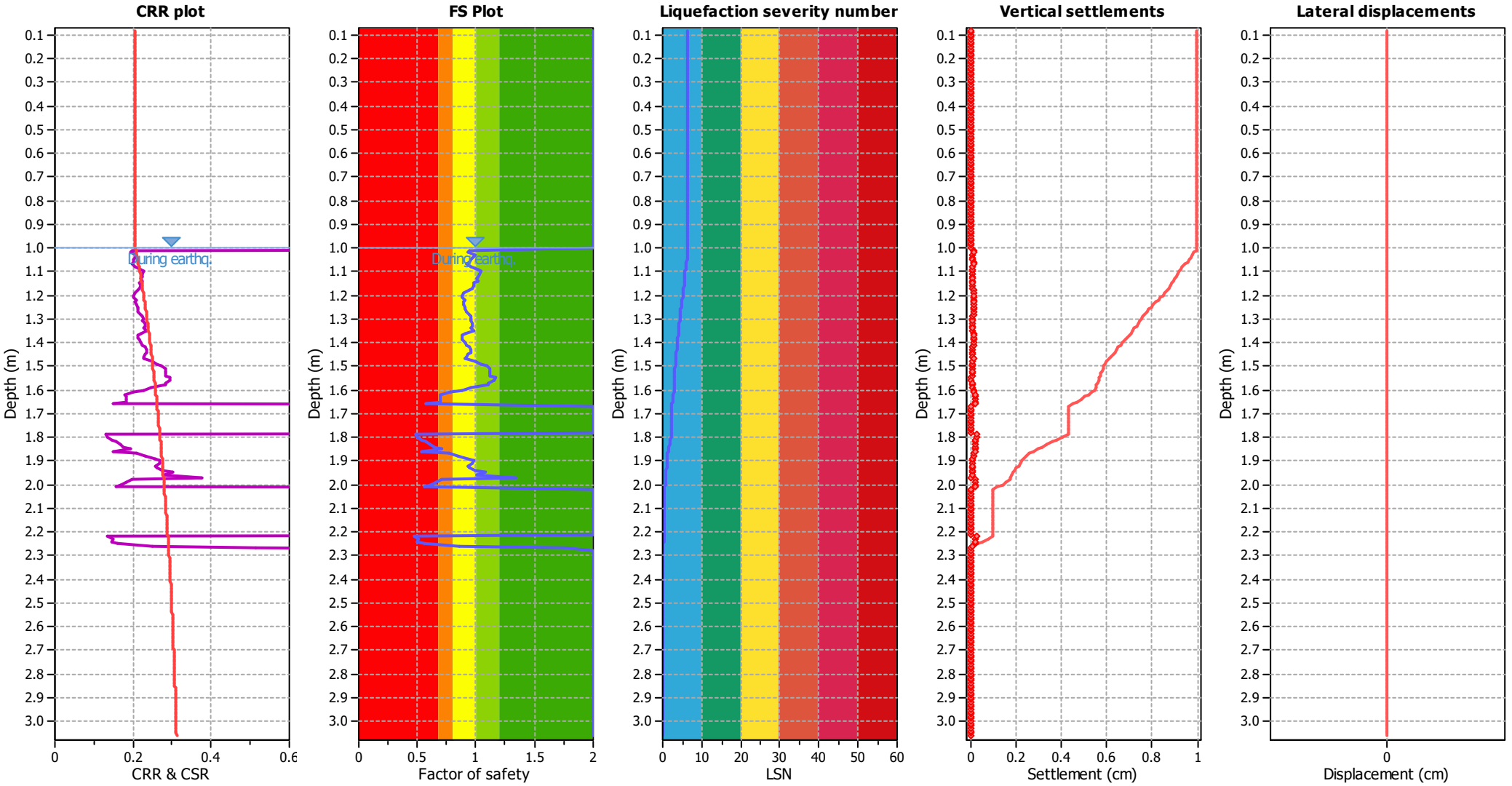
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

EDC
15B Leslie Hills Drive
Riccarton, Christchurch 8011
EDC.co.nz

LIQUEFACTION ANALYSIS REPORT

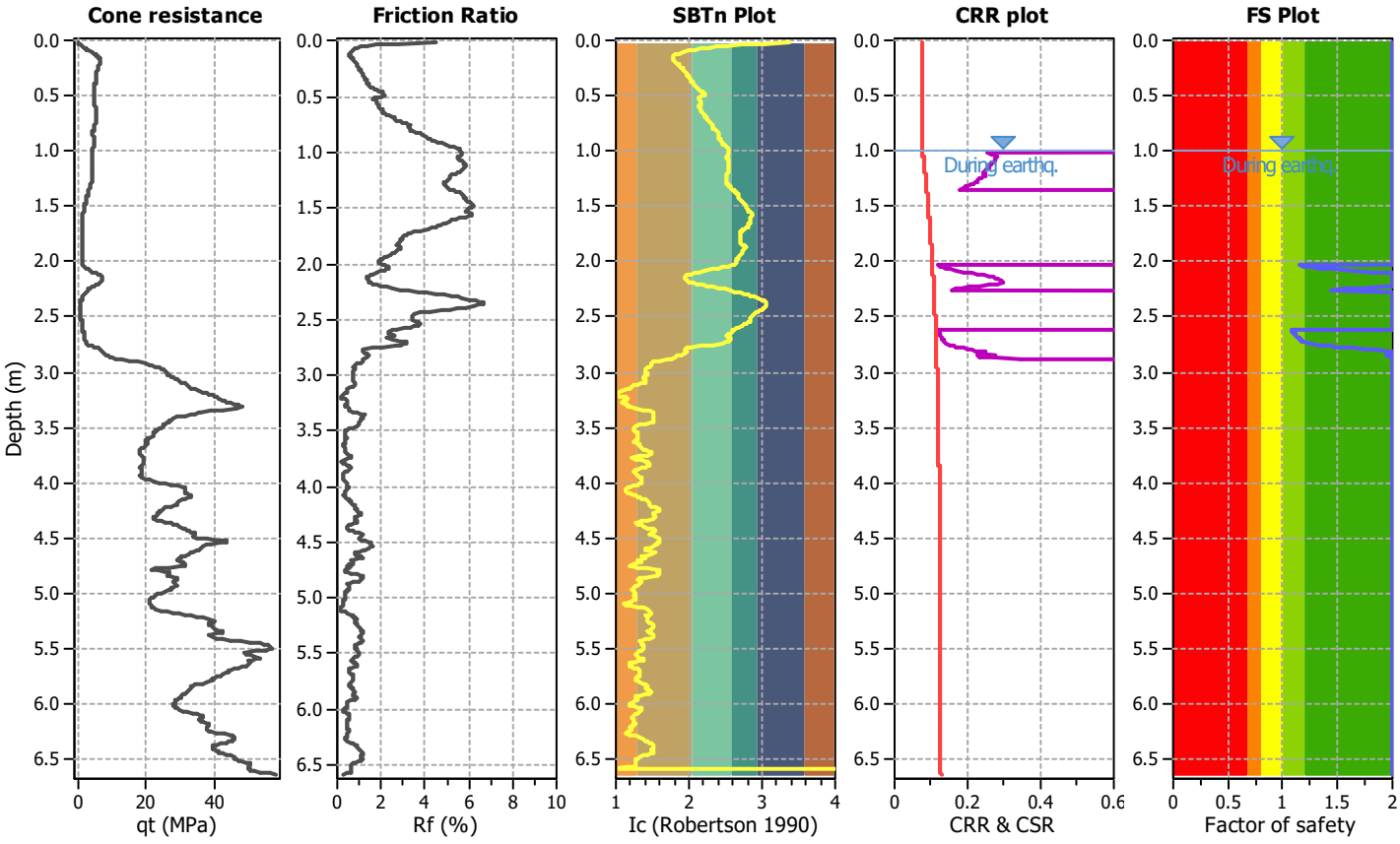
Project title : 29 Pentecost Road - Stage 2

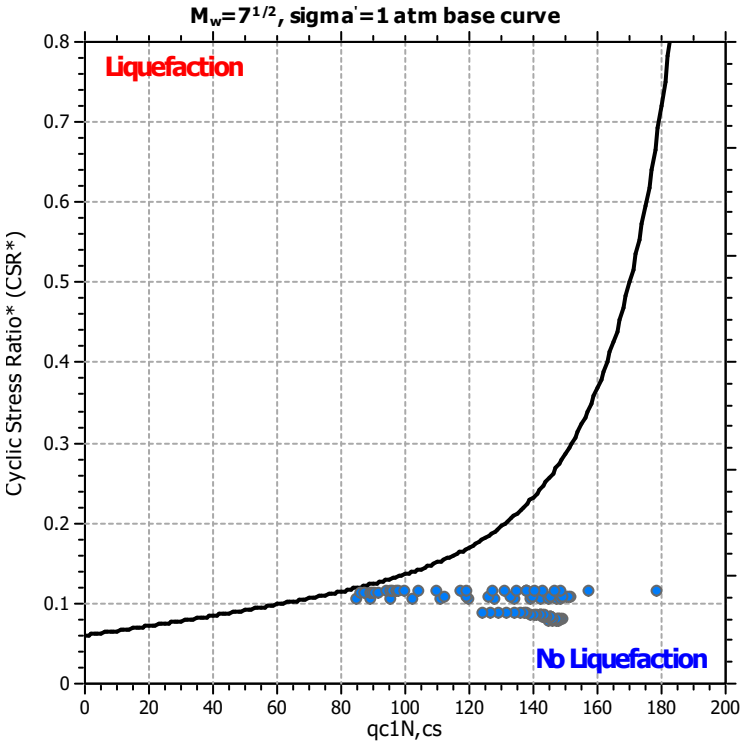
Location : 29 Pentecost Road

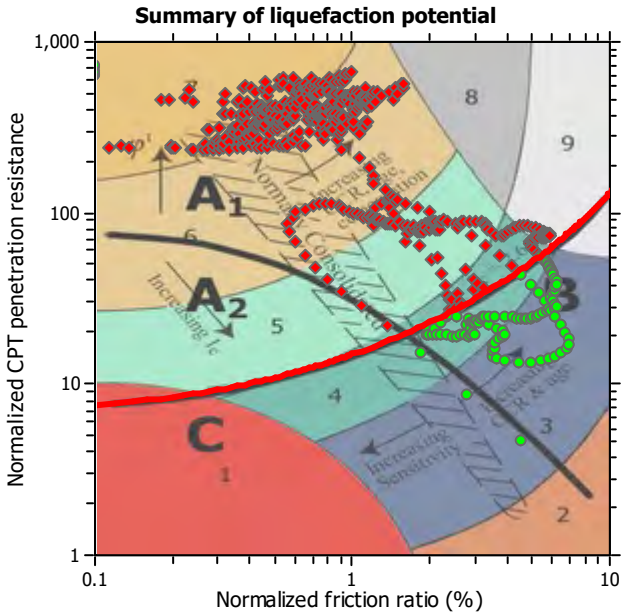
CPT file : CPT302 - SLS A

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

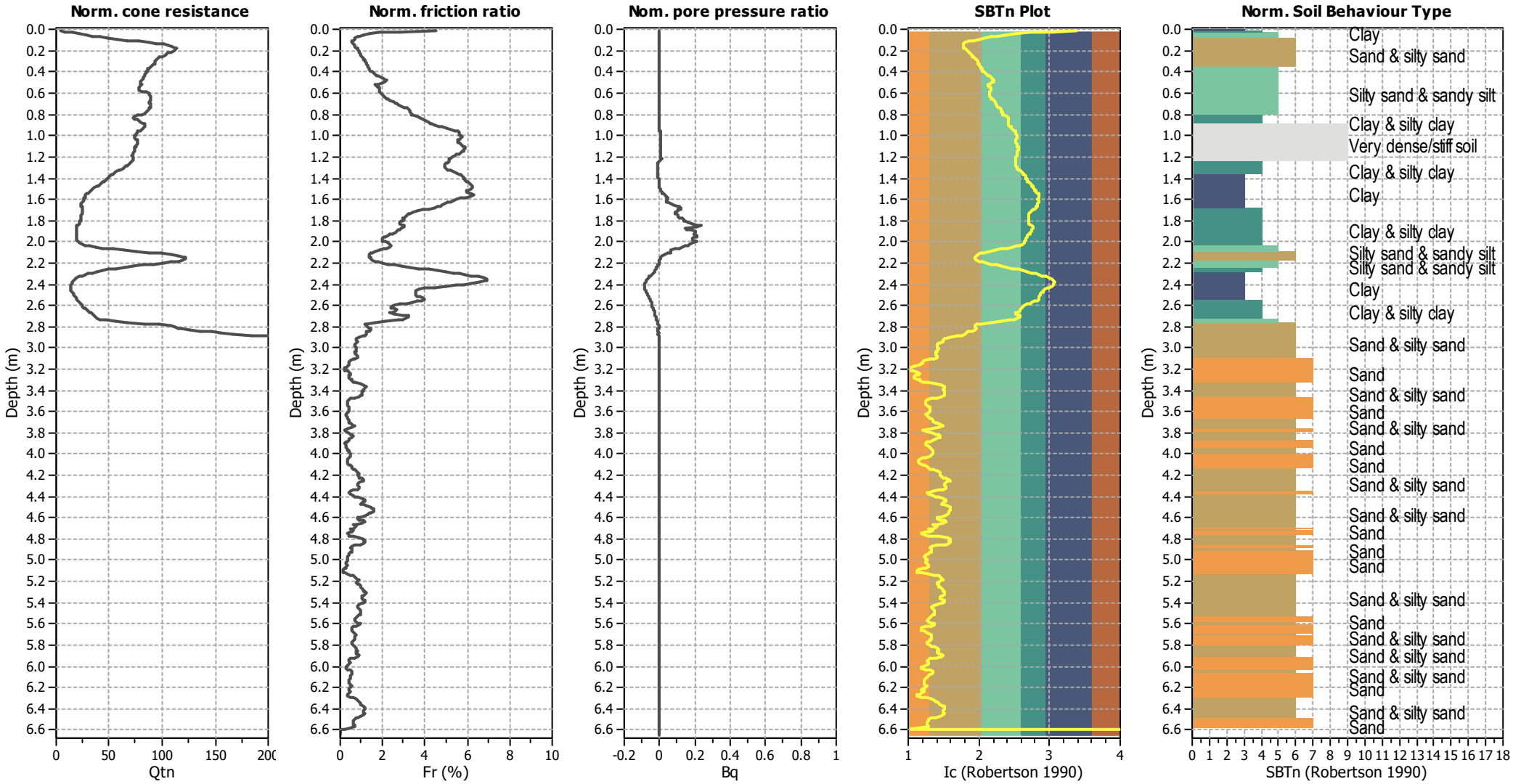






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



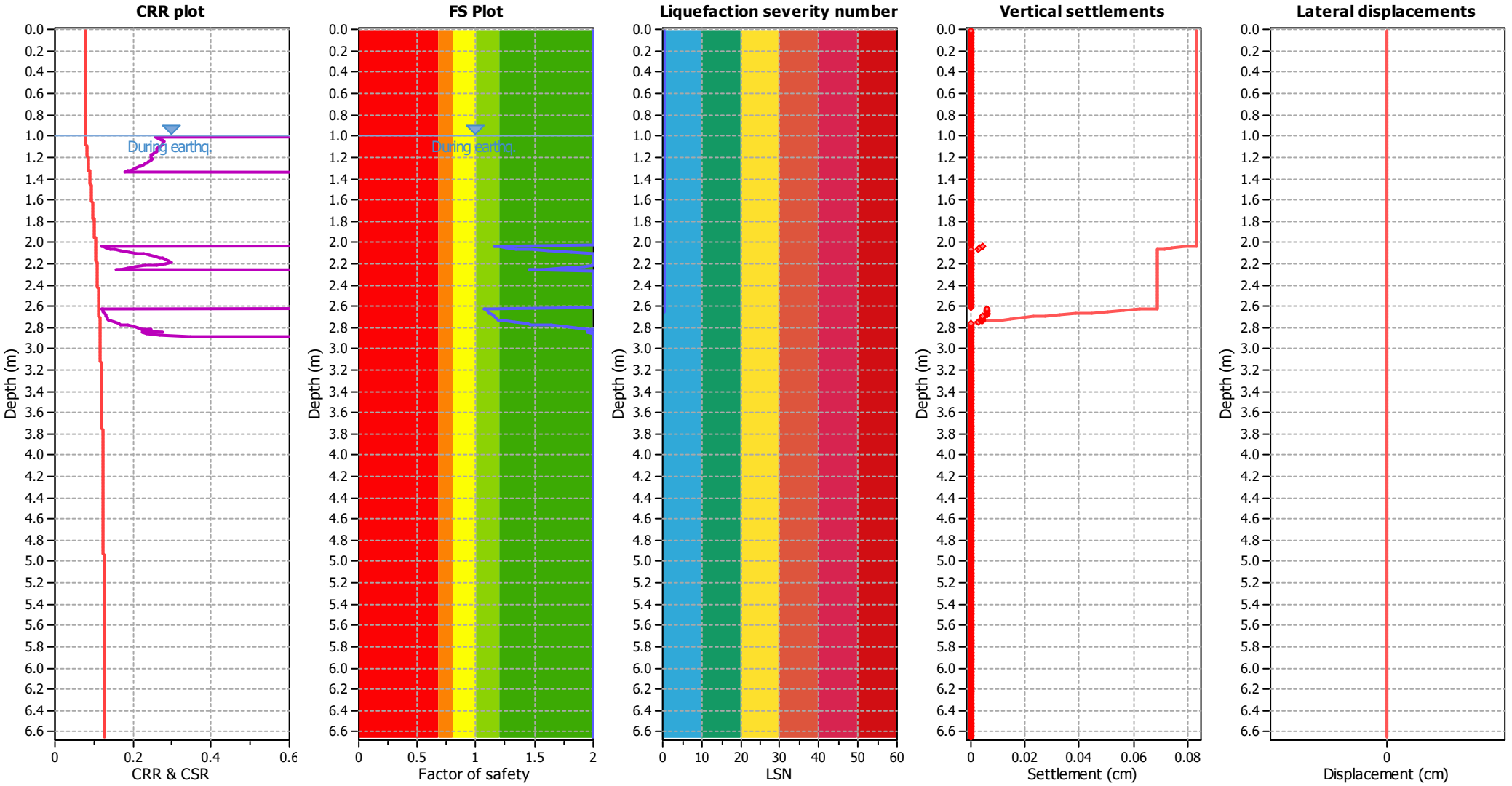
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

EDC
15B Leslie Hills Drive
Riccarton, Christchurch 8011
EDC.co.nz

LIQUEFACTION ANALYSIS REPORT

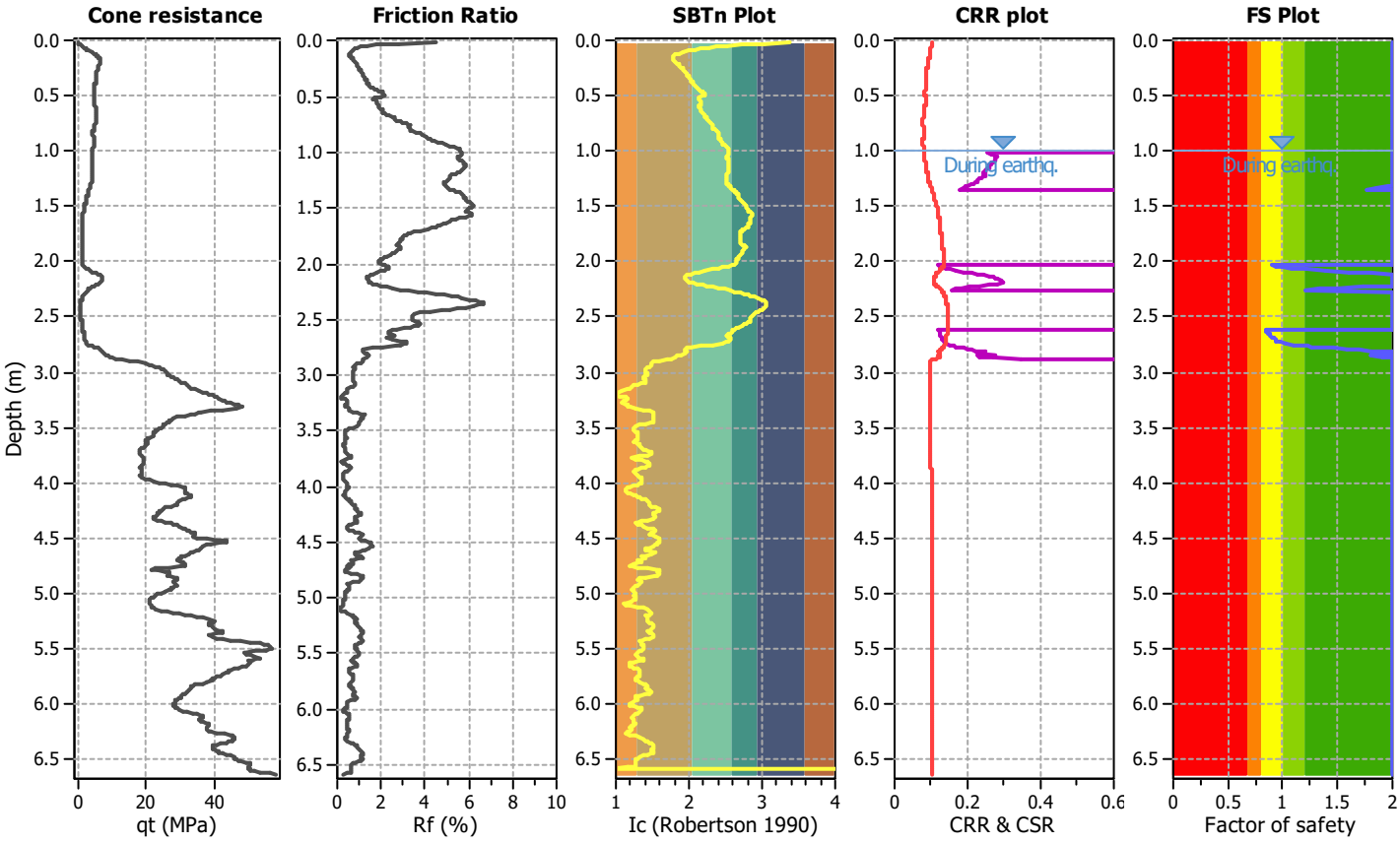
Project title : 29 Pentecost Road - Stage 2

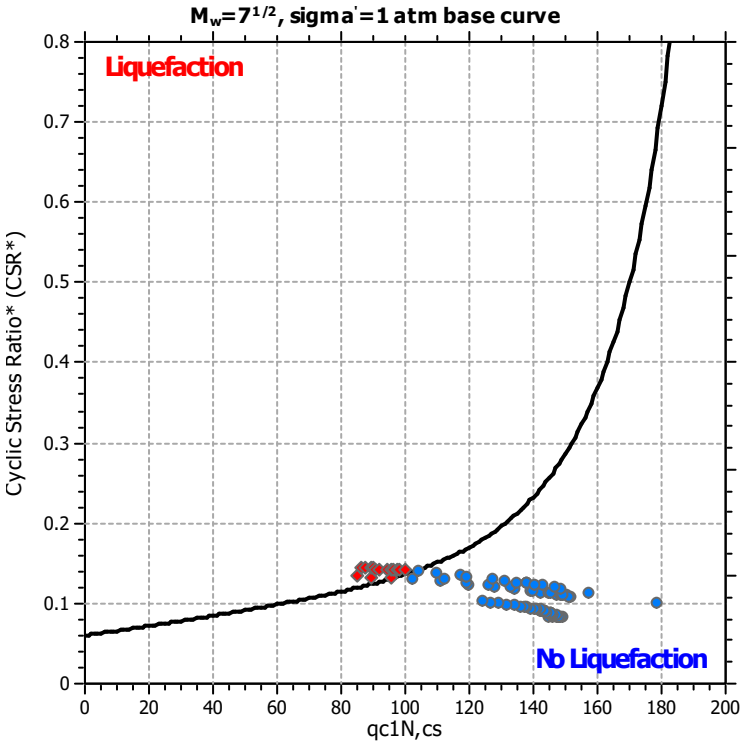
Location : 29 Pentecost Road

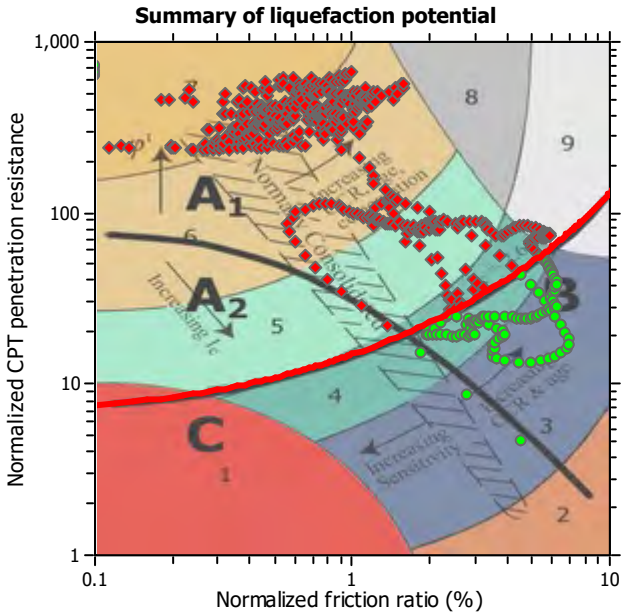
CPT file : CPT302 - SLS B

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

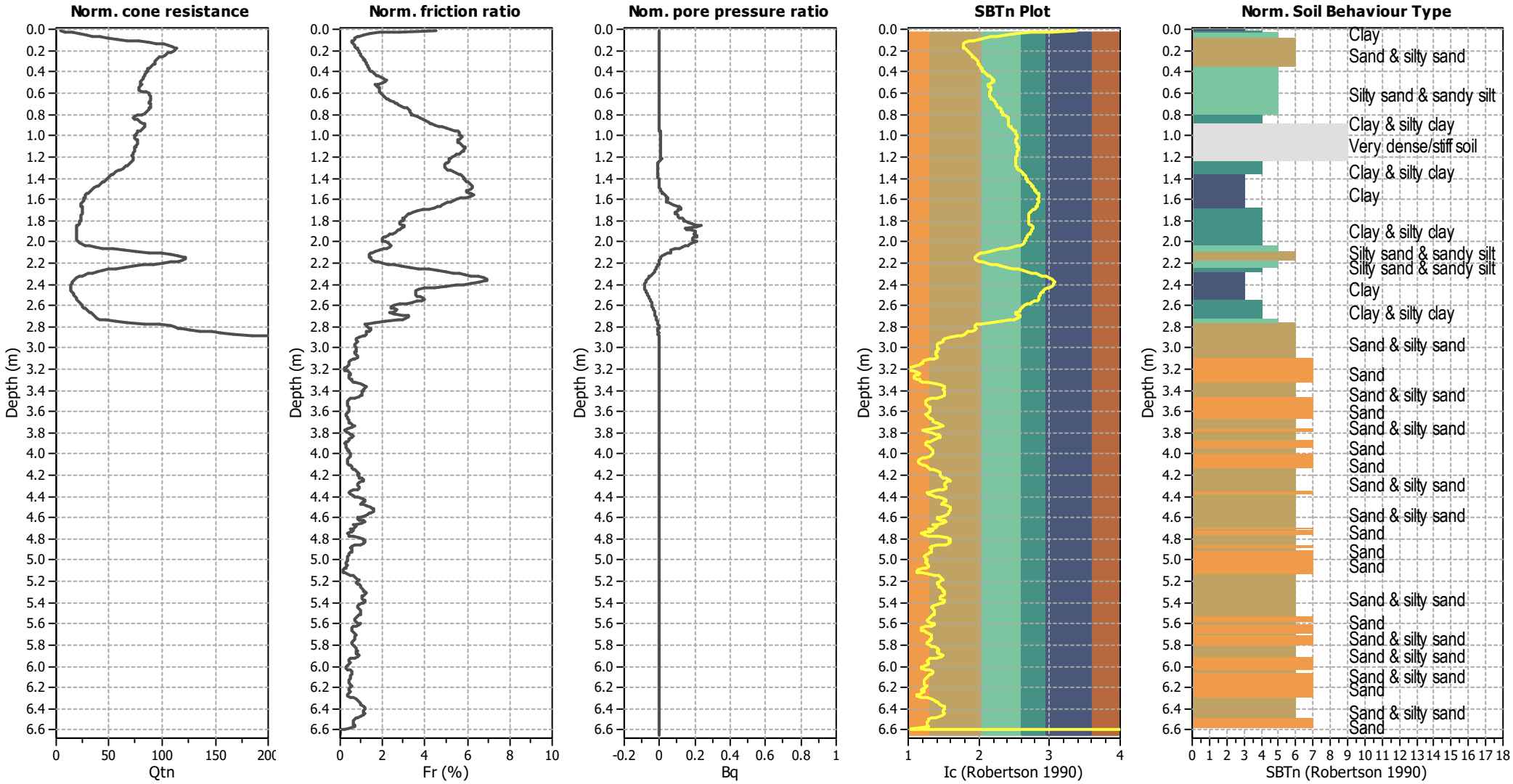






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



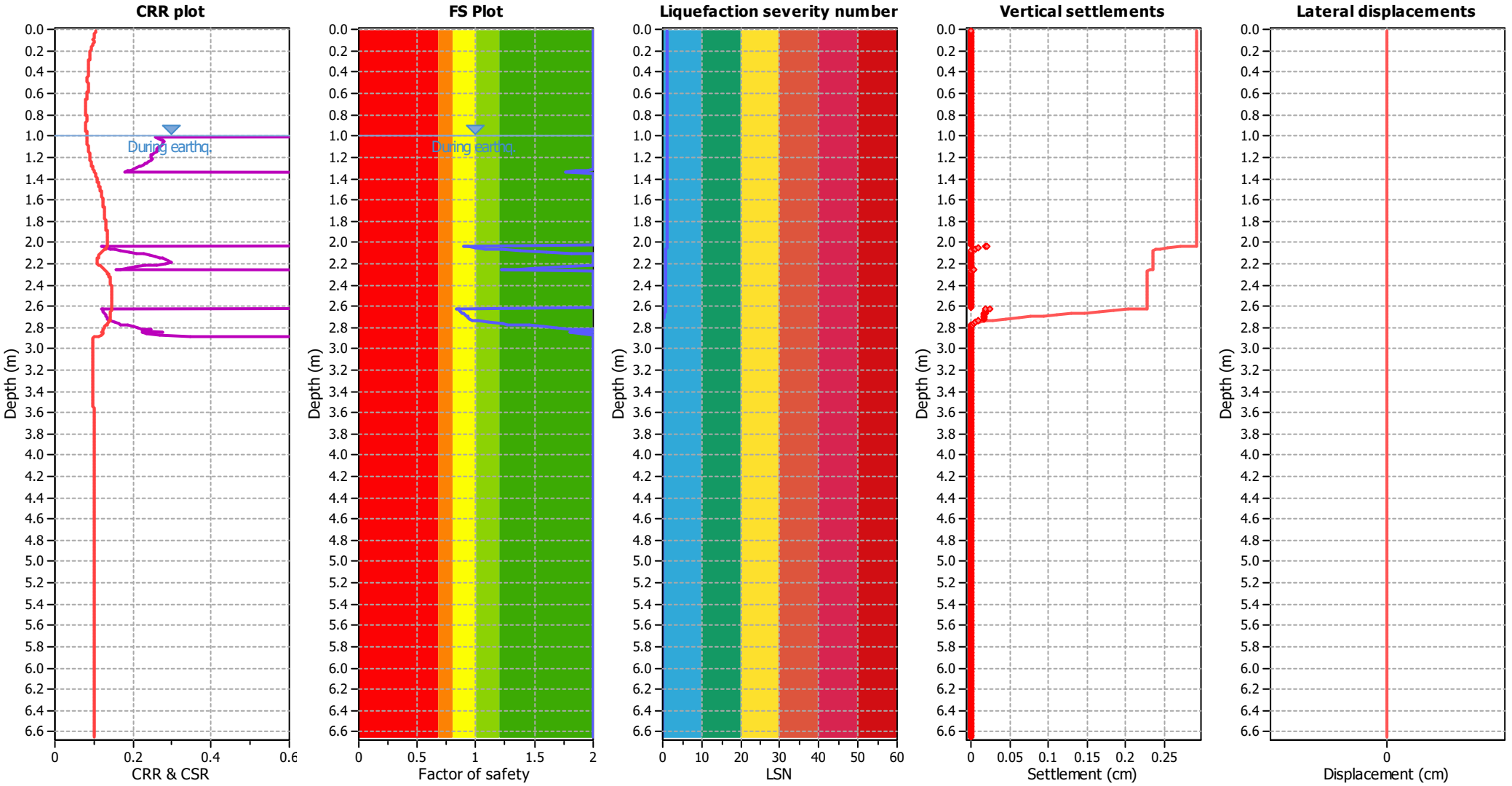
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

EDC
15B Leslie Hills Drive
Riccarton, Christchurch 8011
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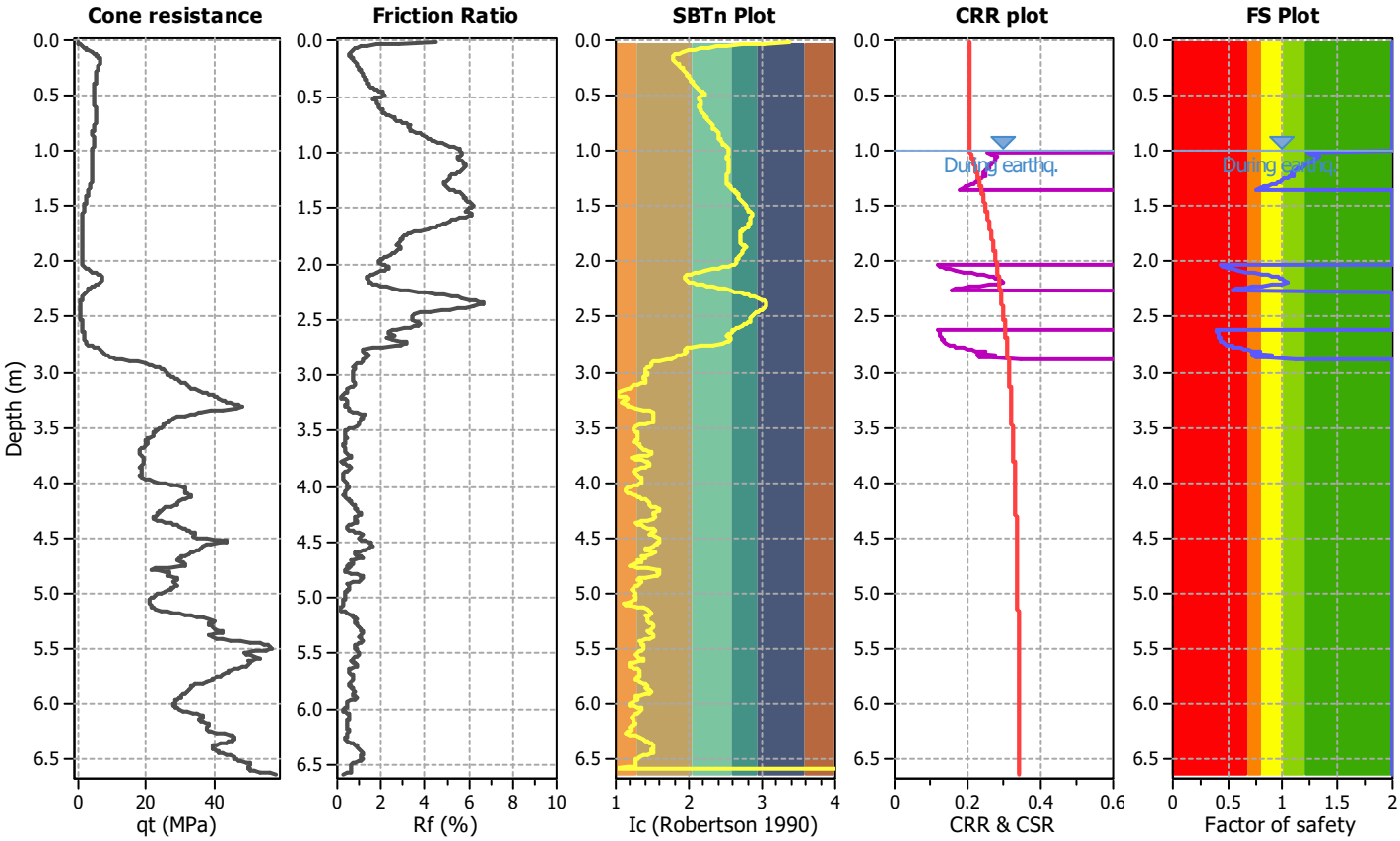
LIQUEFACTION ANALYSIS REPORT

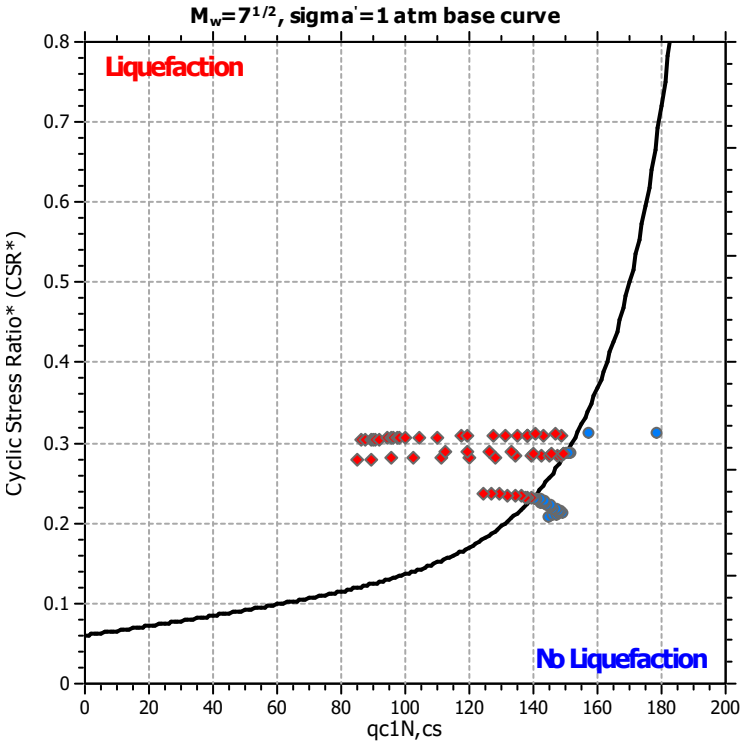
Project title : 29 Pentecost Road - Stage 2 **Location : 29 Pentecost Road**

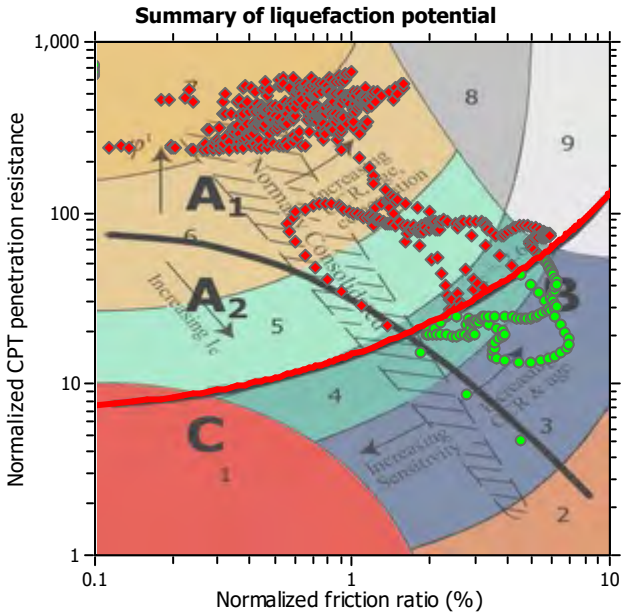
CPT file : CPT302 - ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

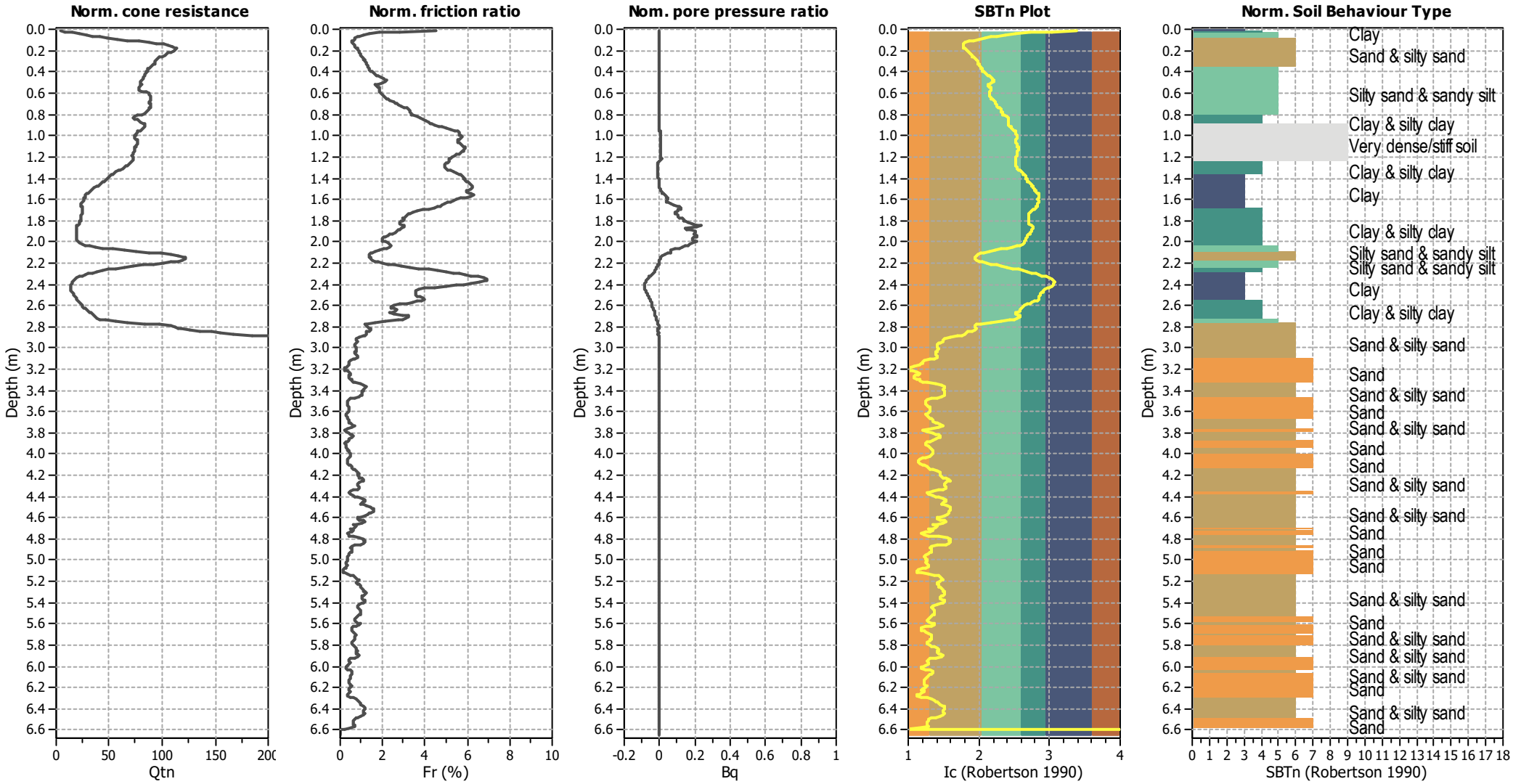






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



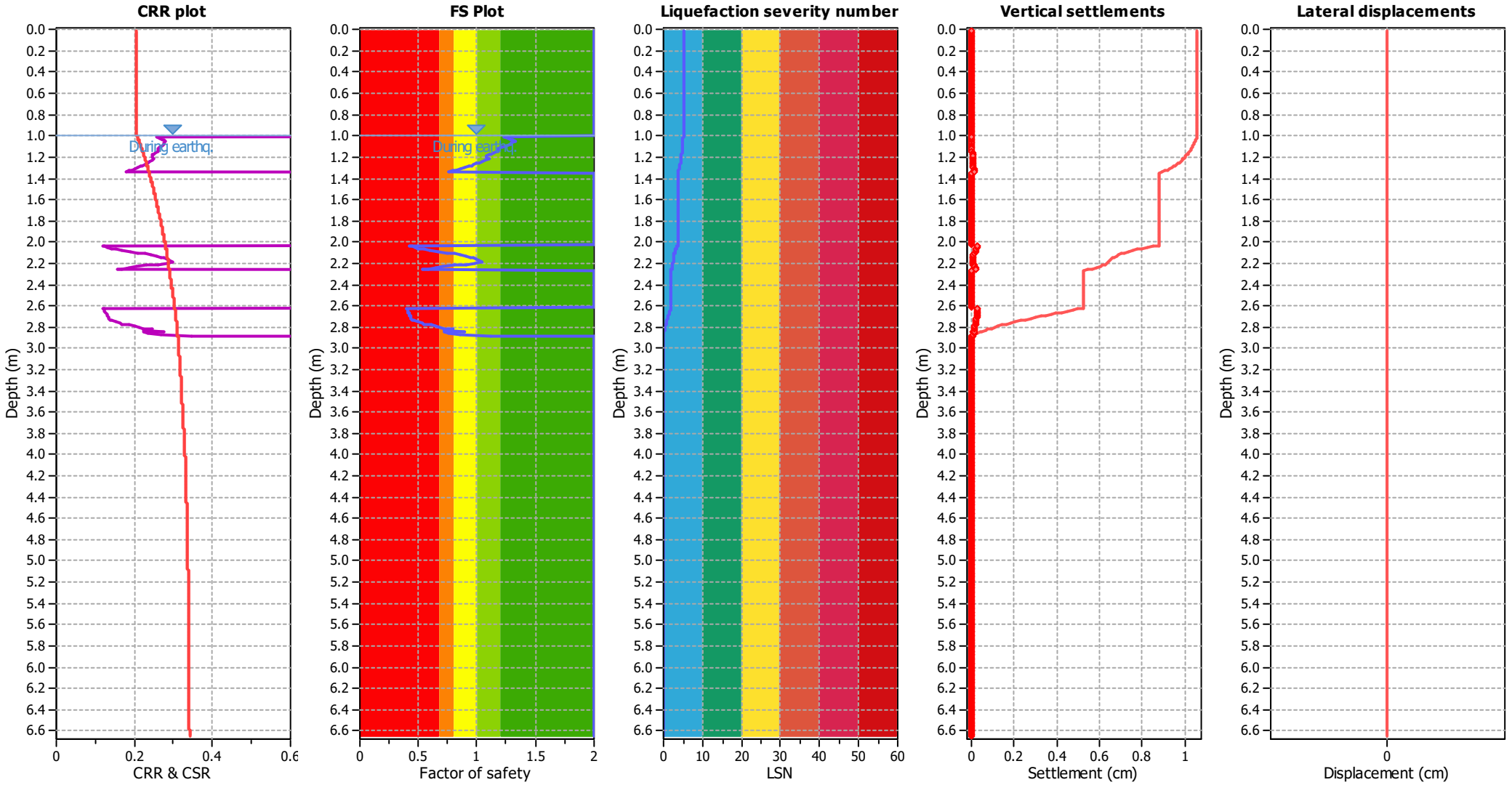
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

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15B Leslie Hills Drive
Riccarton, Christchurch 8011
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LIQUEFACTION ANALYSIS REPORT

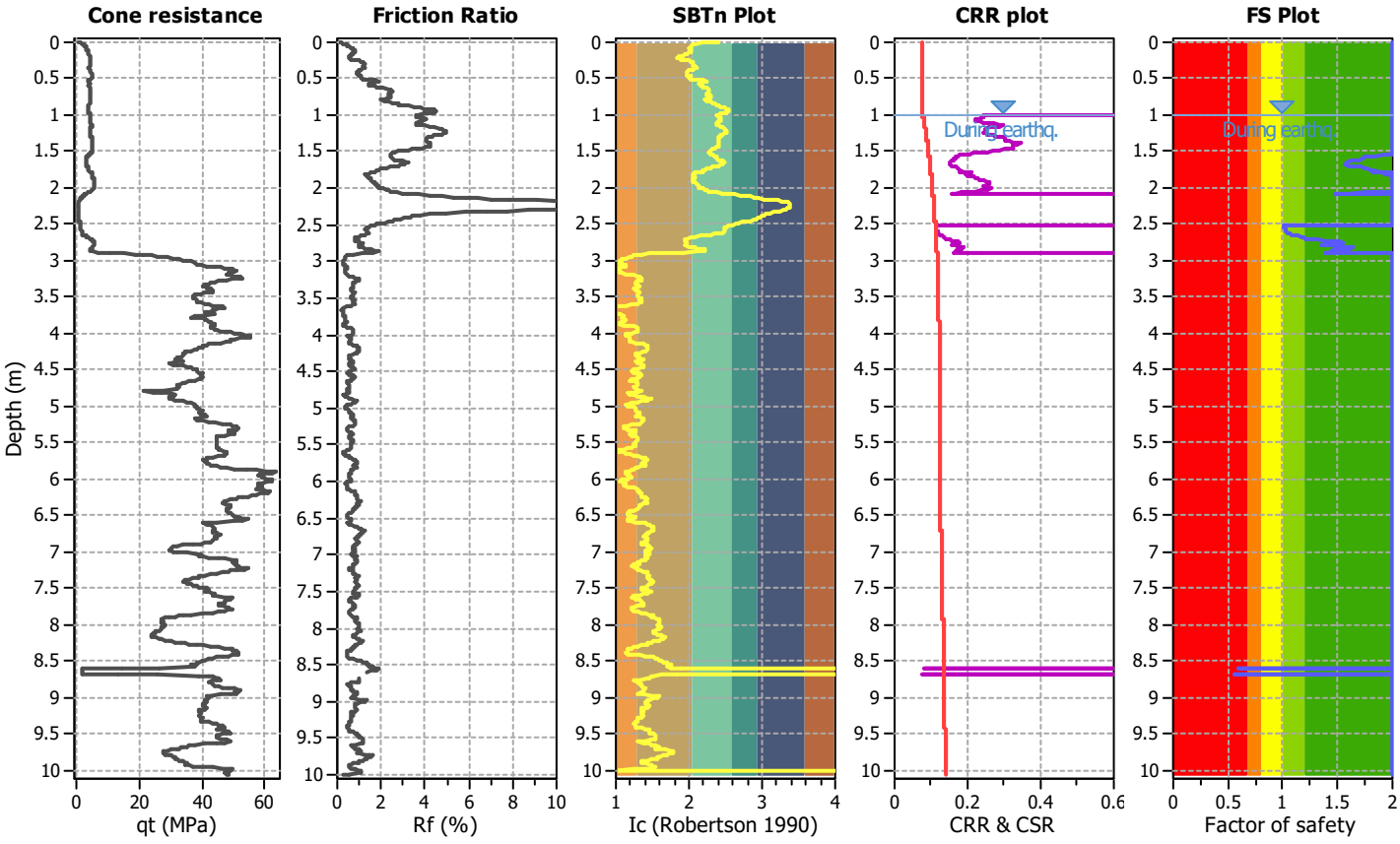
Project title : 29 Pentecost Road - Stage 2

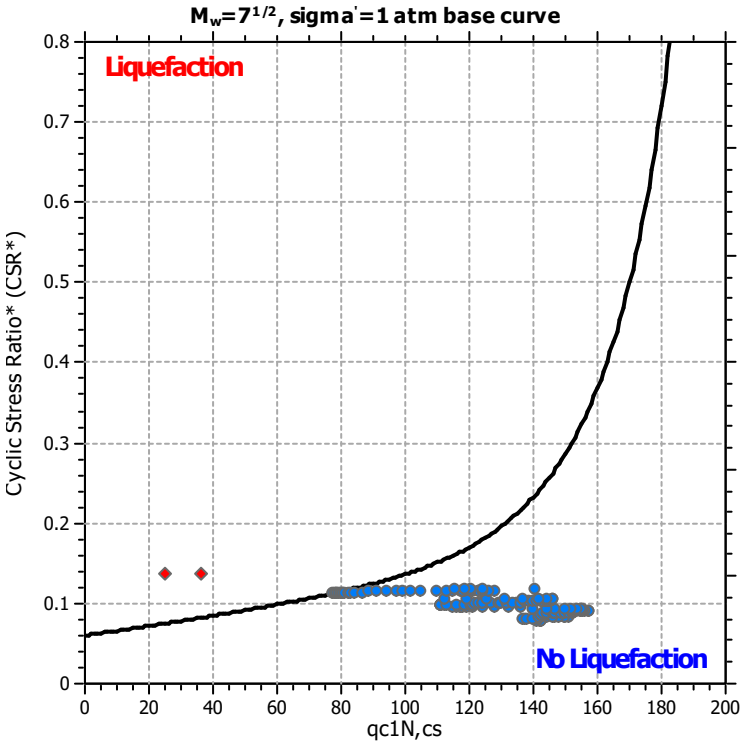
Location : 29 Pentecost Road

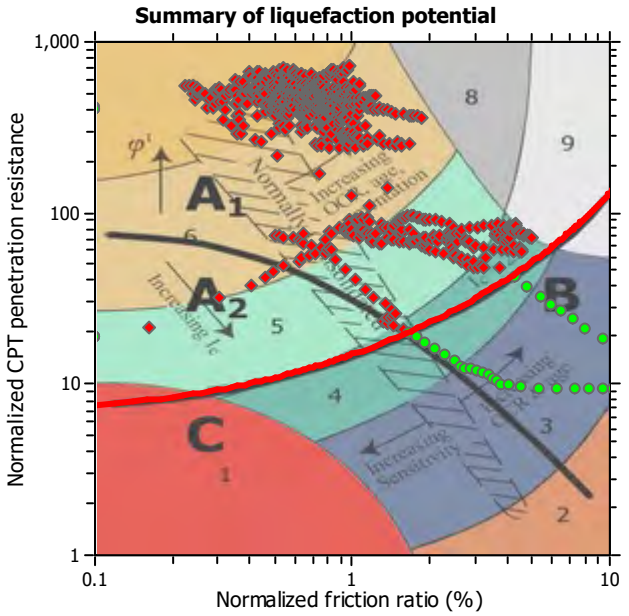
CPT file : CPT1303 - SLS A

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

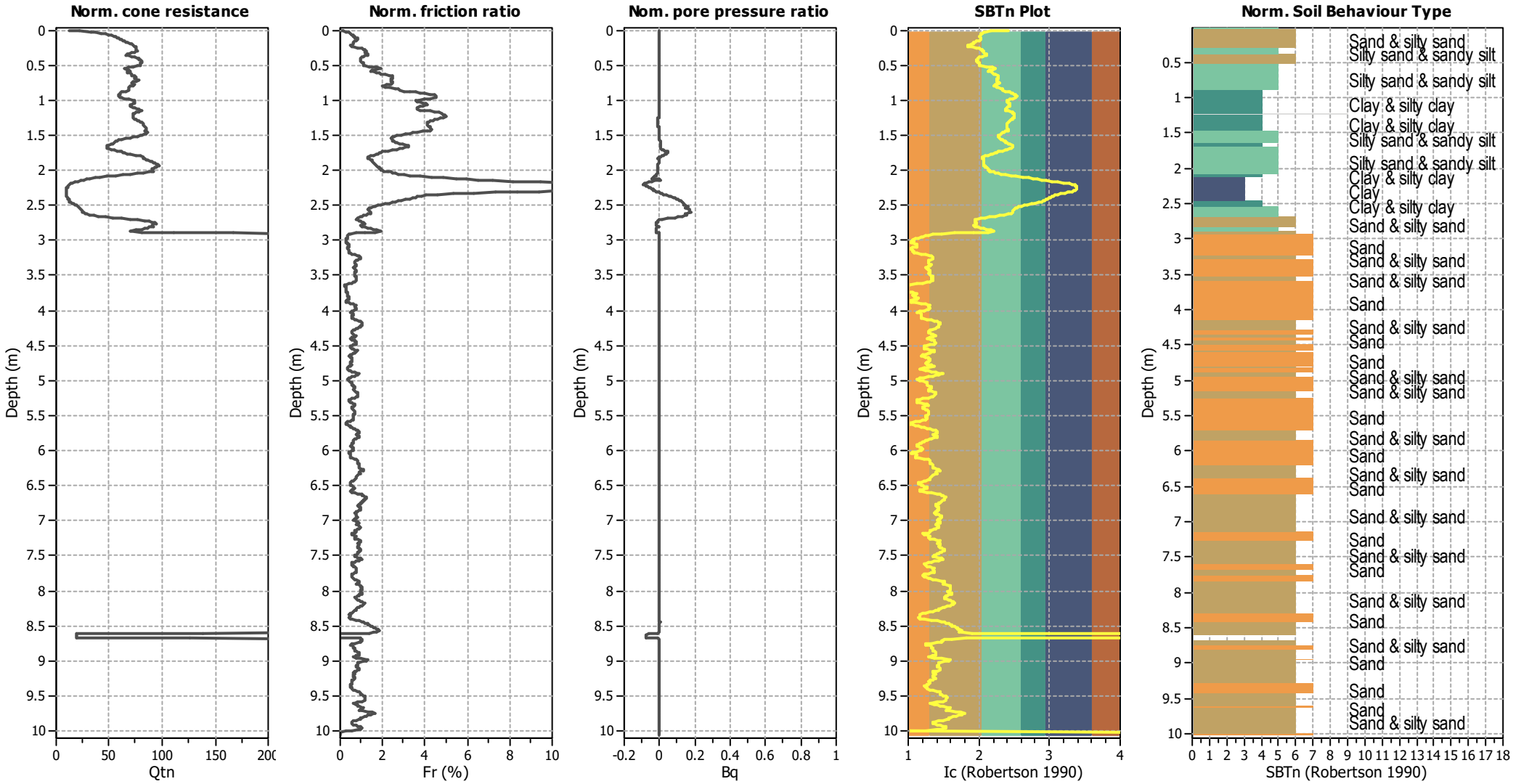






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



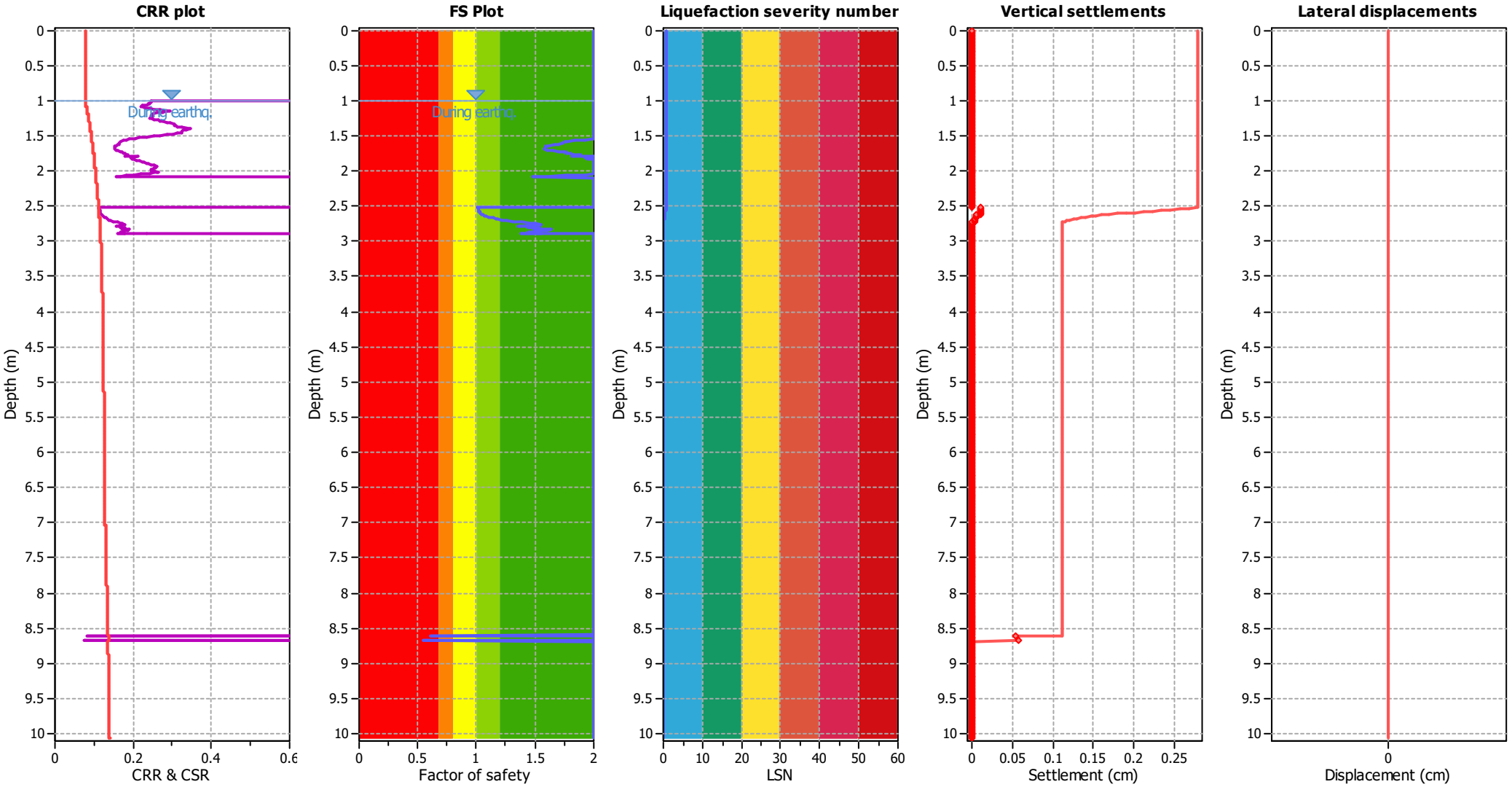
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

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15B Leslie Hills Drive
Riccarton, Christchurch 8011
EDC.co.nz

LIQUEFACTION ANALYSIS REPORT

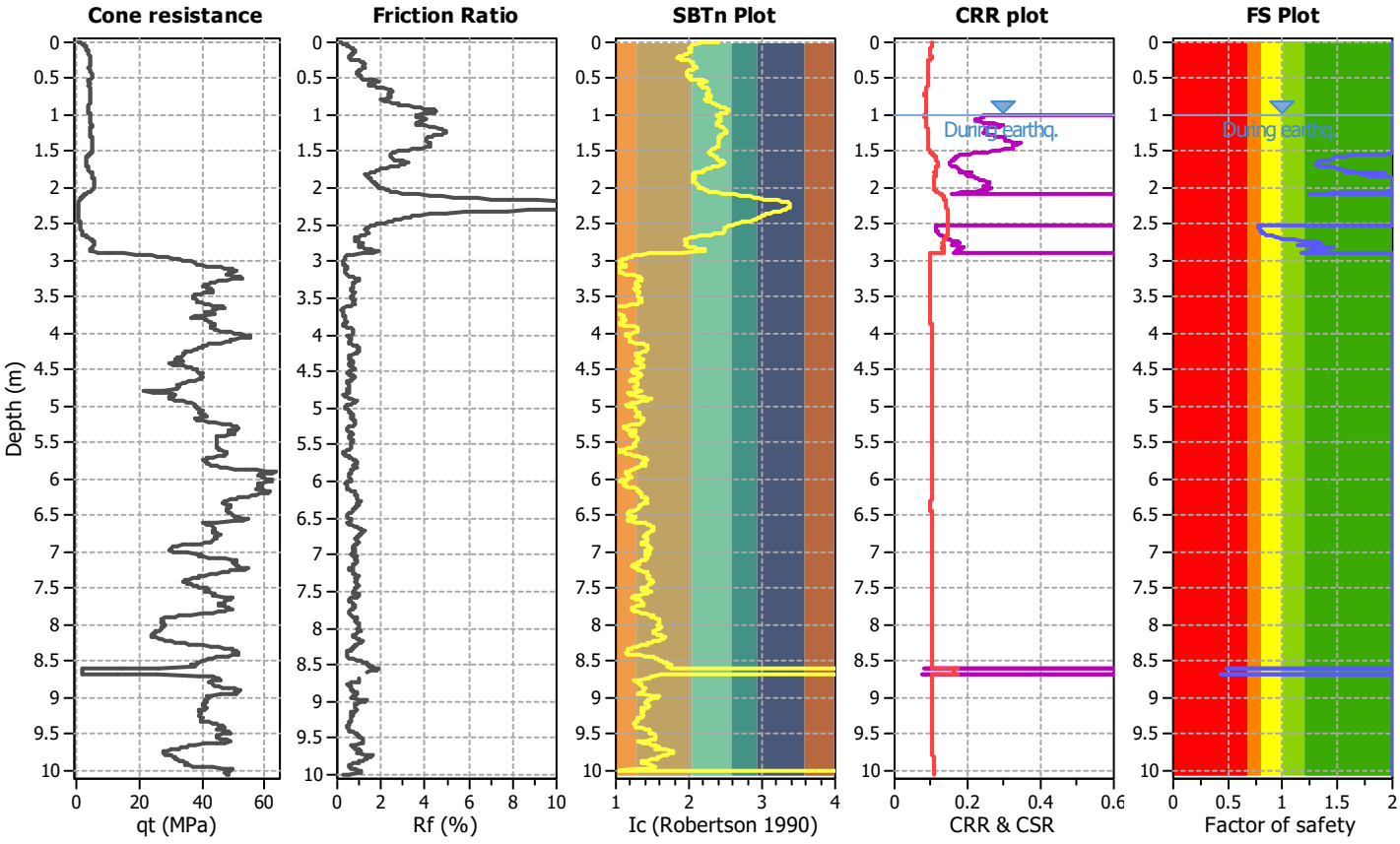
Project title : 29 Pentecost Road - Stage 2

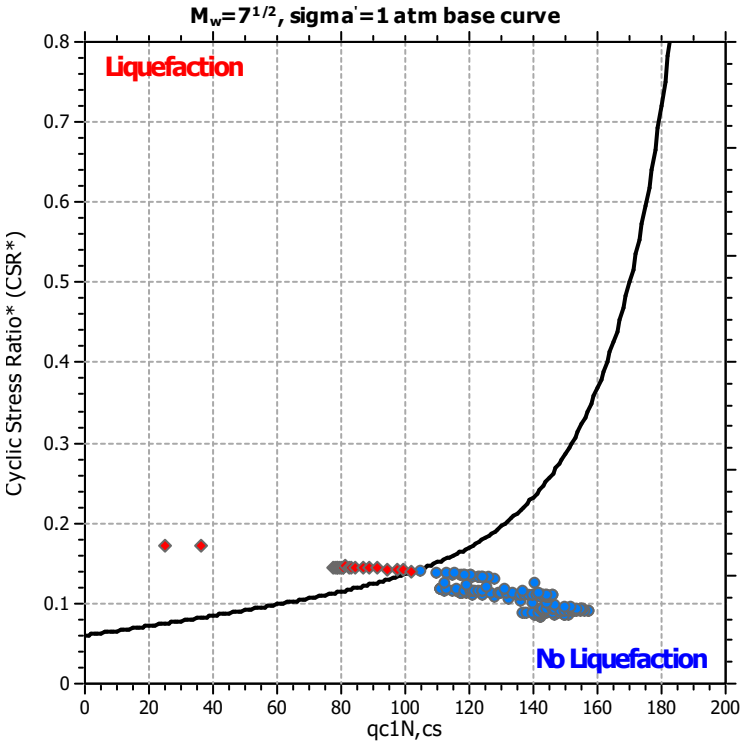
Location : 29 Pentecost Road

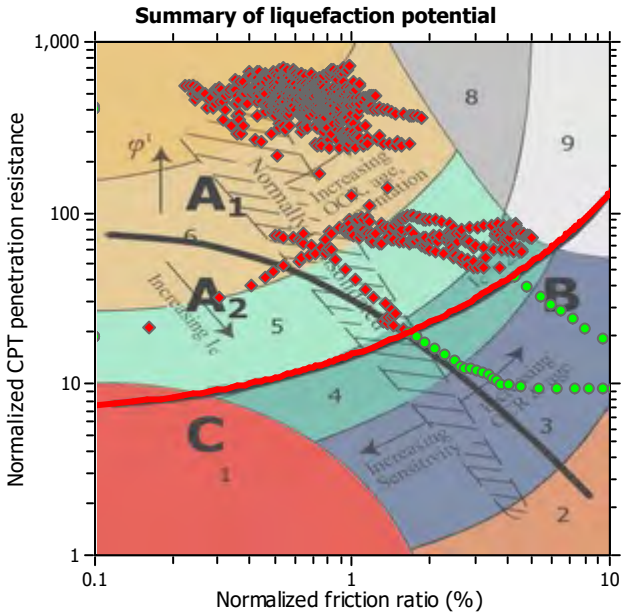
CPT file : CPT303 - SLS B

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

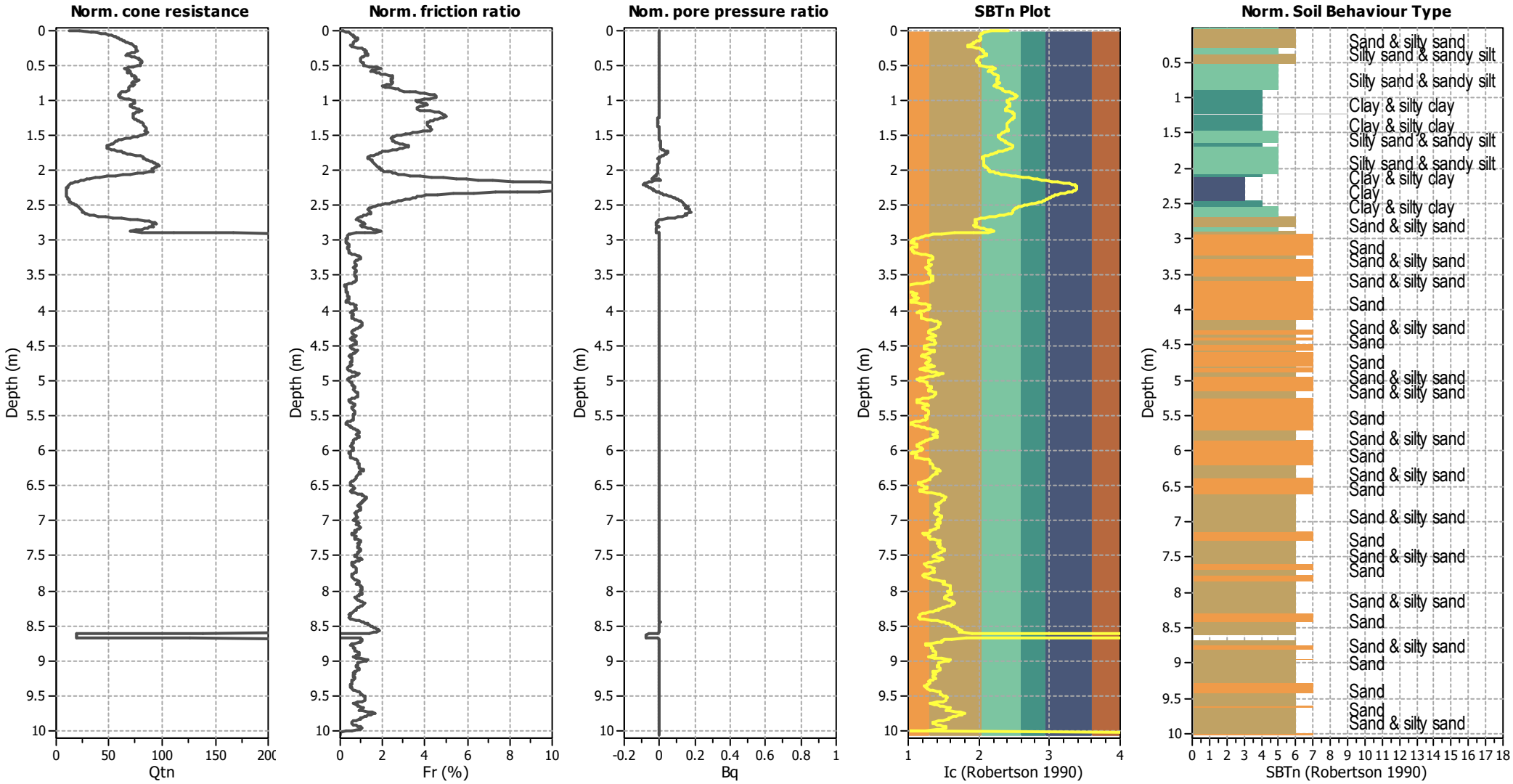






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



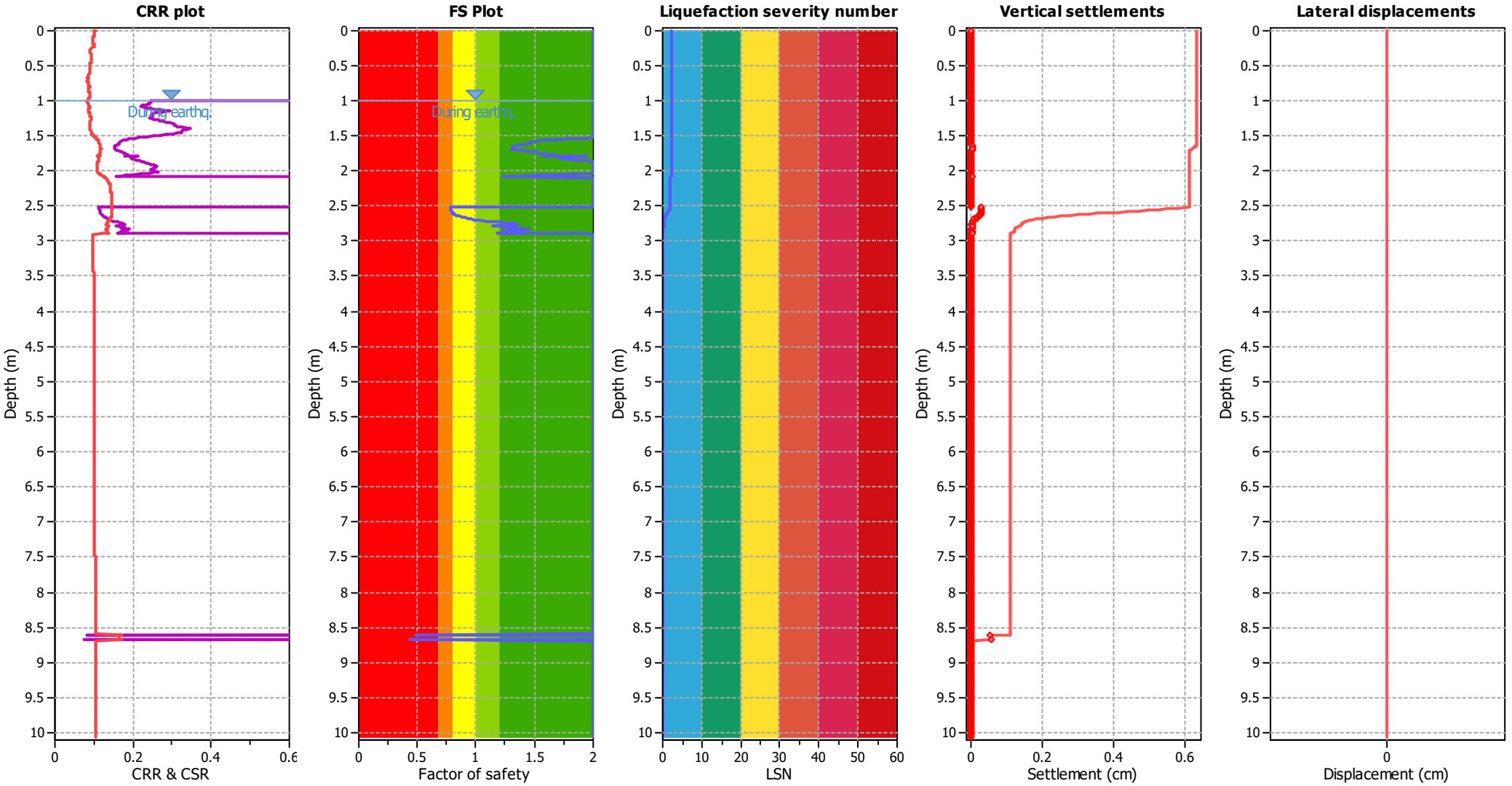
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

EDC
15B Leslie Hills Drive
Riccarton, Christchurch 8011
EDC.co.nz

LIQUEFACTION ANALYSIS REPORT

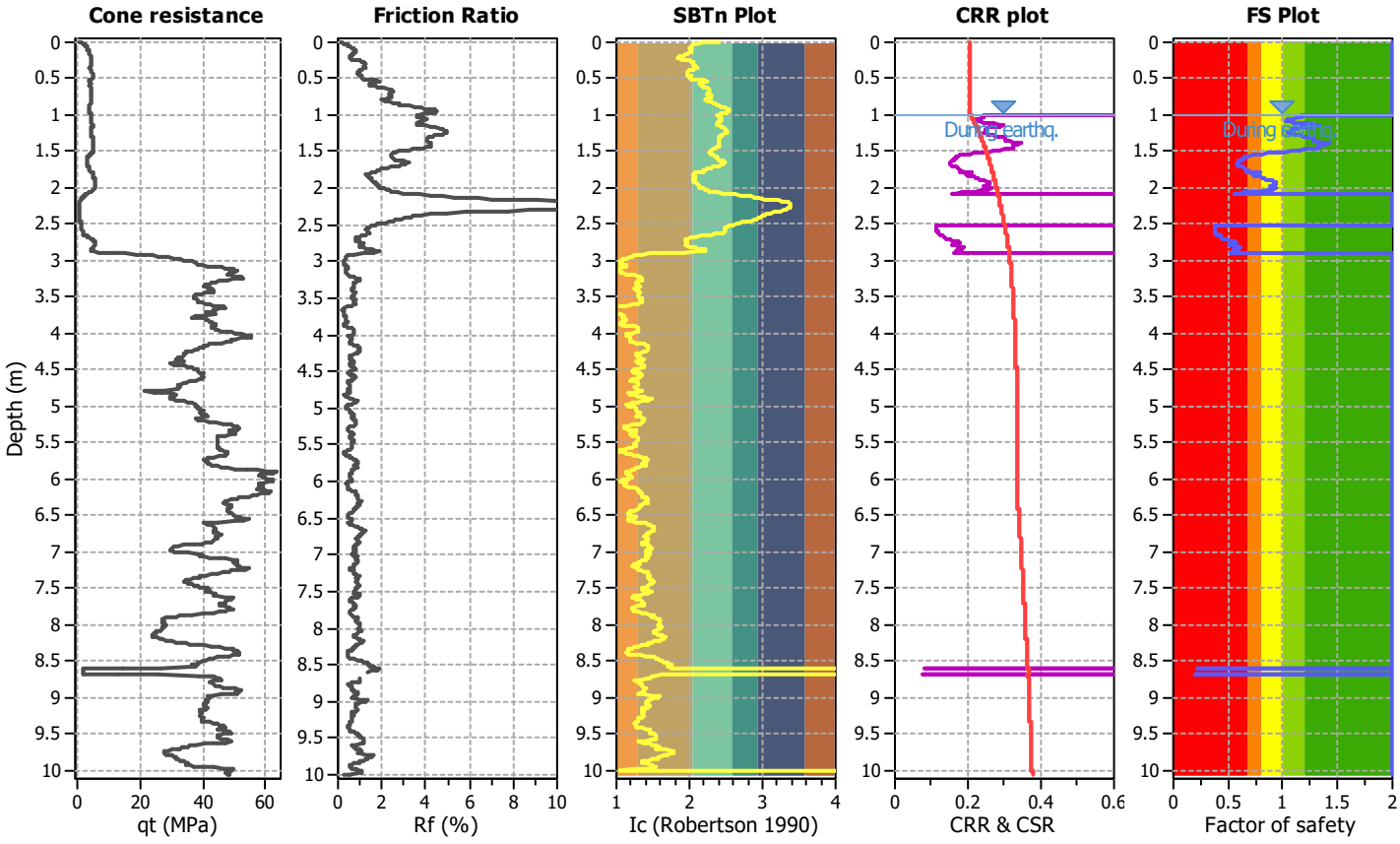
Project title : 29 Pentecost Road - Stage 2

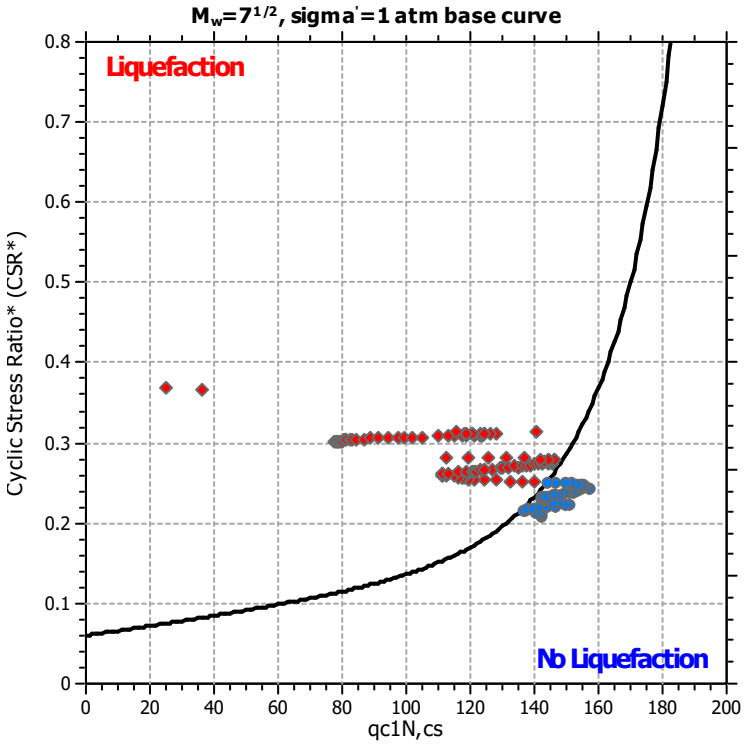
Location : 29 Pentecost Road

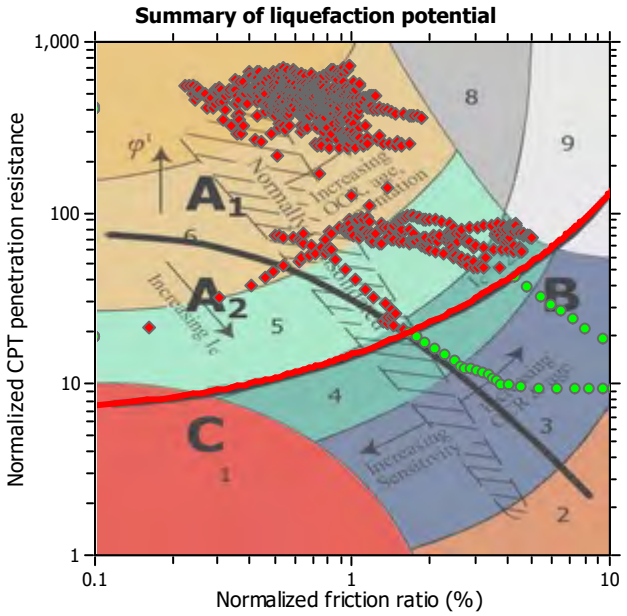
CPT file : CPT303 - ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
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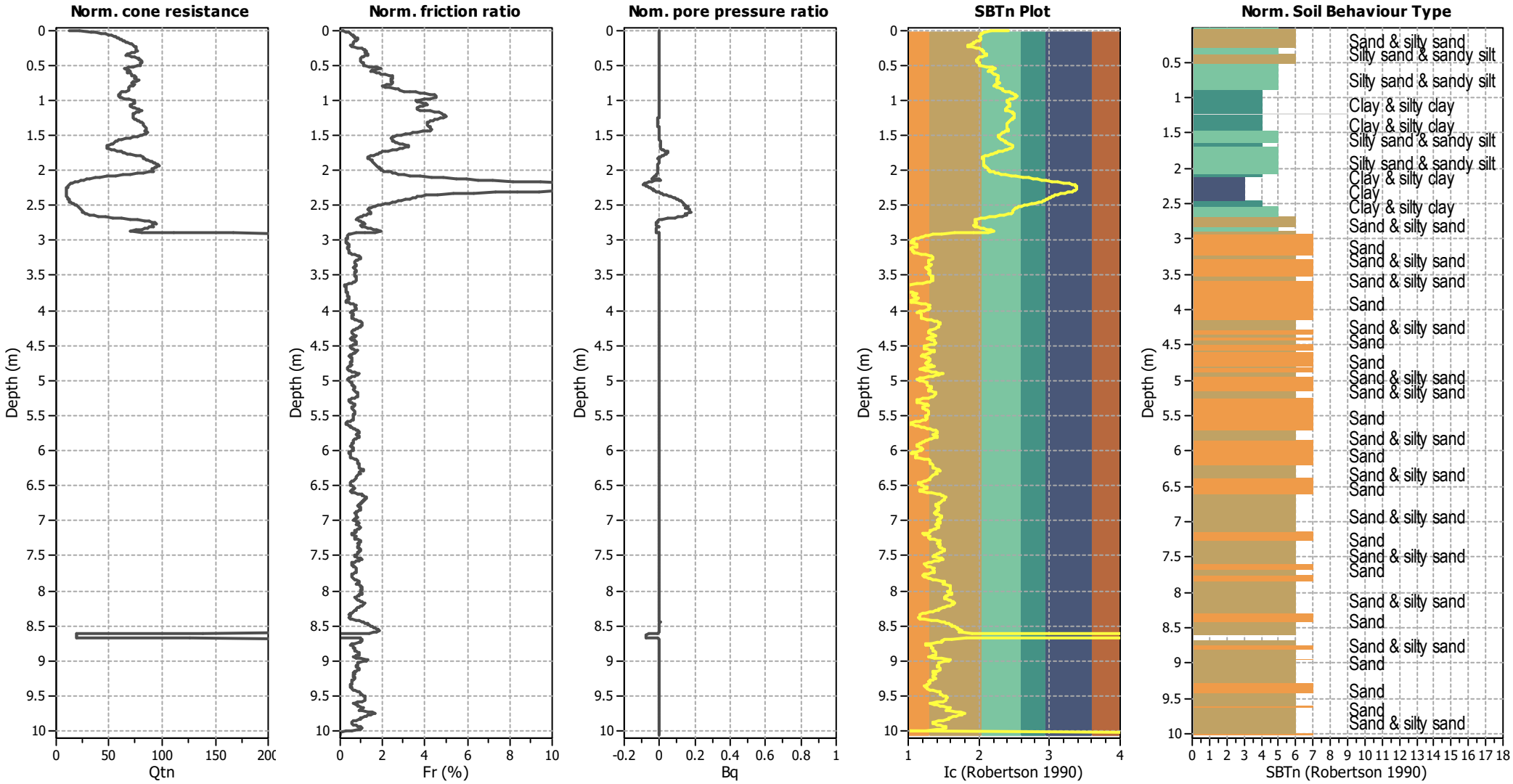
CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
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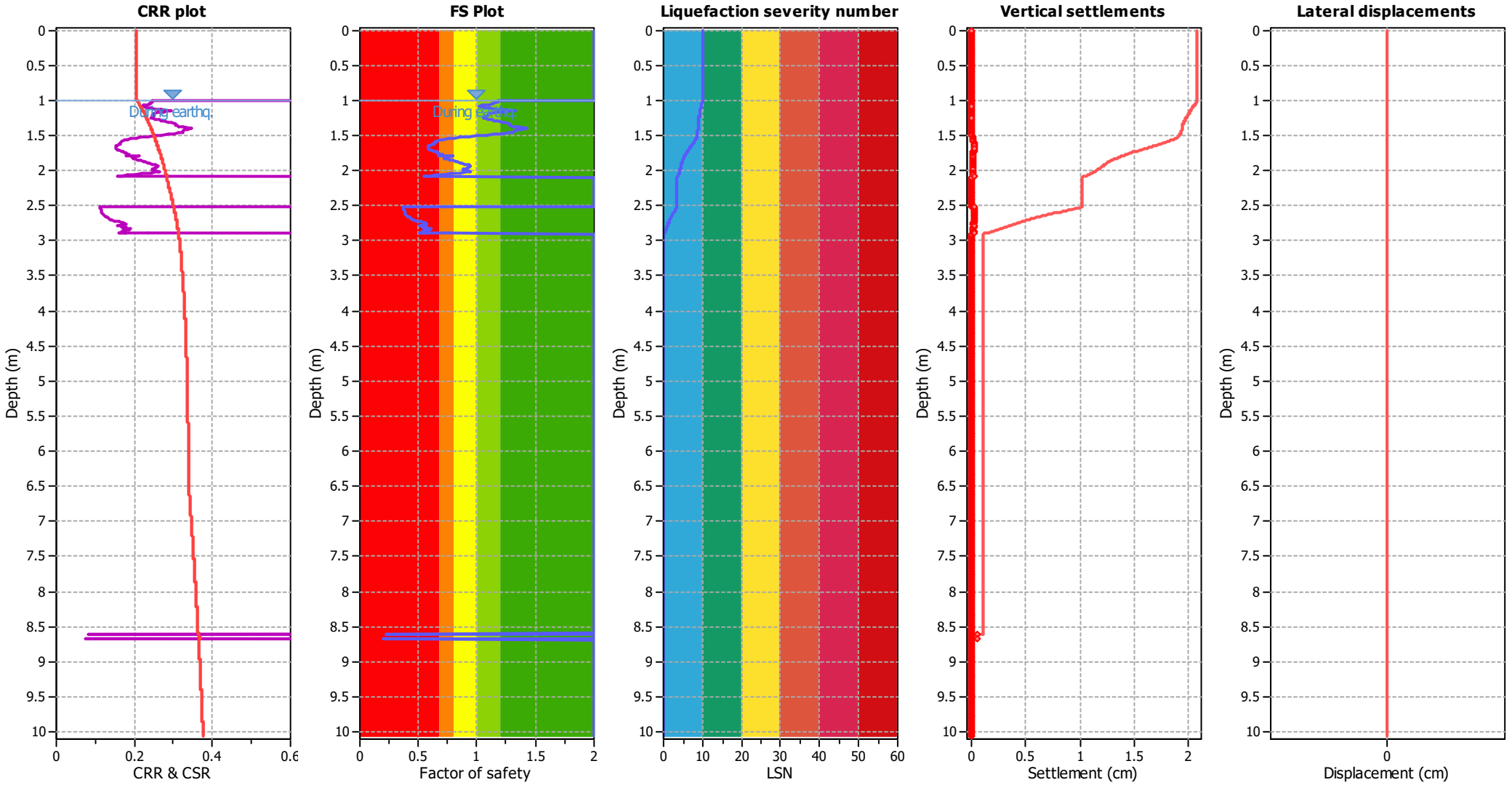
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

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- Moderate expression of liquefaction
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LIQUEFACTION ANALYSIS REPORT

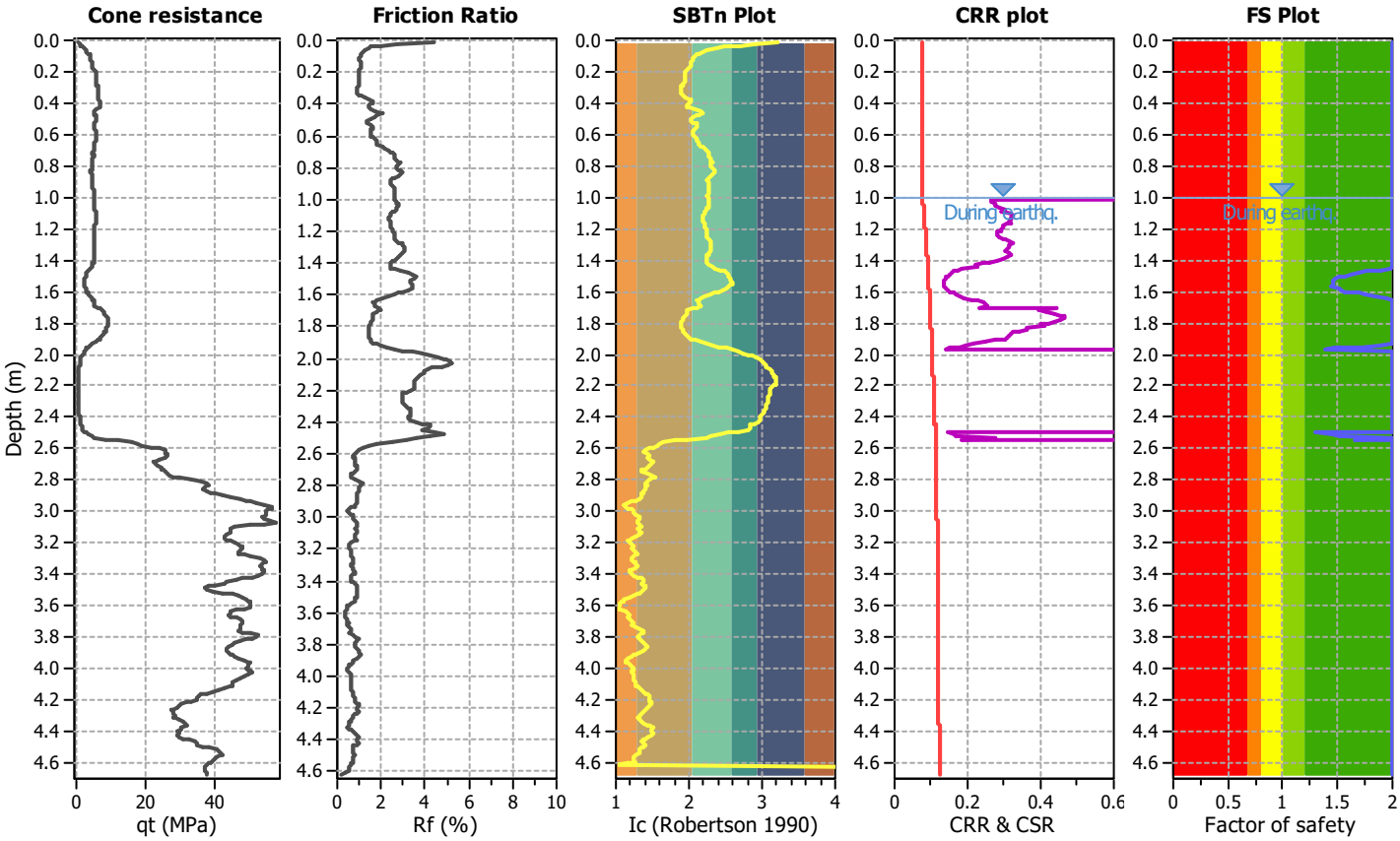
Project title : 29 Pentecost Road - Stage 2

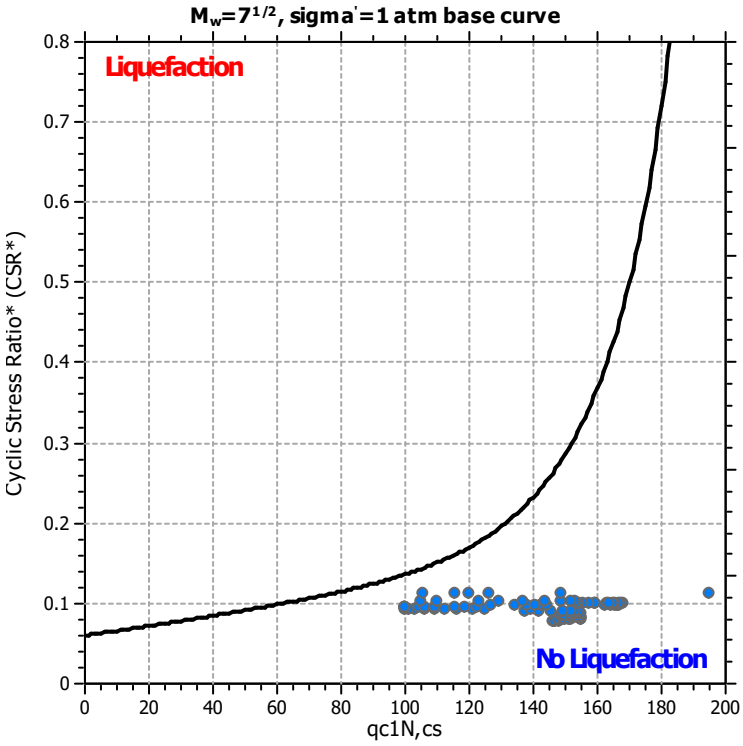
Location : 29 Pentecost Road

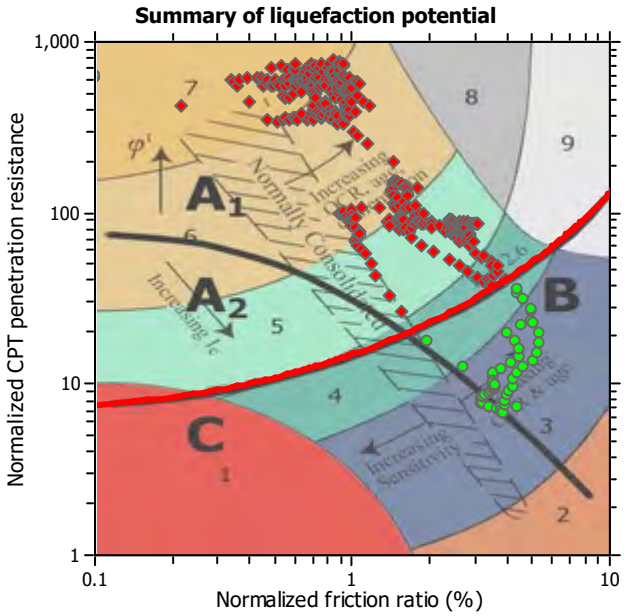
CPT file : CPT304 - SLS A

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

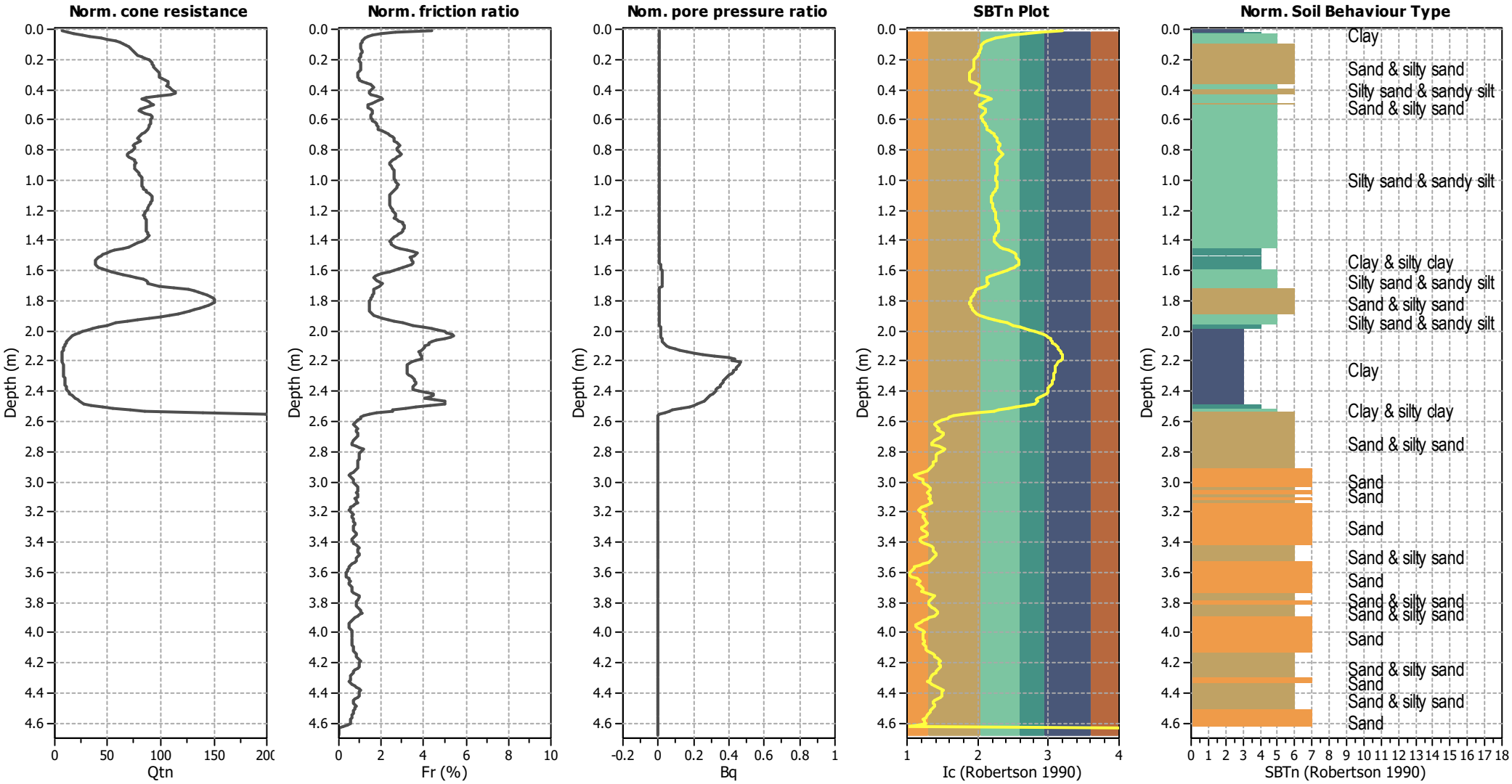






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



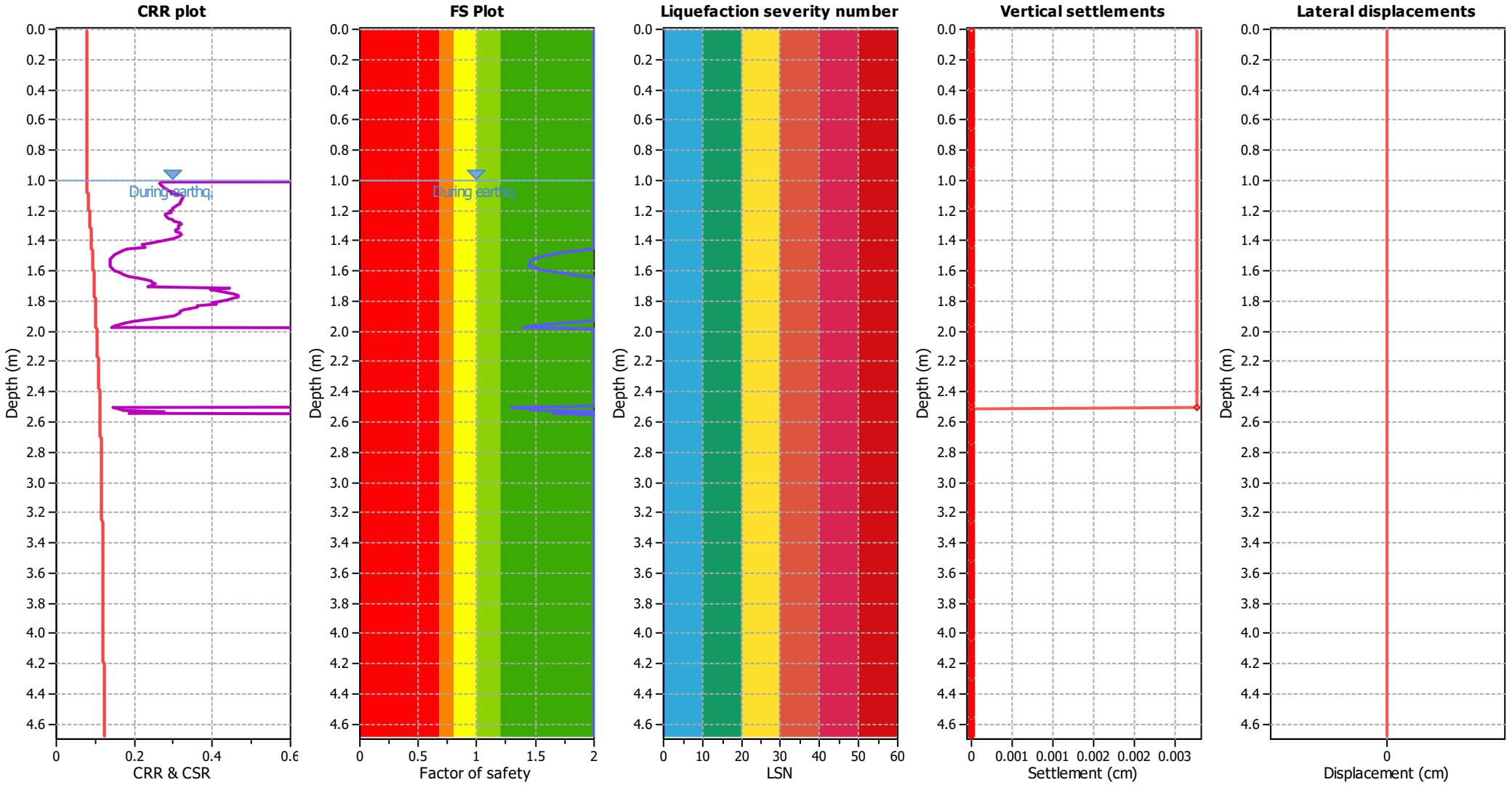
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
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LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

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EDC.co.nz

LIQUEFACTION ANALYSIS REPORT

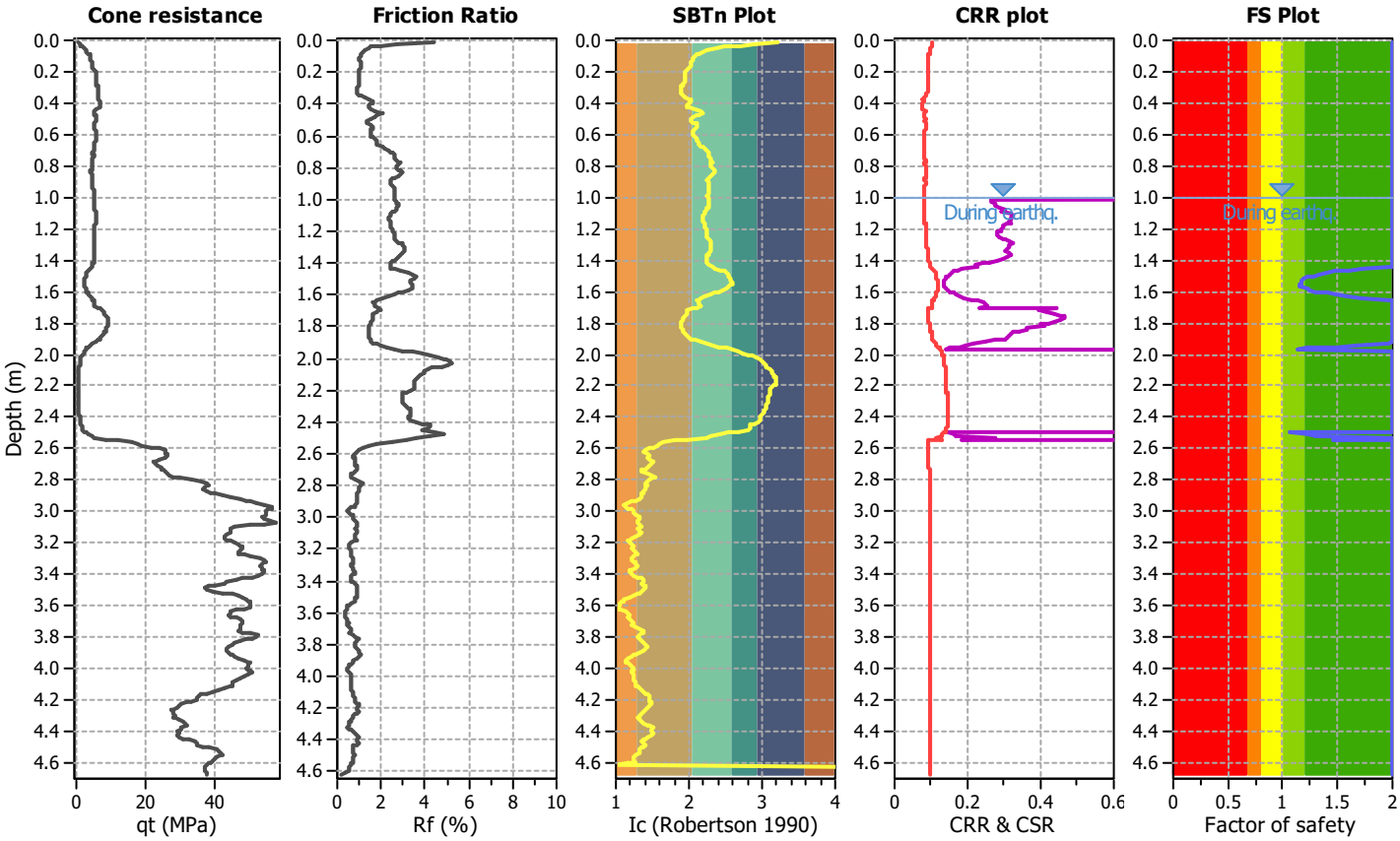
Project title : 29 Pentecost Road - Stage 2

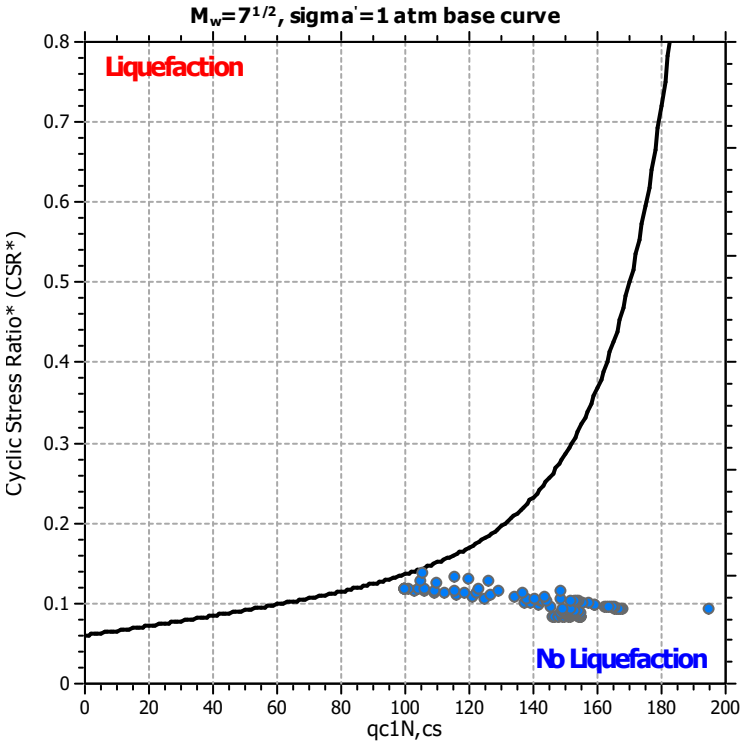
Location : 29 Pentecost Road

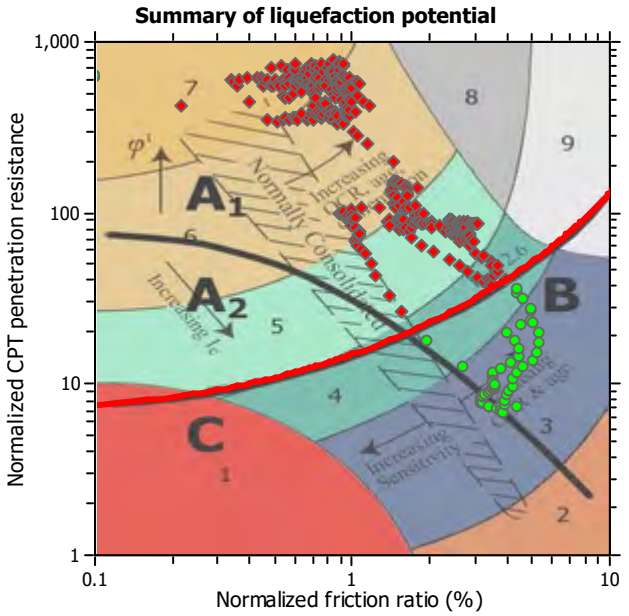
CPT file : CPT304 - SLS B

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

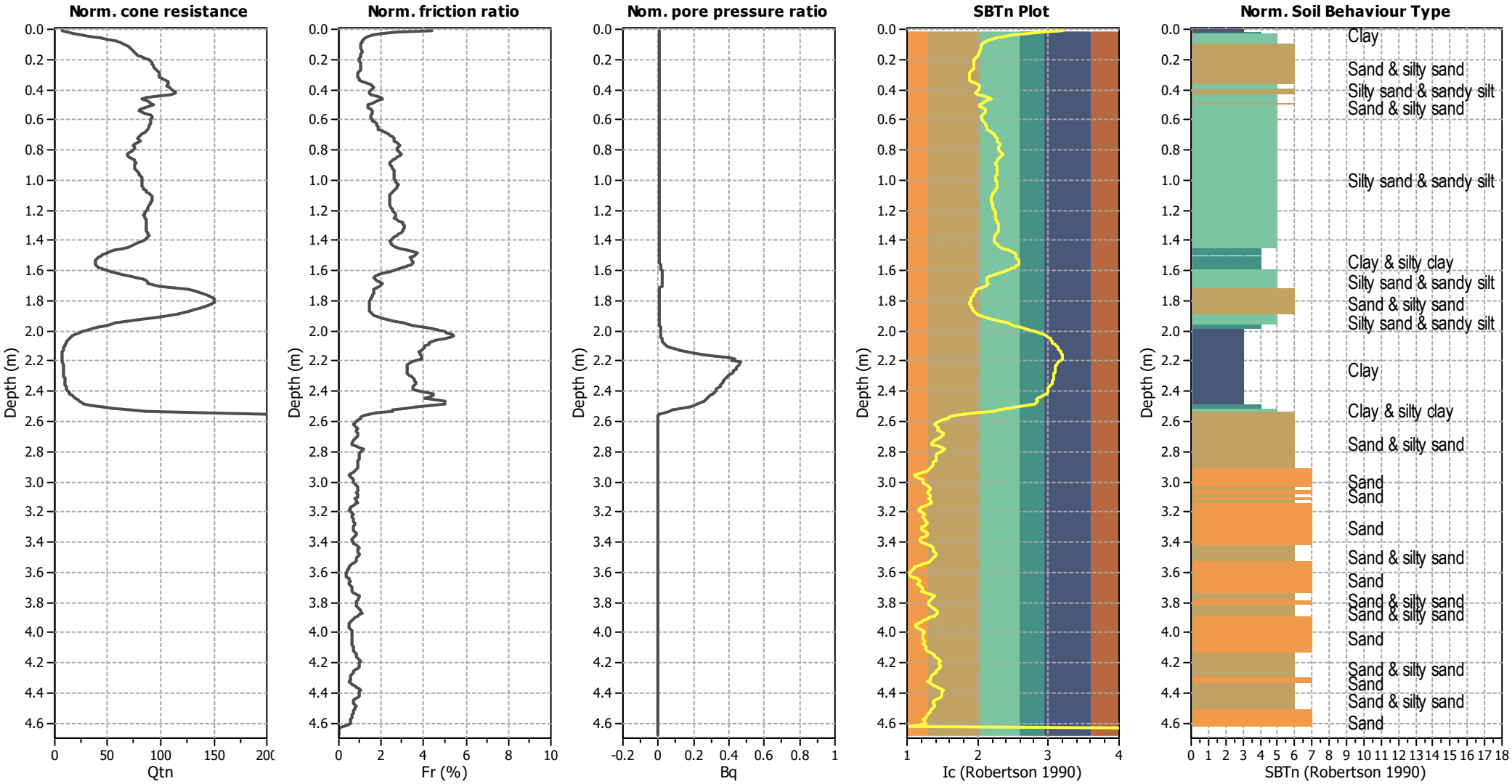






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
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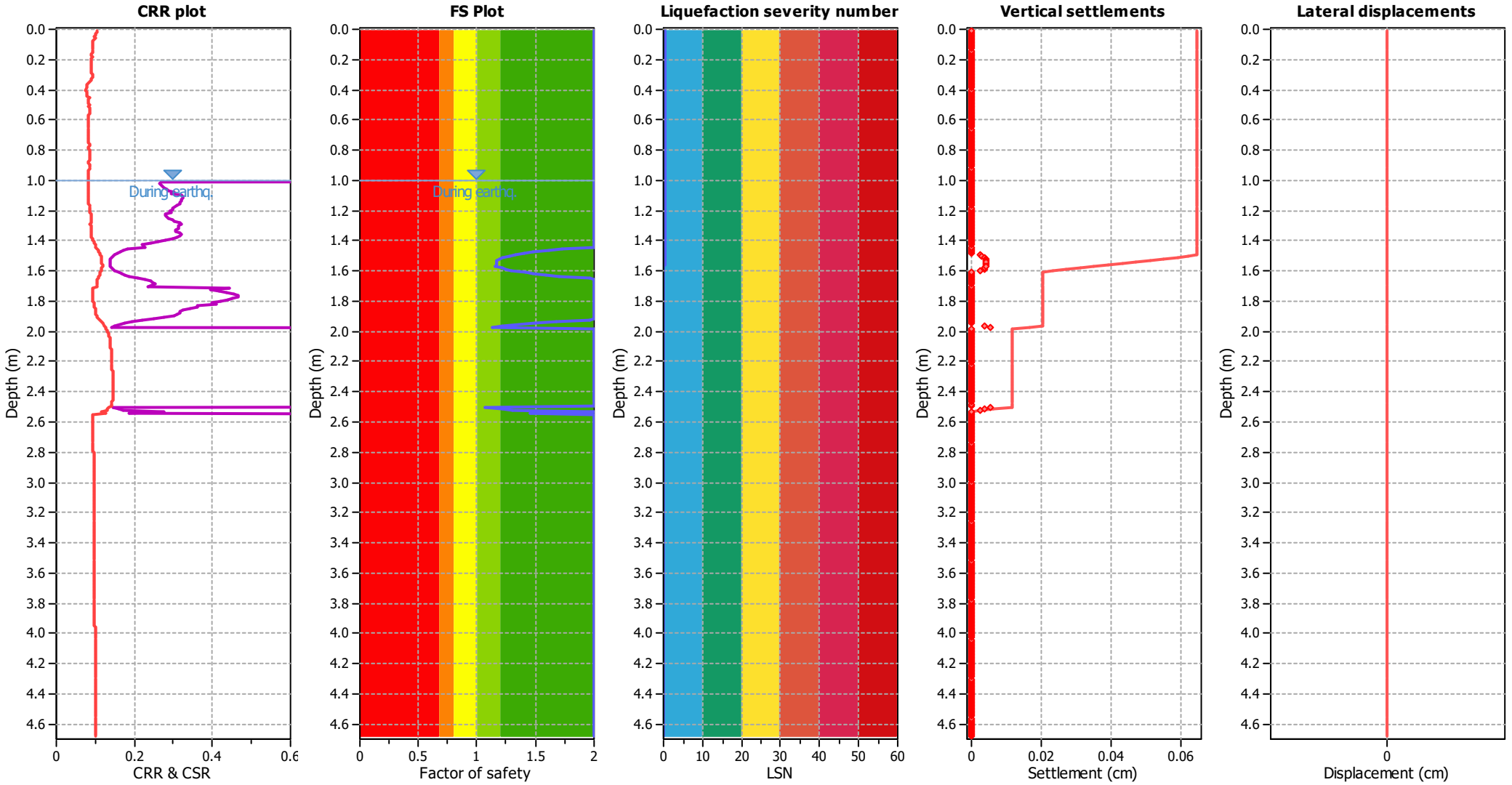
Liquefaction analysis overall plots



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F.S. color scheme

- Almost certain it will liquefy
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LIQUEFACTION ANALYSIS REPORT

Project title : 29 Pentecost Road - Stage 2 **Location : 29 Pentecost Road**

CPT file : CPT304 - ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
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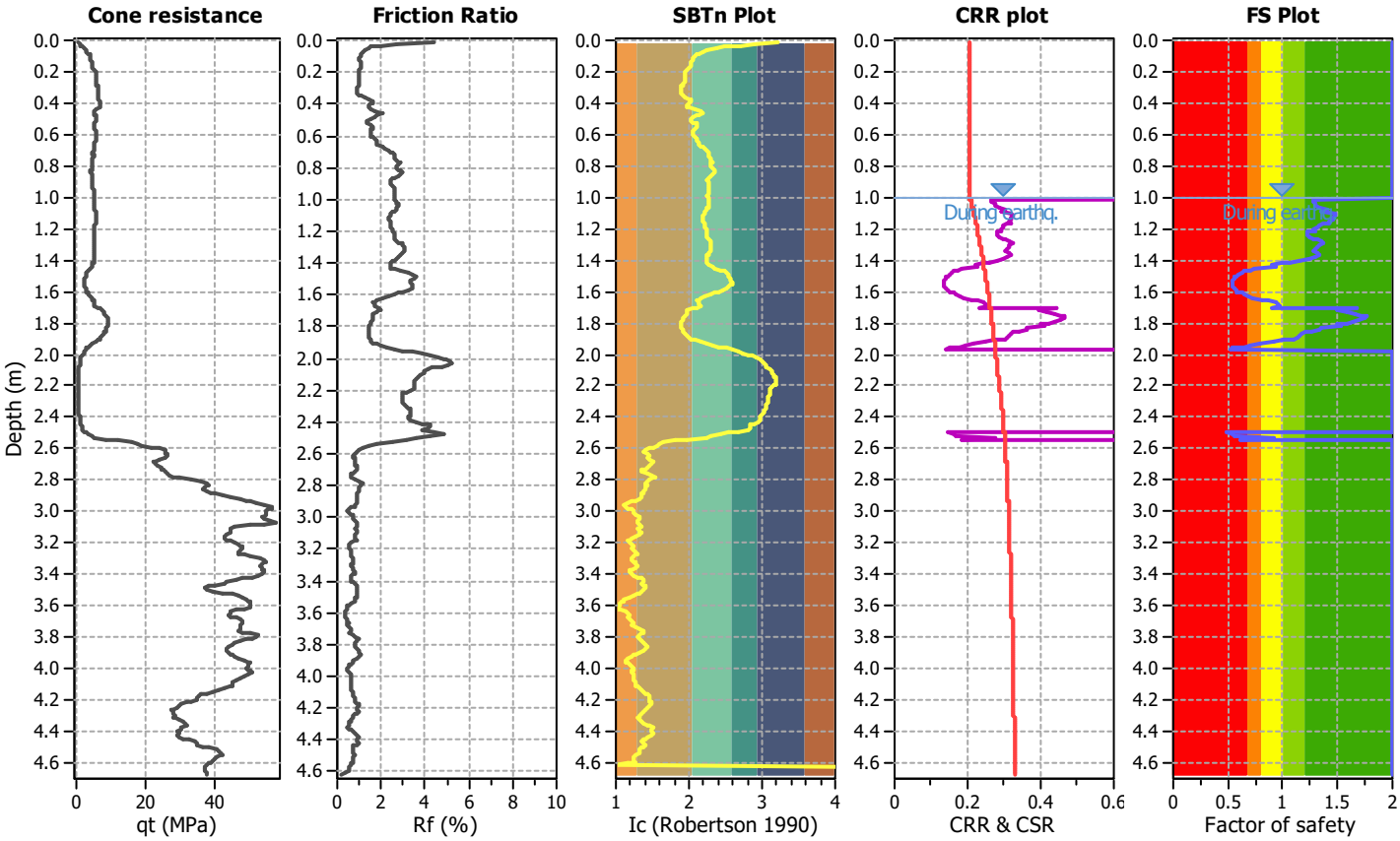

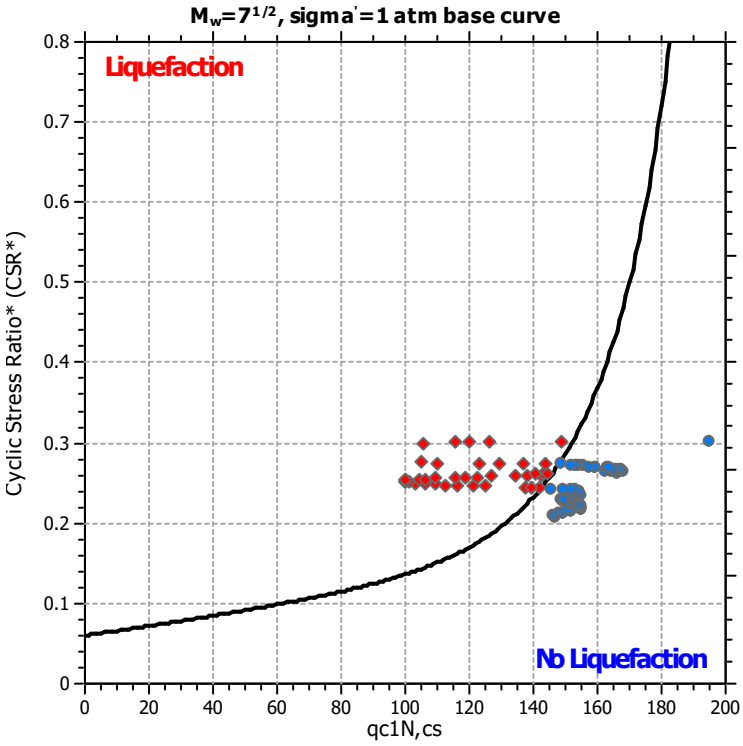

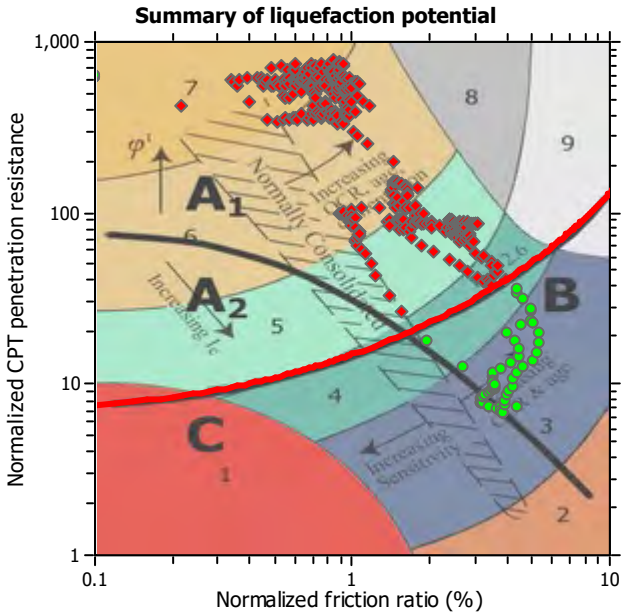

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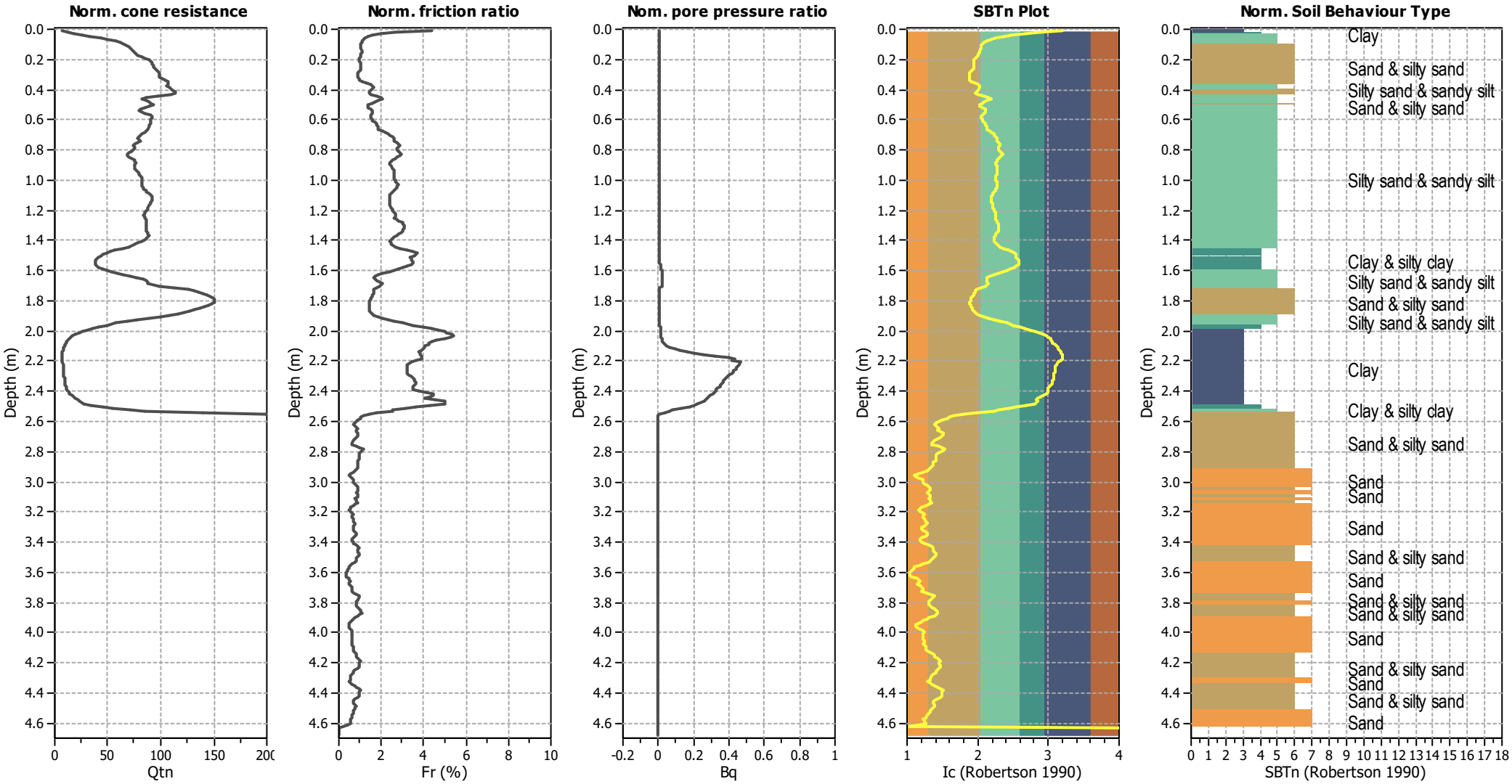

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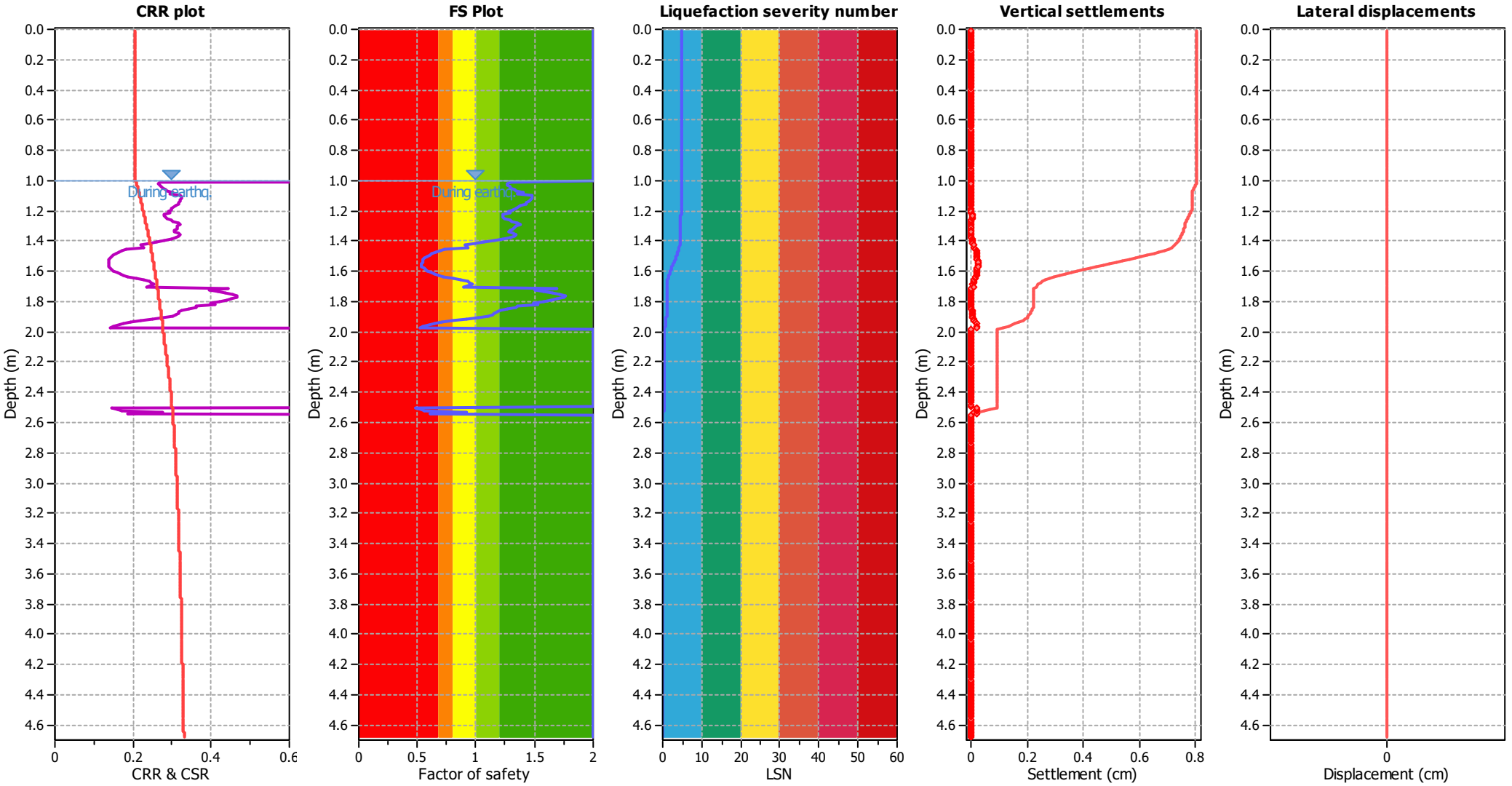
Liquefaction analysis overall plots



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CONSENT ISSUED BC201209 - Page 250 of 689

Application BC201209
Received 10/12/2020

ENGINEERING DESIGN CONSULTANTS

2 December 2020

Our Ref: 45895 - Rev 0

Attn: Quintin Bruce

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Oakville Estate,
Rangiora, Christchurch 8052

Dear Quintin,

GEOTECHNICAL COVERING LETTER FOR LOT 14, STAGE 2, OAKVILLE ESTATE 45895 - REV 0

This covering letter is provided in the context of Resource Consent condition 20.1 (RC185198 / 190903122892), which requests a site-specific intrusive investigation to determine local bearing capacity and foundation design for Lot 14, Oakville Estate, previously 29 Pentecost Road.

EDC has had extensive involvement in the Oakville subdivision, having prepared the Resource Consent Report (Combined Geotechnical & Preliminary Site Investigation Report, Rev 0, dated 18/02/2016), Building Consent Report (Oakville Estate - Stage 2, 29 Pentecost Road, Geotechnical Report, REV 0, dated 19/02/2020) and Ground Completion Report, REV A, dated 19/10/2020. These reports should be read in conjunction to this letter and are provided as Appendix A to C.

Based on these reports, the site was found to have a consist soil profile of stiff to very stiff silty clay to 1.2m, overlying medium sand or firm silt, with shallow dense gravels. Varying depths of fill has been used to reach finished floor levels, with fill over 200mm is considered Engineered Fill which generally consists of clay or gravelly clay that is in accordance with NZS 4431:1989. The soils are considered to comply with NZS:3604 Good Ground from 0.4m below existing ground level (BEGL), with 300 kPa UBC available in the natural clay, and is considered to be TC 1 as defined by the MBIE guidance with respect to liquefaction risk (i.e. liquefaction damage is unlikely).

The recommendations contained in EDC's Building Consent stage geotechnical report are considered pertinent to Lot 14. In summary, two foundation options have been provided;

- *Type C concrete* slab-on-grade foundations in accordance with NZS 3604 (with B1/AS1 modifications). Any hardfill to be placed beneath the slab should consist of an appropriately compacted, well-graded gravel (AP40 or AP65), with a layer of geotextile (DuraForce AS280 or Bidim A19 or engineer approved equal) at the base.

  Or

- *Timber floor pile foundations* with either a pile perimeter or reinforced concrete perimeter footing, in accordance with NZS 3604 (with B1/AS1 modifications).

Either foundation should be founded in the natural inorganic clay generally encountered from 0.4m begl, where a Geotechnical UBC of 300kPa can be used for design.

Any topsoil/fill, very soft, organic or otherwise unsuitable material encountered is not considered a suitable bearing stratum and will require removal beneath the building platform.

A geotechnical engineer should inspect earthworks and foundation construction at the following stages, and pursuant to any Building Consent Conditions:

1. Formation level of any new foundations; and
2. If gravel hardfill is required and is >600mm thick, compaction testing should be undertaken. Frequency will be dependent on the validation test method adopted but should occur at least once gravel fill has been placed and compacted.

REPORT PREPARED BY:

Dan Pickering
BAppSci (Envi.), BSc (Hons) (Geol.)
Geotechnical Engineer

REPORT REVIEWED BY:

Giles Learman
BSc (Hons) CGeol FGS
Geotechnical Team Leader - Canterbury

1.0 LIMITATIONS

Except where required by law, the findings presented as part of this report are for the sole use of our client, as noted above. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing.

To the extent permitted by law, EDC expressly disclaims and excludes liability for any loss, damage, cost or expense suffered by any third party relating to or resulting from the use of, or reliance upon any information contained in this report. It is the responsibility of third parties to independently make enquiries or seek advice in relation to their particular requirements.

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

APPENDIX A

COMBINED GEOTECHNICAL & PRELIMINARY SITE INVESTIGATION REPORT

APPENDIX B

STAGE 2, 29 PENTECOST ROAD, GEOTECHNICAL REPORT, REV 0, DATED 19/02/2020)

APPENDIX C

GROUND COMPLETION REPORT, REV A

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Building Code Clause(s) **B1**

PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY: **Tetrad Consulting Limited**
(Design Firm)

TO: **VIP Design**
(Owner/Developer)

TO BE SUPPLIED TO: **Waimakariri District Council**
(Building Consent Authority)

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

IN RESPECT OF: **Brick shelf angles, stack bond brick veneer and veranda post foundations**
(Description of the Building Work)

AT: **29 Pentecost Road, Oakville Estate, Rangiora** **LOT** **14**
(Address) **DP** **553457**

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

The design carried out by us has been prepared in accordance with:
☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment **Refer to Schedule 1 (attached)**
(verification method / acceptable solution)
☐ Alternative solution as per the attached schedule

The proposed building work covered by this producer statement is described on the drawings by titled **Refer to Schedule 2 (attached)** and numbered **Refer to Schedule 2 (attached)** together dated with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:
(i) Site verification of the following design assumptions: **Refer to Schedule 3 (attached)**
(ii) All proprietary products meeting their performance specification requirements: **Refer to Schedule 3 (attached)**
(iii) Other exclusions: **Refer to Schedule 3 (attached)**

I **believe on reasonable grounds** that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐CM1 ☐CM2 ☒CM3 ☐CM4 ☐CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)
Refer to Schedule 4 (attached)

I, **Alexander Loye** am: ☒ CPEng No. **1018605** ☐ Reg Arch ..... **#**
(Name of Design Professional)

I am a Member of: : ☒ EngNZ ☐NZIA and hold the following qualifications: **B.E. (Hons), CPEng, CMEngNZ**
The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than 200,000*.
The Design Firm is a member of ACENZ: ☐

SIGNED BY **Alexander Loye** SIGNATURE
(Name of Design Professional)

ON BEHALF OF **Tetrad Consulting Limited** DATE **11/12/2020**
(Design Firm)

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.

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

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ATTACHMENT TO PRODUCER STATEMENT – DESIGN (PS1)

ISSUED BY:	**Tetrad Consulting Limited**
TO:	**Waimakariri District Council**
IN RESPECT OF:	**Brick shelf angles, stack bond brick veneer and veranda post foundations**
AT:	**29 Pentecost Road, Oakville Estate, Rangiora**

SCHEDULE 1 – COMPLIANCE DOCUMENTS

The table below provides the New Zealand Standards and supporting documents that have been used to carry out the engineering design to ensure compliance with Clause B1 of the New Zealand Building Code.

Document	Document Title
NZS1170	Loadings Standard
NZS3603	Timber structures standard
NZS4229	
	New Zealand Concrete Masonry Manual for Veneer – Stack Bond

SCHEDULE 2 – DRAWINGS AND SPECIFICATIONS

The table below is a schedule of drawings and specifications that show the structural engineering design

Description	Reference	Revision
Structural Sketches A1.02, A3.01, S3.02, A5.04	December 20	01

SCHEDULE 3 – DESIGN ASSUMPTIONS, PROPRIETARY PRODUCTS AND OTHER EXCLUSIONS

(i) Site Verification of the following design assumptions:
- Ground conditions in accordance with the Geotechnical Report by EDC dated XXXX

(ii) All proprietary products meeting their performance specification requirements, specifically:
- N/A

(iii) Other:
- Structural design loads are based on a 50-year design life and Importance Level 2 structure (normal structures and structures not in other importance levels) as defined in AS/NZS 1170.0 2004 clause 3.3
- This Producer Statement - Design is valid for a building consent issued within 1 year from the date of issue
- Weatherproofing and waterproofing

SCHEDULE 4 – CONSTRUCTION REVIEW

Construction monitoring is proposed to be carried out to a CM3 level to ensure compliance with the structural design to enable the issue of a Producer Statement Review (PS4). The required structural engineering inspections are detailed in the table below. The number of site inspections is dependent on the construction methodology, competency of the contractor and if difficulties are encountered during the works.

Inspection Type
Inspections to be carried out by the local building authority

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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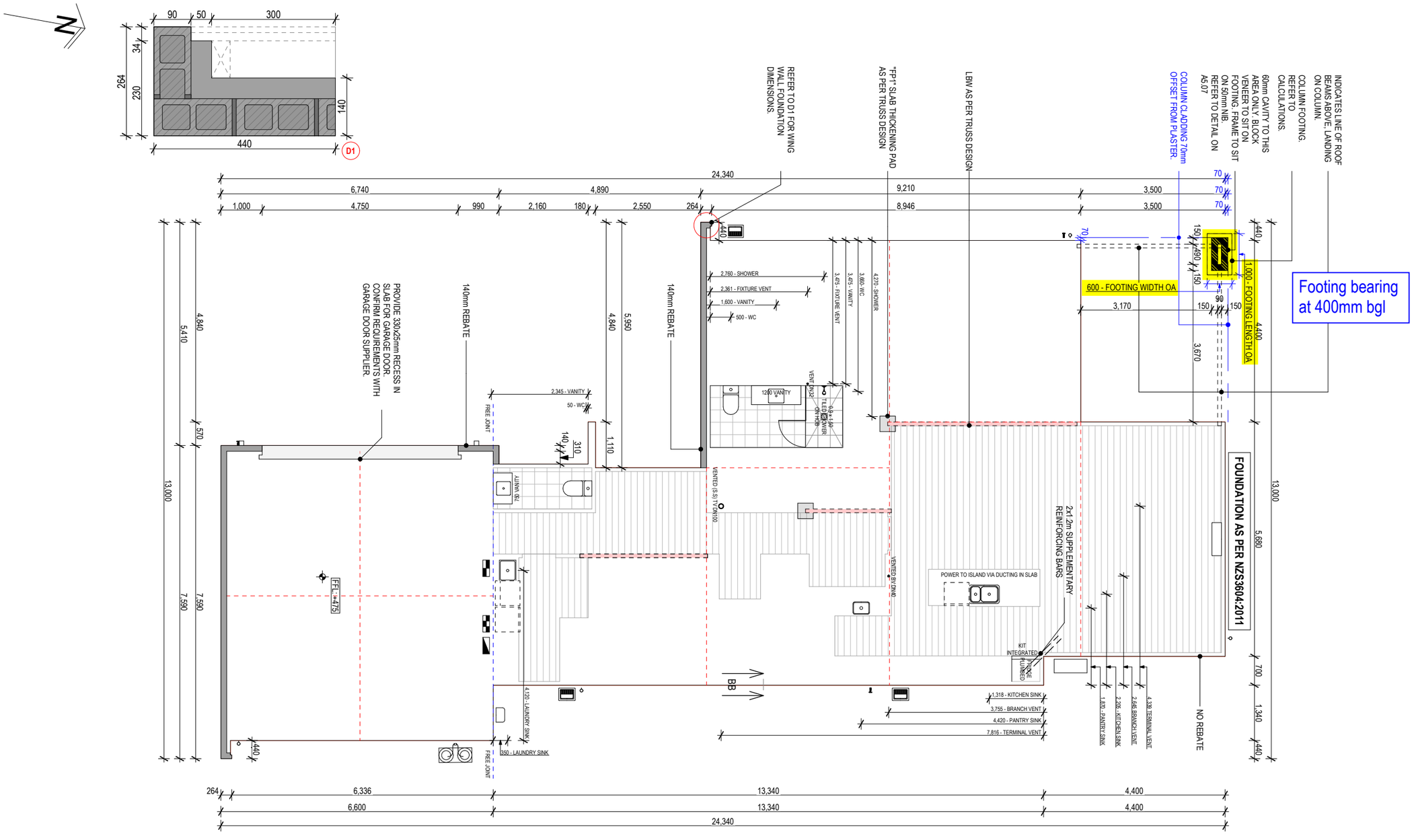

FOUNDATION INFOMATION

MAIN CONTRACTOR : CONFIRM ALL BOUNDARY SETBACKS & RESTRICTIONS COMPLY WITH CURRENT REGULATIONS PRIOR TO COMMENCEMENT OF FOUNDATIONS
CONFIRM POSITIONS OF AVAILABLE SERVICES, CABLING ETC. ON SITE PRIOR TO ANY EXCAVATION, CONFIRM LAYOUT OF KITCHEN & BATHROOM FITTINGS WITH OWNER BEFORE COMMENCING

CLEARANCES : FFL TO BE 150mm MIN ABOVE CROWN OF ROAD AS PER NZBC E1/AS1
MINIMUM FFL ABOVE SURROUNDING GROUND TO BE 225mm TO UNSEALED GROUND, 150mm TO SEALED GROUND

PREPARATION : ALL TOPSOIL SHOULD BE REMOVED FROM BENEATH THE AREA OF THE FLOOR SLAB & CAP40 HARDFILL SHOULD BE PLACED IN LAYERS NOT EXCEEDING 150mm LOOSE DEPTH & COMPACTED TO ACHIEVE A MINIMUM DRY DENSITY OF 2,150kg/m^3

TRUSS DESIGN : REFER TO TRUSS DESIGN FOR SLAB THICKENING & LOAD BEARING WALLS

EARTHING : MESH IN FLOOR SLAB MUST BE EARTHED, EARTH WITH 16mm REO ROD BROUGHT UP INTO GARAGE WALL BELOW METERBOX & WIRED TO MESH. AT PREWIRE, CONNECT A CLAMP & PIECE OF WIRE TO ROD & EARTH TO METERBOX.

INSTALLATION NOTES

FOUNDATION : NZS 3604:2011 SINGLE POUR SLAB & PERIMETER FOUNDATION. FOUNDATION, REFER TO DETAILS FOR MORE INFO/ALL FOUNDATION FOOTING SIZES.

FOOTING (GENERAL) : 200mm/260mm WIDE CONCRETE FOUNDATION FOOTING (20MPa MIN) REINFORCED WITH 2/D16 BARS & D10 STARTERS @ 600mm CRS MAX EXTENDING 400mm MIN INTO SLAB, REFER TO DETAILS FOR FURTHER INFO.

SLAB : 100mm THICK CONCRETE SLAB (20MPa MIN), REINFORCED WITH GRADE 500E MESH WITH 30mm COVER MIN ON 0.25mm POLYTHENE DPM, 25mm MAX SAND BLINDING LAYER & 150mm MAX LAYER COMPACTED AP40 GRANULAR FILL

REBATE : 2x COATS OF BITUMINOUS LIQUID TO BRICK REBATE

CORNER REINFORCING : MESH SUPPLEMENTARY REINFORCING (2/D12 1200mm LONG) TO INTERNAL CORNERS WHERE SHRINKAGE CONTROLS DO NOTMEET THE INTERNAL CORNER

INSTALLATION NOTES

SHRINKAGE CONTROL : 1/4 DEEP SAW CUT INTO CONCRETE SLAB @ 6m CRS MAX @ 1:2 RATIO MAX.
SHRINKAGE CONTROL JOINTS MAY BE CUT AT AN ANGLE NOT LESS THAN 60°, IN ACCORDANCE WITH NZS 3604:2011 7.5.8.6.1
AVOID CONSTRUCTION JOINTS & SHRINKAGE CONTROLS UNDER TILED AREAS & FRAMING THAT IS TO BE USED AS A BRACING ELEMENT

PLUMBING : TYPICAL 140mm OFFSET FROM WALL TO CENTRE OF WC WASTE RISER (CONSULT MANUFACTURER'S TECHNICAL SPEC TO CONFIRM)
TYPICAL 45mm OFFSET TO CENTRE LINE OF WALL TO CENTRE OF VANITY & TUB WASTE RISERS

COLUMN FOOTING CALCULATIONS TO RESIST UPLIFT AS PER NZS 3604:2011 TABLE 9.1

WINDZONE : HIGH

SUPPORTED ROOF AREA : 6m2 = 0.30m3 FOOTING REQUIRED

SIZE : 1000mm WIDE x 600mm LONG x 500mm DEEP

VIP DESIGN
ARCHITECTURAL DESIGNERS
PHONE: 027 313 0880
EMAIL: admin@vipdesign.co.nz
ADDRESS: PO Box 19765, Woolston, Christchurch 8062
WEB: www.vipdesign.co.nz

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KEY	SYMBOL
METER BOARD	
DISTRIBUTION BOARD	
COMMS PANEL	
GULLY TRAP	
HOSE TAP	
DOWNPIPE	
INT HEAT PUMP	
EXT HEAT PUMP	

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STRUCTURAL REVIEW
Shelf Angles
09.12.20

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE:	VERSION:
CONSENT ISSUE	1.2A
DATE:	**SCALE:**
13.10.2020	1:100, 1:10

A1.02
FOUNDATION PLAN

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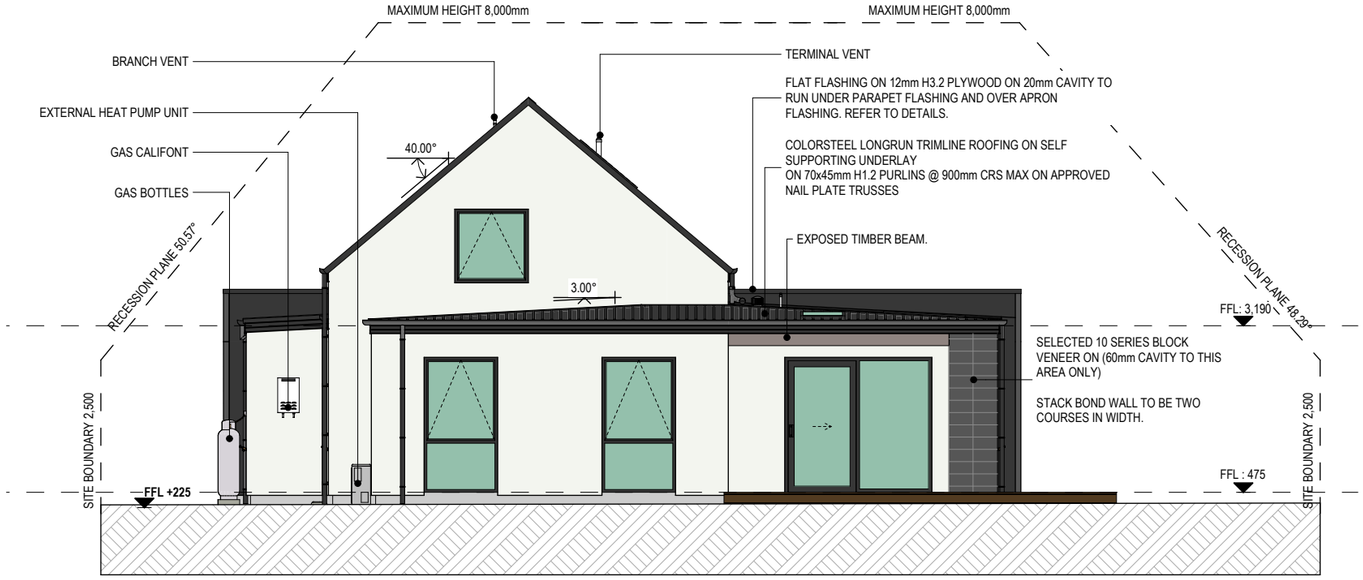
Received 16/12/2020

PROPOSED BUILDING R VALUES

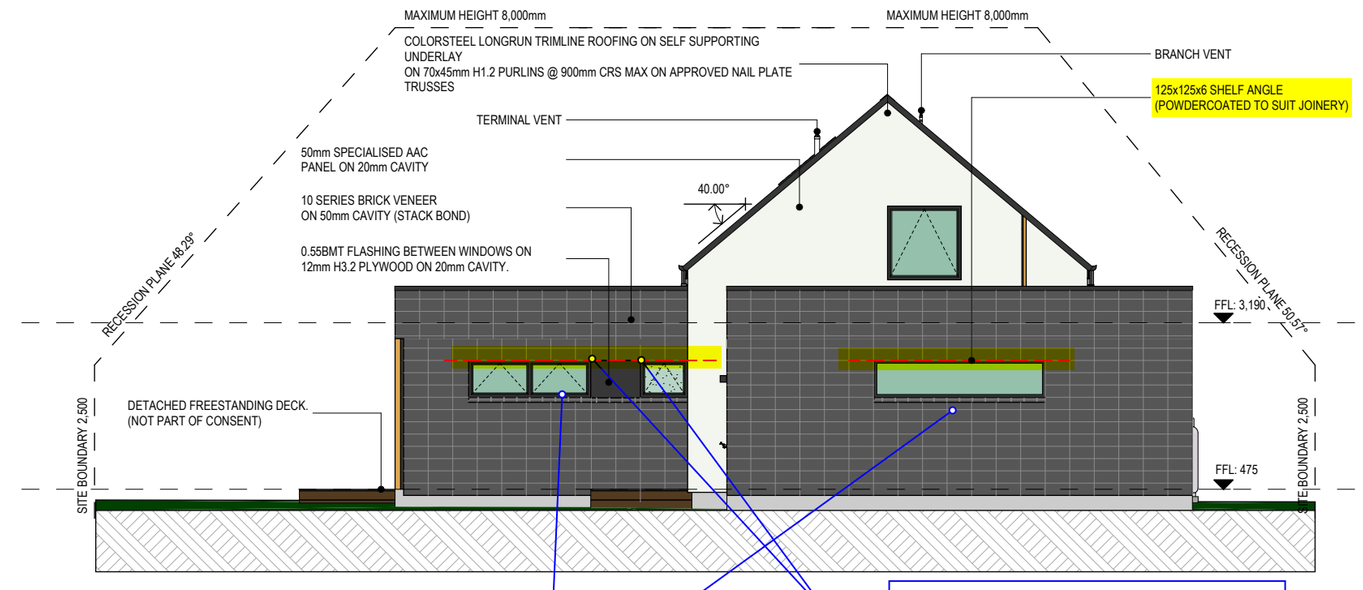
ROOF	:	COLORSTEEL TRIMLINE ON 70x45mm H1.2 PURLINS @ 900mm CRS ON SELF-SUPPORTING ROOF UNDERLAY OVER PRE-FABRICATED TRUSSES @ 900mm CRS WITH R3.6 INSULATION
CONSTRUCTION R VALUE	:	**3.23**
WALLS	:	90 SERIES BLOCK VENEER ON 20mm CAVITY, 90x45 H1.2 SG8 FRAMING @ 400mm CRS, DWANGS @ 400mm CRS, 10mm STANDARD PLASTERBOARD WITH R2.6 INSULATION
CONSTRUCTION R VALUE	:	**2.27**
		50mm SPECIALIZED AAC PANEL ON 20mm CAVITY, 90x45 H1.2 SG8 FRAMING @ 600mm CRS, DWANGS @ 800mm CRS, 10mm STANDARD PLASTERBOARD WITH R2.6 INSULATION
CONSTRUCTION R VALUE	:	**2.80**
FLOOR	:	FLOOR SLAB ON GRADE (NZS 3604:2011 SINGLE POUR SLAB & PERIMETER FOUNDATION.)
CONSTRUCTION R VALUE	:	**1.37**
EXTERIOR JOUNERY	:	DOUBLE GLAZING (TOTAL GLAZING <30%)
CONSTRUCTION R VALUE	:	**0.26**

BUILDING ENVELOPE RISK MATRIX		
NORTH ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	High risk	3
Deck design	Low risk	0
Total Risk Score:		**13**



DRAWING : NORTH ELEVATION
1:100

BUILDING ENVELOPE RISK MATRIX		
SOUTH ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**



DRAWING : SOUTH ELEVATION
1:100

Provide lattice mesh in course immediately above and below openings

Ensure angle is coach screwed to studs at boundary of windows

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ARCHITECTURAL DESIGNERS
PHONE: 027 313 0880
EMAIL: admin@vipdesign.co.nz
ADDRESS: PO Box 19765, Woolston, Christchurch 8062
WEB: www.vipdesign.co.nz

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STRUCTURAL REVIEW
Shelf Angles
11.12.20

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE: CONSENT ISSUE	**VERSION:** 1.2A
DATE: 13.10.2020	**SCALE:** 1:100

A3.01
ELEVATIONS

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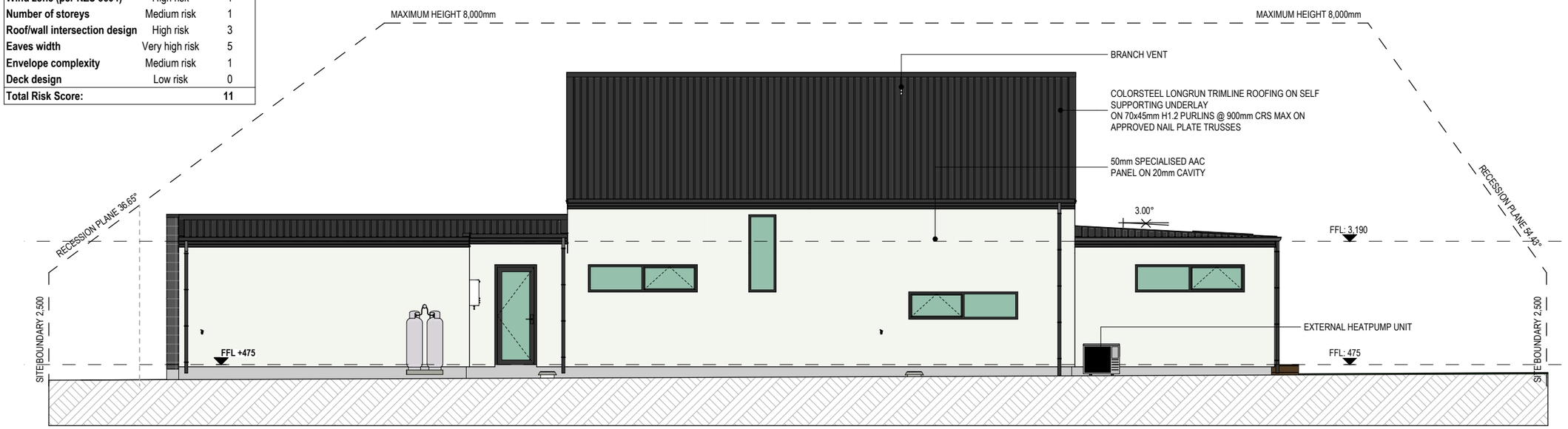
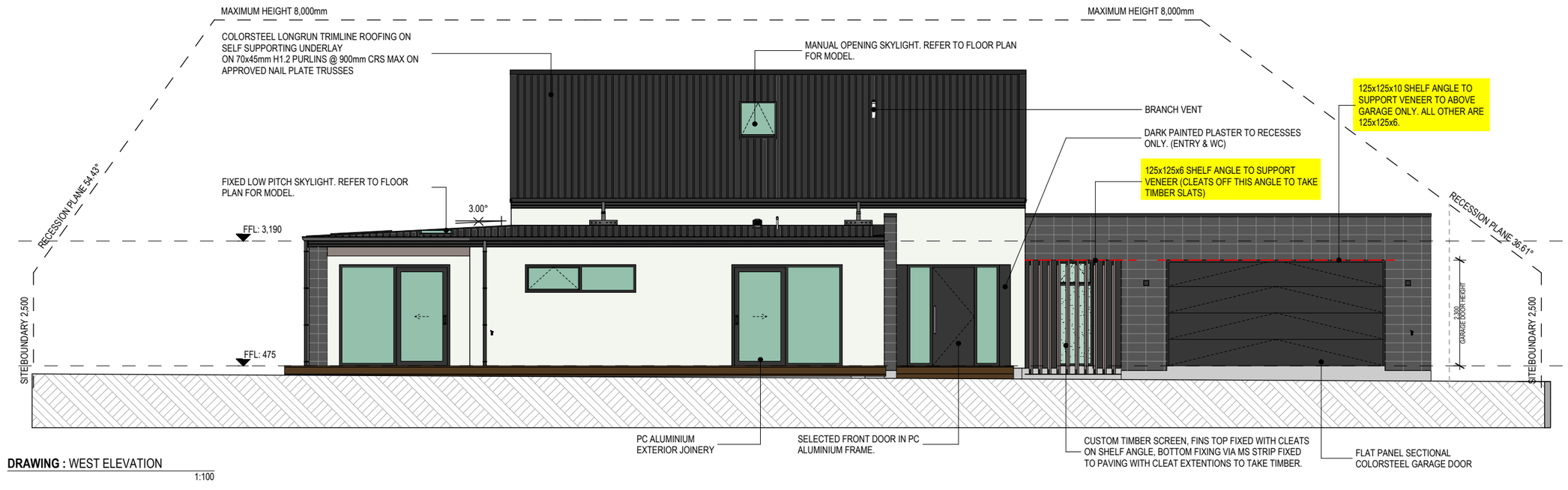
BUILDING ENVELOPE RISK MATRIX		
EAST ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**



DRAWING : EAST ELEVATION
1:100

BUILDING ENVELOPE RISK MATRIX		
WEST ELEVATION		
Risk Factor	**Risk Severity**	**Risk Score**
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Medium risk	1
Roof/wall intersection design	High risk	3
Eaves width	Very high risk	5
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		**11**



DRAWING : WEST ELEVATION
1:100

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ARCHITECTURAL DESIGNERS
PHONE: 027 313 0880
EMAIL: admin@vipdesign.co.nz
ADDRESS: PO Box 19765, Woolston, Christchurch 8062
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Shelf Angles
09.12.20

PROJECT DETAILS:

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29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

DRAWING DETAILS:

STAGE:	**VERSION:**
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13.10.2020	1:100

A3.02
ELEVATIONS

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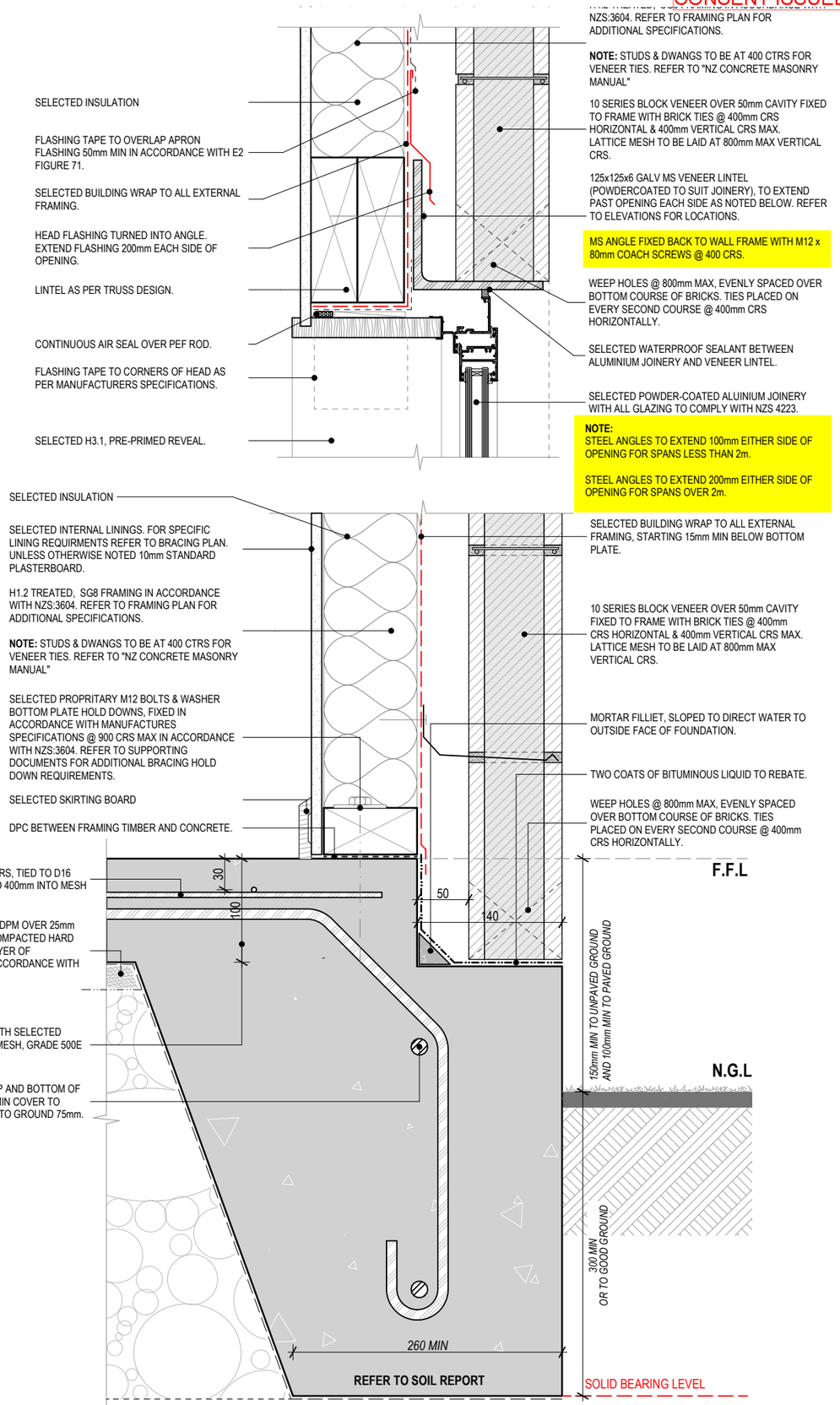
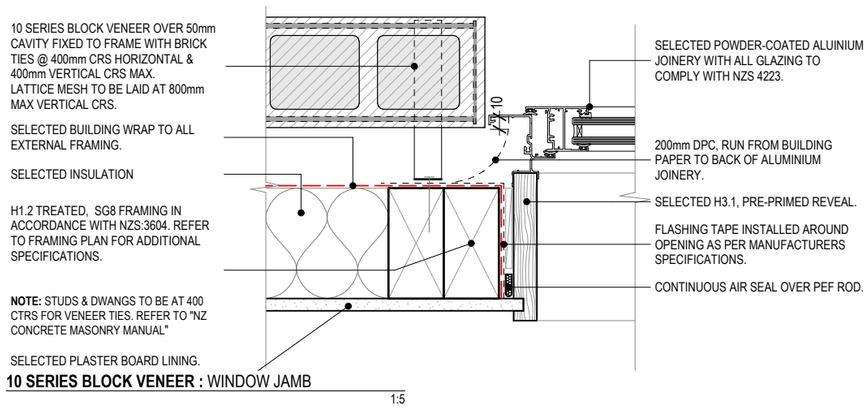
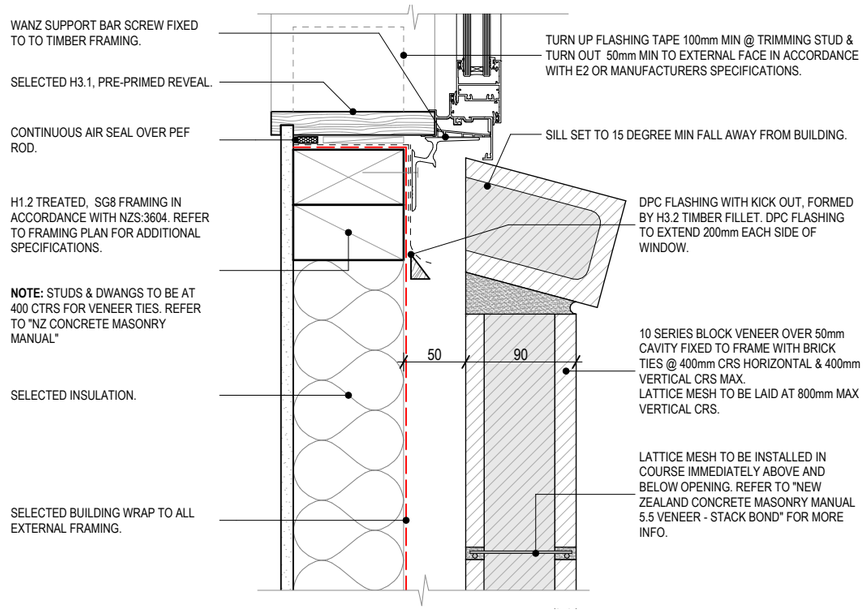




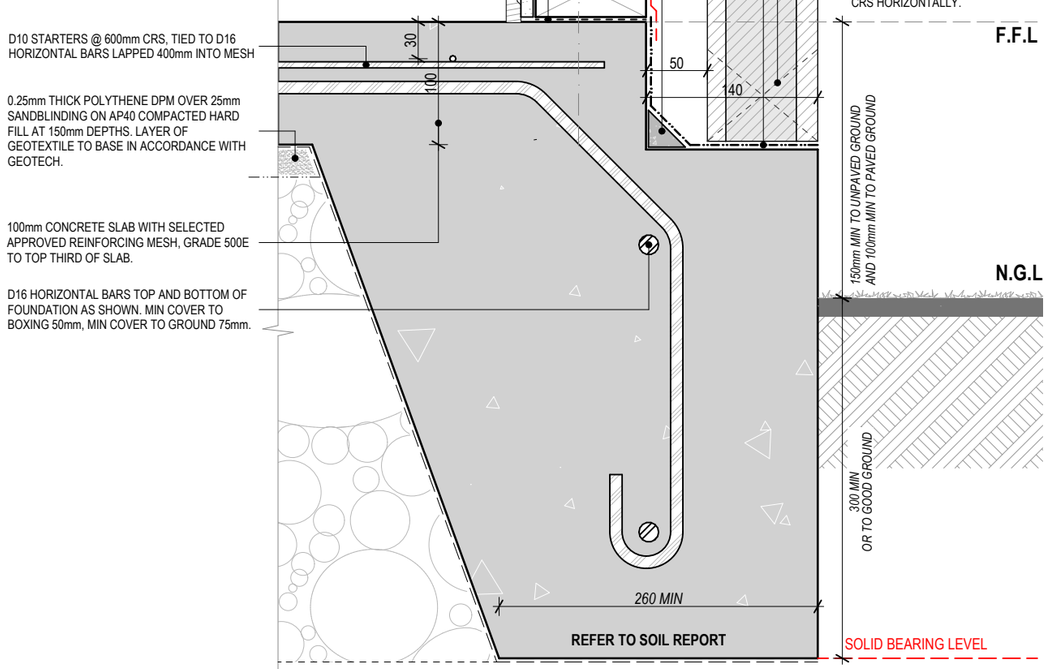
10 SERIES BLOCK VENEER : WINDOW JAMB

1:5



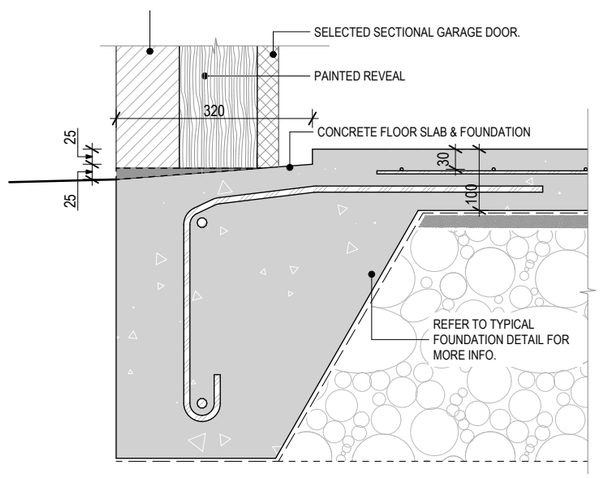
10 SERIES BLOCK VENEER : WINDOW SILL

1:5



10 SERIES BLOCK VENEER : FOUNDATION

1:5



10 SERIES BLOCK VENEER : GARAGE DOOR REBATE

1:10

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REFER TO "NEW ZEALAND CONCRETE MASONRY MANUAL 5.5 VENEER - STACK BOND" LOCATED IN SUPPORTING DOCS.

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STRUCTURAL REVIEW
Shelf Angles
09.12.20

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

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A5.04

DETAILS : CLADDING (10 SERIES)

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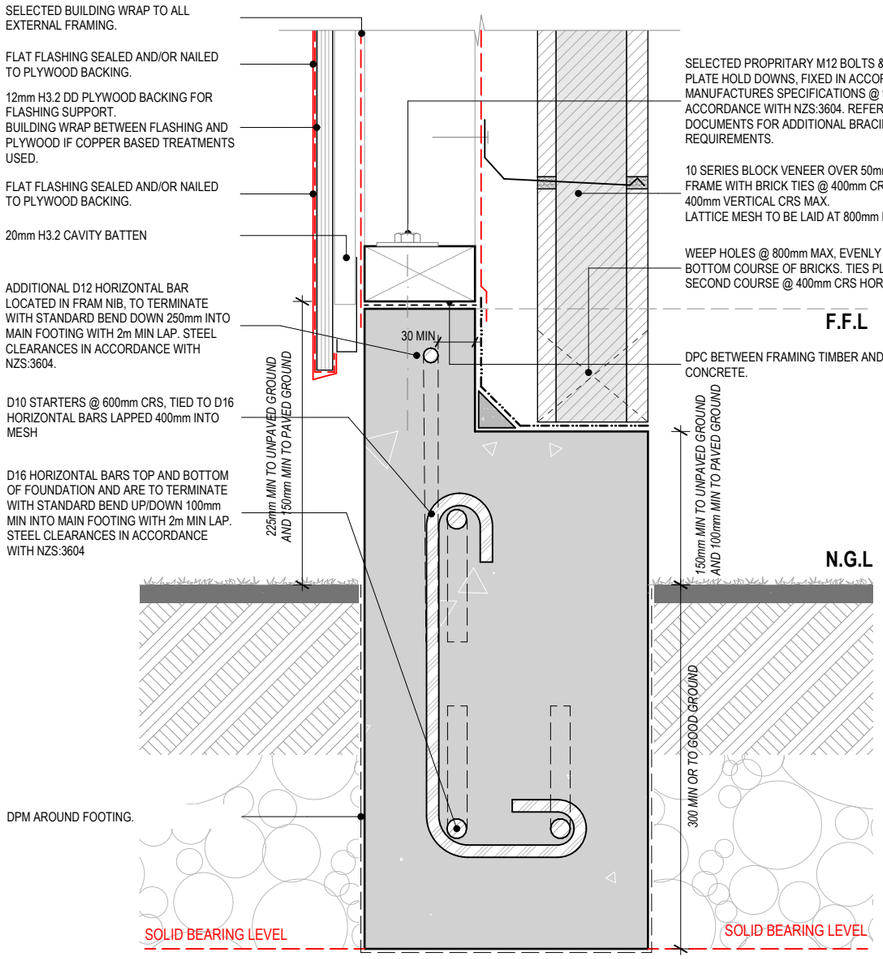
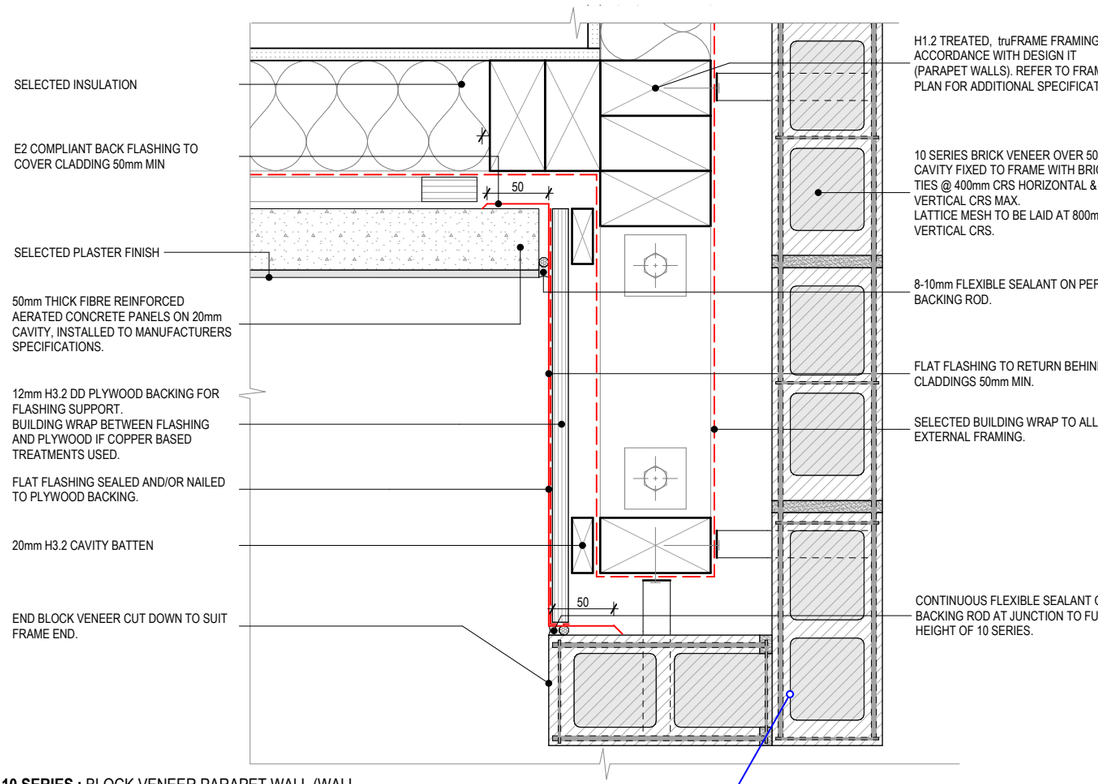


10 SERIES : BLOCK VENEER PARAPET WALL (FOUNDATION)

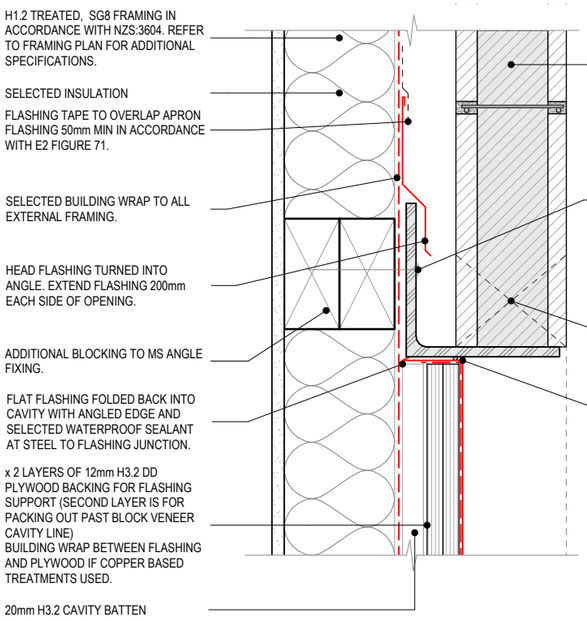
1:5



10 SERIES : BLOCK VENEER PARAPET WALL (WALL EXTENTIONS)

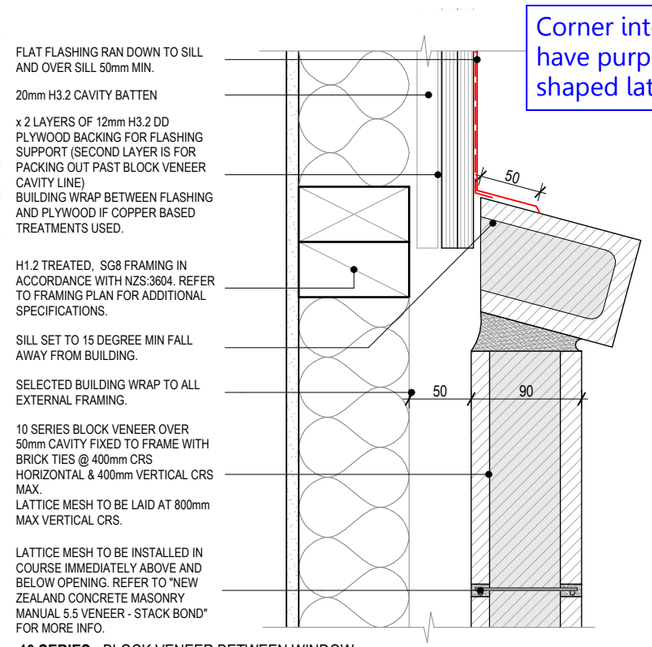
1:5

Corner intersections to have purpose-made L shaped lattice mesh



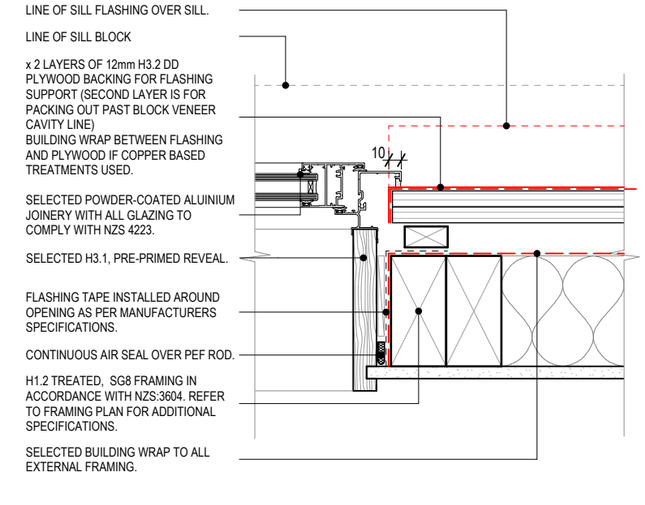
10 SERIES BLOCK VENEER : BETWEEN WINDOW FLASHING (HEAD)

1:5



10 SERIES : BLOCK VENEER BETWEEN WINDOW FLASHING (SILL)

1:5



10 SERIES : BLOCK VENEER BETWEEN WINDOW FLASHING (JAMB)

1:5

VIP DESIGN
ARCHITECTURAL DESIGNERS
PHONE: 027 313 0880
EMAIL: admin@vipdesign.co.nz
ADDRESS: PO Box 19765, Woolston, Christchurch 8062
WEB: www.vipdesign.co.nz

SUBJECT TO ALL NECESSARY COUNCIL & DEVELOPER APPROVALS.

CONTRACTOR TO VERIFY ALL DIMENSIONS & LEVELS PRIOR TO COMMENCEMENT OF ANY WORK. DO NOT SCALE OFF DRAWINGS.

ALL RIGHTS RESERVED. NO PART OF THIS WORK MAY BE REPRODUCED OR COPIED IN ANY FORM WITHOUT WRITTEN PERMISSION FROM VIP DESIGN.

Tetrad.
Quality by Design

STRUCTURAL REVIEW
Stack Bond Veneer
11.12.20

PROJECT DETAILS:

JOYCE BUILT

JOB # D0088

ADDRESS:
LOT: 14 DP: 553457

29 PENTECOST ROAD
OAKVILLE ESTATE, STAGE 2
RANGIORA

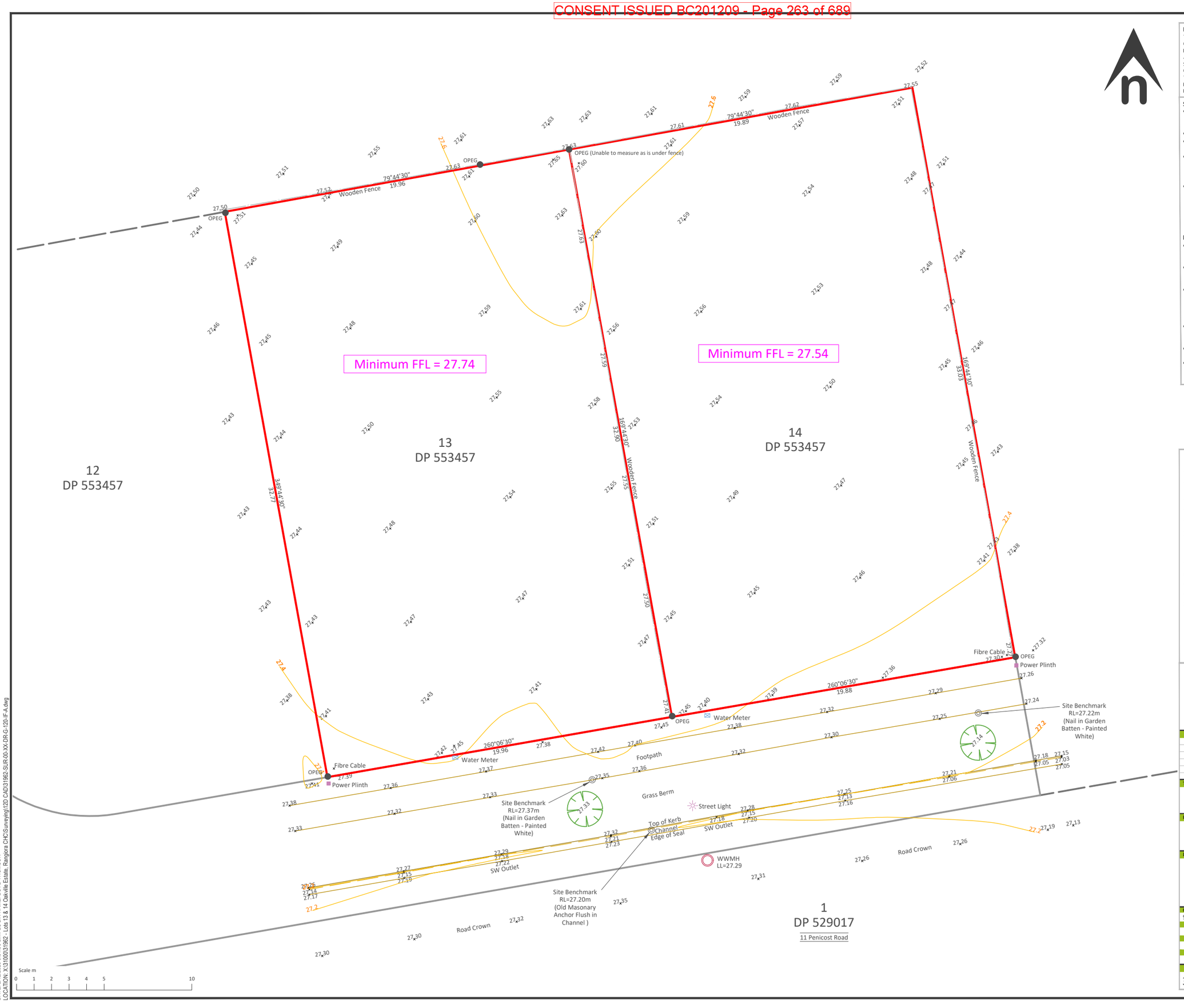
DRAWING DETAILS:

STAGE:	**VERSION:**
CONSENT ISSUE	1.2A
DATE:	**SCALE:**
13.10.2020	1:5

A5.06

DETAILS : CLADDING (10 SERIES)

Application BC201209
Received 10/12/2020



DATE: 2/12/2020 9:31:59 a.m. LOGIN NAME: BOYD.THOMSON
LOCATION: X:\3100\31962 - Lots 13 & 14 Oakville Estate, Rangiora CHC\Surveying\12D CAD\31962-SUR-00-XX-DR-G-120-IF-A.dwg

DISCLAIMER:
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SURVEY ORIGIN NOTES:
- HORIZONTAL DATUM IS GEODETIC 2000.
  PROJECTION IS TRANSVERSE MERCATOR.
  ORIGIN IS MT PLEASANT CIRCUIT, AT 800 000mN 400 000mE.
- HEIGHT DATUM IS LYTTELTON VERTICAL DATUM 1937.
- ORIGIN OF LEVELS: UF 17 (AG31)
  RL=22.107m LINZ GEODETIC DATABASE (DEC 2020)
- ORIGIN OF SURVEY: UF 17 (AG31)
  830754.173mN 389406.244mE
  SOURCED LINZ GEODETIC DATABASE (DEC 2020)
- BOUNDARIES SHOWN ON THIS PLAN HAVE BEEN ADOPTED FROM DP 553457 (SURVEYED IN 2020) AND HAVE BEEN CONFIRMED BY RE-OBSERVATION AND MEASUREMENT OF OLD SURVEY REFERENCE MARKS IN THE VICINITY. IF THE POSITION OF THE BOUNDARIES IS REQUIRED A REDEFINITION SURVEY SHOULD BE CARRIED OUT TO CONFIRM THE EXACT BOUNDARY POSITIONS.

NOTES:
- EASEMENTS, COVENANTS AND OTHER LEGAL INSTRUMENTS PERTAINING TO THIS SITE MAY NOT BE REPRESENTED ON THIS PLAN. A FULL INVESTIGATION OF LEGAL RECORDS SHOULD BE UNDERTAKEN.
- NOT ALL PUBLIC & PRIVATE DRAINAGE INFORMATION IS SHOWN ON THIS PLAN. SYMBOLS AND MODELS OF SERVICES ARE SHOWN DIAGRAMMATICALLY ONLY AND NOT TO SCALE.
- UNLESS OTHERWISE SHOWN THE POSITION AND ALIGNMENT OF SERVICES SHOWN ON THIS PLAN HAVE BEEN OBTAINED FROM COUNCIL RECORDS AND ARE SUBJECT TO THE ERRORS OR OMISSIONS OF THAT DATA, THEY SHOULD NOT BE USED FOR DESIGN PURPOSES. ALL SERVICES SHOULD BE LOCATED BEFORE ANY DESIGN OR CONSTRUCTION BEGINS.
- CRITICAL LEVELS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN. THE LEVELS SHOWN ON THIS PLAN MAY NOT CORRESPOND TO THE COUNCIL'S DEFINITION OF GROUND LEVEL FOR DESIGN PURPOSES.
- CONTOURS SHOWN ON THIS PLAN HAVE BEEN ELECTRONICALLY COMPUTED, THEY MAY NOT REPRESENT THE TRUE GROUND LEVELS.
- THE SIZE AND POSITION OF TREES SHOWN ON THIS PLAN IS APPROXIMATE. THE TREE 'TYPE' IS A BEST GUESS. IF CRITICAL, TREES SHOULD BE IDENTIFIED BY A QUALIFIED ARBORIST.

FOR
INFORMATION

LEGEND

LOT BOUNDARIES	
ROAD BOUNDARIES	
ABUTTAL BOUNDARIES	
EASEMENT BOUNDARIES	
MAJOR CONTOURS (1m INTERVAL)	20
MINOR CONTOURS (0.2m INTERVAL)	
MEASUREMENTS (METRES)	25.67
EXISTING BUILDINGS (EXTERIOR CLADDING)	
BUILDING EAVES (TOP OF GUTTER)	
EDGE OF CONCRETE	
FENCES	
WASTE WATER LINE	WW
STORM WATER LINE	SW
WATER SUPPLY LINE	W
OVERHEAD POWER LINE	P
TELEPHONE LINE	T
TREES	
TRUNK SURVEYED, DRIPLINE ESTIMATED	
SURVEYED DRIPLINE & TRUNK	
HEDGE	

envivo
ENGINEERING SURVEYING PLANNING
envivo ltd 39 carlyle st sydenham christchurch 8023
+64 3 928 1185 admin@envivo.co.nz www.envivo.co.nz

REV	BY	DATE	APP'D	REVISION/ COMMENTS

TITLE
SITE PLAN

PROJECT/LOCATION
LOTS 13 & 14 OAKVILLE ESTATE
RANGIORA

LEGAL DESCRIPTION
LOTS 13 & 14 DP 553457

CERTIFICATE OF TITLE
961322, 655 m² & 961323, 655 m²

SURVEYED	DRAWN	DESIGNED	APPROVED
PT	MM	-	BT
DATE	DATE	DATE	DATE
01/12/20	01/12/20	-	02/12/20
SCALE @A1; @A3	ZONING		
1:100; 1:200	REFER LOCAL AUTHORITY		

PROJECT	ORIG	ZONE	LOC	TYPE	RL	DRG No	SUIT	REV
31962	SUR	00	XX	DR	G	120	IF	A

SECTION 3

Truss Details & Bracing Details

See Sheet A2.08 for bracing calculations in the plans

(Include Fixings of Gib & Ecoply)

- Design IT Calcs
- Hyspan etc.

VIP Frames & Trusses

Christchurch

Date: **15 October 2020**

Fabricator: **VIP Frames & Trusses**

Job Name: VIP Design
New House
Lot 14 Pentecost Rd

-- 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 shall be sent to buildinginfo@wmk.govt.nz

Building Consent No: BC201209
(Provided by relevant Consenting Authority at time of Consent application)

We have been engaged to provide the trusses and 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) Any slab thickening requirements detailed.
(c) All truss loaded lintels that are either inside or outside the requirements of NZS3604:2011.
(d) All roof bracing details as required by NZS3604:2011.

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

Wind Zone	**High**	**Altitude**	**100m**
		Snow (Open Ground Load)	**.900kPa**
Roof Material	**Longrun**	**Snow (Basic Roof Load)**	**.403kPa**

Treatment Definition:

External Walls -	H1.2 Treated
Internals Walls -	H1.2 Treated
Trusses -	H1.2 Treated

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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 the 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 possible.

Council Contacts:

Consents Officer: Michael Molloy
Email #:
Phone: 03 3118906

Please forward to:

VIP Frames & Trusses
65-67 Wickham Street
Ph (03) 389-8200

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.miteknz.co.nz

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **VIP Frames & Trusses**

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 **82068** 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
vi) Timber is graded to the requirements of NZS 3603:1993
vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

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

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

On behalf of MiTek New Zealand Limited, **Date: Thursday, 15 October 2020**

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
BC201209 12/01/2021 Michaelmo

-- 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 shall be sent to buildinginfo@wmk.govt.nz

Job: 82068
Client: VIP Design
Phone:
CONSENT ISSUED BC201209 - Page 267 of 889
Site: New House
Lot 14 Pentecost Rd
Rangiora
BC201209
Description:
Building Consent No.:
Phone:

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **VIP Frames & Trusses**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

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

Job Details

Importance Level : 2

Design Working Life : 50 years

Roof Truss

Timber Group:	~MSGx45 H1.2	Pitch:	40.000 deg	Nominal Overhang:	70 mm
Roof		**Ceiling**		**Wind**	
Material:	Longrun Iron	Material:	Gib Board 13mm	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:	600 mm centres	**Snow**	
Live Load:	Qur = 0.250 kPa	Live Load:	Qc = 1.400 kN	Location:	Rangiora (N4) at 100 m
	Qc = 1.100 kN	**Occupancy Live Load**		Open Ground Load:	0.900 kPa
		Distributed:	Quf = 1.500 kPa	Basic Roof Load:	0.630 kPa
		Concentrated:	Qcf = 1.800 kN		
Attic Floor		**Attic Room Ceiling**		**Attic Wall**	
Material:	20mm Particle Board	Material:	Gib Board 12mm	Material:	Gib Board
Dead Load:	0.200 kPa	Dead Load:	0.200 kPa	Dead Load:	0.300 kPa
Restraints:	Continuous	Restraints:	600 mm centres	Restraints:	Continuous

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

MiTek® Truss List

Legend: * = detail only, ? = input only, ~~Txx~~ = 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)
*H1	2	4899	2.122	900	*R6	1	793	3.000	900	T5	4	4310	3.000	900 LB
J1	5	3410	3.000	900	S2	3	6290	40.000	900	T6	5	4310	3.000	900 LB
J3	1	2510	3.000	900	S2A	1	6290	40.000	900	T7	1	10080	3.000	900 LB
J5	1	1610	3.000	900	S3	1	6290	40.000	900	T8	2	5580	3.000	900
J8	1	2510	3.000	900	S3A	1	6290	40.000	900	J4	1	2510	3.000	900
J10	1	1610	3.000	900	S4	1	6290	40.000	900	J9	1	2510	3.000	900
P2	1	4480	0.000	900	S5	1	6290	40.000	900	P1	1D	4480	0.000	900 LB
*R1	1	793	3.000	900	S6	4	6380	40.000	900	P3	1D	2870	0.000	900
*R2	2	383	3.000	900	T1	1	5580	3.000	450	J2	1D	3410	3.000	900
*R3	2	383	3.000	900	T2	1	7010	3.000	900	J7	1D	3410	3.000	900
*R4	1	793	3.000	900	T3	13	7010	3.000	450	S1	1D	10080	3.000	900 LB
*R5	1	793	3.000	900	T4	1	7010	3.000	900					

Total quantity : 67

The computer design input has been carried out by:

Signed: .....

Date: ...Thursday, 15 October 2020....

Name of Detailer: Michael Lim

Qualifications and Title: Detailer

On behalf of: VIP Frames & Trusses

Job: 82068
Client: VIP Design
Site: New House
Lot 14 Pentecost Rd
Rangiora
BC201209
Description:
Building Consent No.:
Phone:

CONSENT ISSUED BC201209 - Page 268 of 889

TRUSS FIXING SELECTION REPORT - Characteristic Loads

Fixings are selected from the LUMBERLOK Brochure 08/2014 (Timber Connectors Characteristic Loadings Data)

MiTek® Truss List
Legend: * = detail only, ? = input only, ~~Txx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	Fixing Qty	Fixing Selected
*H1	2	4899						Refer NZS3604:2011 Tables 15.6
J1	5	3410	F	3.565	1.732	Cross	5	Pair of Wire Dog Staples
			E	3.445	1.761	Butt	5	JH 47x90
J3	1	2510	E	2.656	1.274	Cross	1	Pair of Wire Dog Staples
			G	1.945	0.968	Butt	1	JH 47x90
			D	0.603	0.332	Butt	1	Pair of 3.15d Nails
J5	1	1610	D	1.657	0.769	Cross	1	Pair of Wire Dog Staples
			E	0.452	0.045	Butt	1	Pair of 3.15d Nails
			C	1.277	0.747	Butt	1	JH 47x90
J8	1	2510	E	2.656	1.274	Cross	1	Pair of Wire Dog Staples
			G	1.945	0.968	Butt	1	JH 47x90
			D	0.603	0.332	Butt	1	Pair of 3.15d Nails
J10	1	1610	D	1.657	0.769	Cross	1	Pair of Wire Dog Staples
			E	0.452	0.045	Butt	1	Pair of 3.15d Nails
			C	1.277	0.747	Butt	1	JH 47x90
P2	1	4480	E	3.923	2.057	Cross	1	Pair of Wire Dog Staples
			H	3.923	2.057	Butt	1	JH 47x90
*R1	1	793						Refer NZS3604:2011 Tables 15.6
*R2	2	383						Refer NZS3604:2011 Tables 15.6
*R3	2	383						Refer NZS3604:2011 Tables 15.6
*R4	1	793						Refer NZS3604:2011 Tables 15.6
*R5	1	793						Refer NZS3604:2011 Tables 15.6
*R6	1	793						Refer NZS3604:2011 Tables 15.6
S2	3	6290	H	8.934	1.377	Cross	3	Pair of Wire Dog Staples
			L	11.669	3.007	Butt	3	JH 47x120
			K	7.052	9.491	Cross	3	CT400
			J	6.118	0.227	Cross	3	Pair of Wire Dog Staples
S2A	1	6290	M	19.968	4.138	Butt	1	JH 47x190
			L	7.396	8.721	Cross	1	CT400
			H	19.562	2.495	Cross	1	Pair of Wire Dog Staples
			J	15.251	0.000	Cross	1	Pair of Wire Dog Staples
S3	1	6290	M	7.788	2.130	Butt	1	Pair of MultiGrips
			H	9.540	1.278	Cross	1	Pair of Wire Dog Staples
			J	7.485	1.536	Cross	1	Pair of Wire Dog Staples
S3A	1	6290	M	21.935	3.079	Butt		No fixing selected. Fixing By Architect.
			H	28.413	1.951	Cross	1	Pair of Wire Dog Staples
			J	18.745	0.796	Cross	1	Pair of Wire Dog Staples
S4	1	6290	H	9.540	1.278	Cross	1	Pair of Wire Dog Staples
			L	7.788	2.130	Butt	1	Pair of MultiGrips
			J	7.485	1.536	Cross	1	Pair of Wire Dog Staples
S5	1	6290	H	9.539	1.293	Cross	1	Pair of Wire Dog Staples
			L	8.159	1.622	Butt	1	Pair of MultiGrips
			J	7.488	1.716	Cross	1	Pair of Wire Dog Staples
S6	4	6380	H	12.144	1.206	Cross	4	Pair of Wire Dog Staples
			L	12.144	1.478	Cross	4	Pair of Wire Dog Staples
T1	1	5580	H	2.808	1.315	Butt	1	JH 47x90
			K	3.118	1.298	Cross	1	Pair of Wire Dog Staples
T2	1	7010	J	0.273	0.943	Cross	1	Pair of Wire Dog Staples
			O	5.409	2.596	Cross	1	Pair of Wire Dog Staples
			K	9.582	4.810	Cross	1	CT400
T3	13	7010	I	3.601	1.796	Cross	13	Pair of Wire Dog Staples
			N	3.640	1.773	Cross	13	Pair of Wire Dog Staples
T4	1	7010	J			Wide		No fixing selected
T5	4	4310	F	4.509	2.219	Butt	4	JH 47x90
			I	4.509	2.104	Cross	4	Pair of Wire Dog Staples
T6	5	4310	F	4.509	2.193	Butt	5	JH 47x90
			I	4.354	2.222	Butt	5	JH 47x90
T7	1	10080	L	3.936	2.322	Cross	1	Pair of Wire Dog Staples
			T	2.822	1.562	Cross	1	Pair of Wire Dog Staples
			Q	10.640	6.435	Cross	1	CT400
T8	2	5580	I	5.617	2.631	Butt	2	JH 47x90
			M	6.237	2.595	Cross	2	Pair of Wire Dog Staples
J4	1	2510	F	2.997	1.790	Cross	1	Pair of Wire Dog Staples
			I	2.866	2.195	Butt	1	JH 47x90
J9	1	2510	F	2.997	1.790	Cross	1	Pair of Wire Dog Staples
			I	2.866	2.195	Butt	1	JH 47x90
P1	1D	4480	E	25.230	9.594	Cross	1	CT400
			H	29.081	9.599	Butt		No fixing selected. Fixing By Architect.
P3	1D	2870	D	17.449	12.651	Cross	1	16kN Truss to Top Plate
			G	28.361	13.851	Cross	1	16kN Truss to Top Plate
J2	1D	3410	B	5.313	3.165	Cross	1	Pair of Wire Dog Staples
			H	5.272	3.392	Butt	1	Pair of MultiGrips
J7	1D	3410	B	5.313	3.165	Cross	1	Pair of Wire Dog Staples
			H	5.272	3.392	Butt	1	Pair of MultiGrips
S1	1D	10080	B	7.422	4.299	Cross	1	CT400
			K	30.788	17.094	Cross		No fixing selected. Fixing By Architect.
			G	3.954	2.281	Cross	1	Pair of Wire Dog Staples

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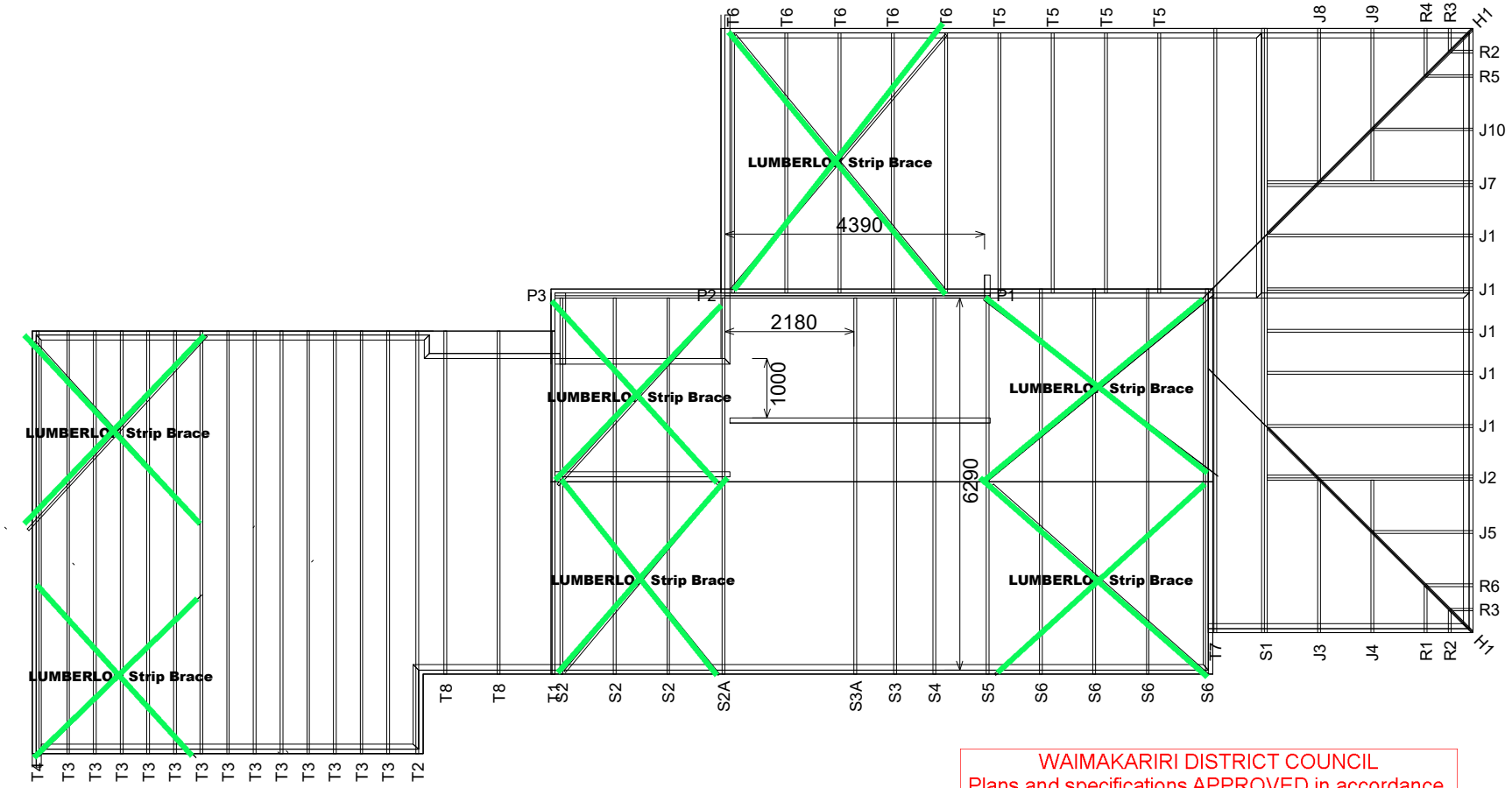
Roof Bracing Layout



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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

Truss "As-Built" designs shall be sent to buildinginfo@wmk.govt.nz

BC201209

VIP Frames & Trusses
CHRISTCHURCH | AUCKLAND

65 Wickham St.
PO Box 19-765,
Christchurch

91 Adams Drive,
Pukekohe,
Auckland

0800 PRENAIL
(0800 7736245)

JOB No **82068**

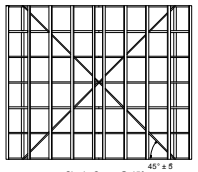
Client: VIP Design
Job Name: New House
Address: Lot 14 Pentecost Rd
Rangiora

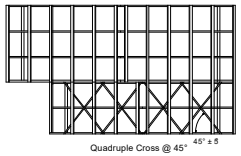
Pitch: 40.000
Roof Material: Longrun Iron
Soffit Overhang: 70
Wind Area: High
Snow Load: 0.630

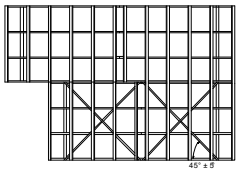
Trusses And Rafters At 900 Centres Unless Stated Otherwise

DRAWN BY Michael Lim
DATE 15 Oct,2020 PAGE 1 of

Roof Bracing Details


Single Cross @ 45°


Quadruple Cross @ 45°

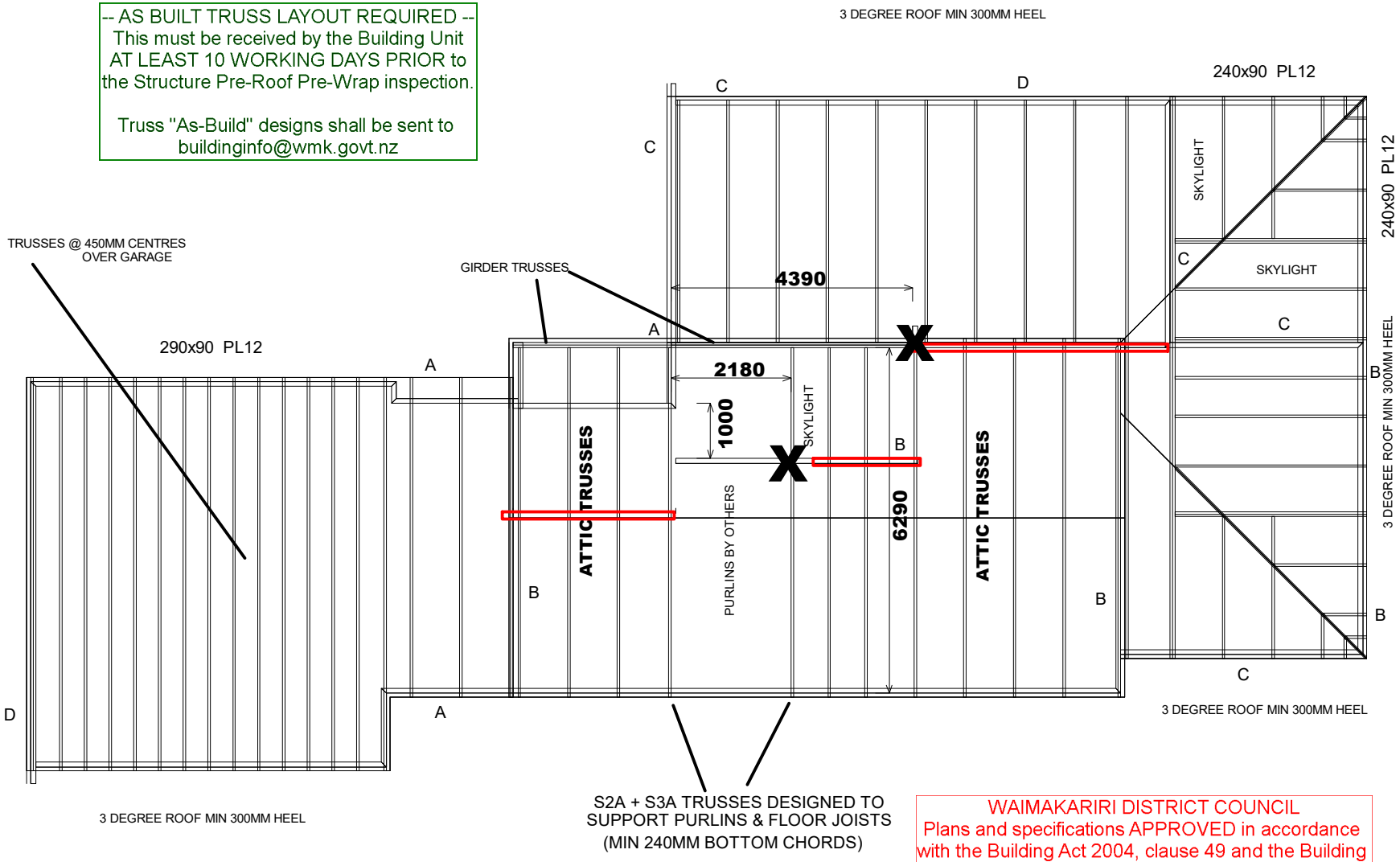

Double Cross @ 45°
(as diagram above)

NOTES:
Refer to:
Lumberlok roof bracing brouchure
07/2006

CONSENT ISSUED BC201209 - Page 270 of 689

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

Truss "As-Built" designs shall be sent to buildinginfo@wmk.govt.nz



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

= Load Bearing Walls Not Requiring Slab Thickening (Under 10kN)

X = Type FP1 375x375 Slab Pad

Architect / Engineer to confirm all top floor loads are transferred to foundation / slab below

All Other lintels / beams by architect / engineer

BC201209

VIP Frames & Trusses CHRISTCHURCH | AUCKLAND

65 Wickham St.
PO Box 19-765,
Christchurch

91 Adams Drive,
Pukekohe,
Auckland

0800 PRENAIL
(0800 7736245)

JOB No **82068**

Client: VIP Design
Job Name: New House
Address: Lot 14 Pentecost Rd
Rangiora

Pitch: 40.000
Roof Material: Longrun Iron
Soffit Overhang: 70
Wind Area: High
Snow Load: 0.630

Trusses And Rafters At 900 Centres Unless Stated Otherwise

DRAWN BY Michael Lim

DATE 15 Oct,2020 PAGE 1 of

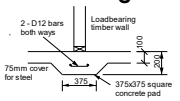
These lintels have been sized as per the GANGLAM and FLITCH BEAM selection manuals as provided by MiTek NZ Ltd.

HYSPAN lintels have been sized as per the HYSPAN selection charts.

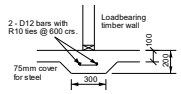
Unless otherwise stated all lintels are as per NZS3604 2011

LINTEL	SIZE	
A	2/90x45	MSG8
B	2/140x45	MSG8
C	2/190x45	MSG8
D	2/240x45	MSG8
E	2/290x45	MSG8
F		

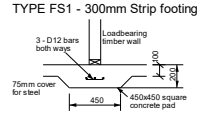
Slab Thickening Details



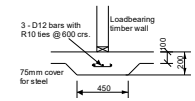
TYPE FP1 - 375x375mm Pad



TYPE FS1 - 300mm Strip footing



TYPE FP2 - 450x450mm Pad



TYPE FS2 - 450mm Strip footing

Worksheet

14 October 2020

SN-R10157064

PROLAM SUMMARY

Customer/Project: Worksheet
Physical Address:

Designer: Michael Lim, VIP Frame & Truss
67 Wickem St Broomley, Christchurch
E: michael@vft.co.nz P: 033898200

82068 - VIP Design - Lot 14 Pentecost Rd - Alfresco - 1

Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	High (44.0 m/s)
Roof Pitch	3 °	Snow Region	Region N4
Eaves	700 mm	Altitude	100 m
Roof Span	2.51 m	Ground Snow Load	0.90 kPa
Lintel Span	3.50 m	Roof Snow Load	0.63 kPa

Use Prolam PL12H1-250100 240 x 90mm PL12

Capacity Ratio	3.5
Long Term Deflection	< 1.0 mm
Max. Bearing Reaction	4.4 kN
Load Combination	1.2G + Su
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	4.5 kN Characteristic Load

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

PRODUCER STATEMENT

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

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

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

David King

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
14 October 2020

Worksheet

14 October 2020

SN-R10157065

PROLAM SUMMARY

Customer/Project: Worksheet
Physical Address:

Designer: Michael Lim, VIP Frame & Truss
67 Wickem St Broomley, Christchurch
E: michael@vft.co.nz P: 033898200

82068 - VIP Design - Lot 14 Pentecost Rd - Alfresco - 2

Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	High (44.0 m/s)
Roof Pitch	3 °	Snow Region	Region N4
Eaves	700 mm	Altitude	100 m
Roof Span	3.41 m	Ground Snow Load	0.90 kPa
Lintel Span	4.40 m	Roof Snow Load	0.63 kPa

Use Prolam PL12H1-250100 240 x 90mm PL12

Capacity Ratio	1.9
Long Term Deflection	2.0 mm
Max. Bearing Reaction	6.5 kN
Load Combination	1.2G + Su
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	6.875 kN Characteristic Load

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

PRODUCER STATEMENT

TASMAN CONSULTING ENGINEERS CIVIL & STRUCTURAL

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

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

David King

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
14 October 2020

Worksheet

14 October 2020

SN-R10157066

PROLAM SUMMARY

Customer/Project: Worksheet
Physical Address:

Designer: Michael Lim, VIP Frame & Truss
67 Wickem St Broomley, Christchurch
E: michael@vft.co.nz P: 033898200

82068 - VIP Design - Lot 14 Pentecost Rd - GD

Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	High (44.0 m/s)
Roof Pitch	3 °	Snow Region	Region N4
Eaves	700 mm	Altitude	100 m
Roof Span	7.01 m	Ground Snow Load	0.90 kPa
Lintel Span	4.80 m	Roof Snow Load	0.63 kPa

Use Prolam PL12H1-300100 290 x 90mm PL12

Capacity Ratio	1.4
Long Term Deflection	4.5 mm
Max. Bearing Reaction	12.0 kN
Load Combination	1.2G + Su
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	13 kN Characteristic Load

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

PRODUCER STATEMENT

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

David King

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
14 October 2020

LUMBERLOK

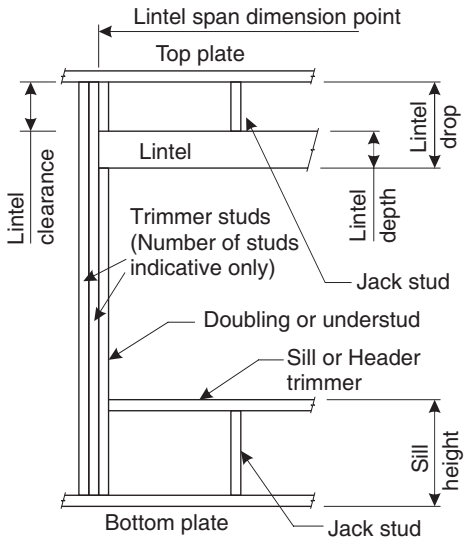
LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

NOTE:

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

DEFINITIONS



Lintel Supporting Girder Trusses:

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

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

SELECTION CHART FOR LINTEL FIXING

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

MiTek®

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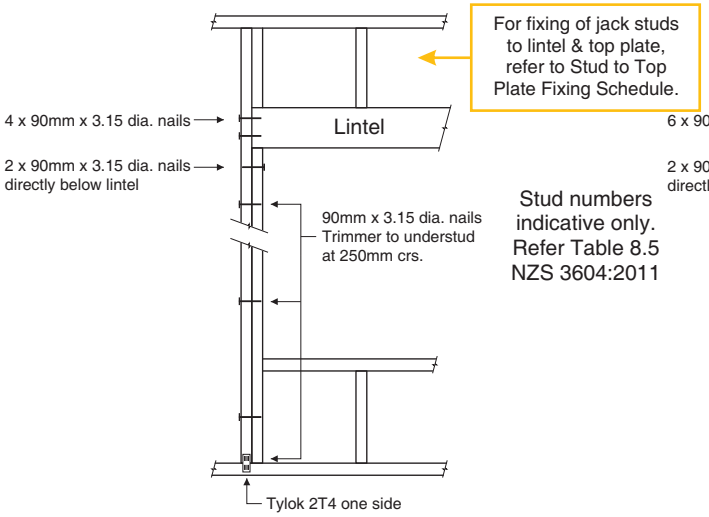
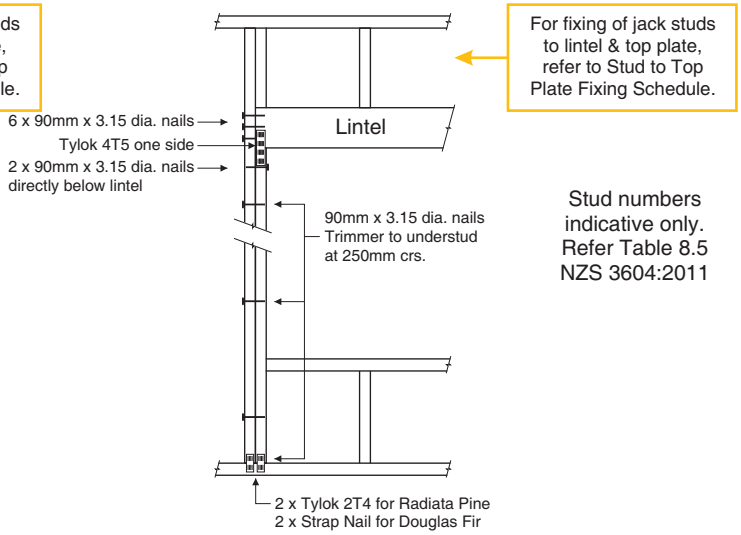
LUMBERLOK®

LINTEL FIXING OPTIONS

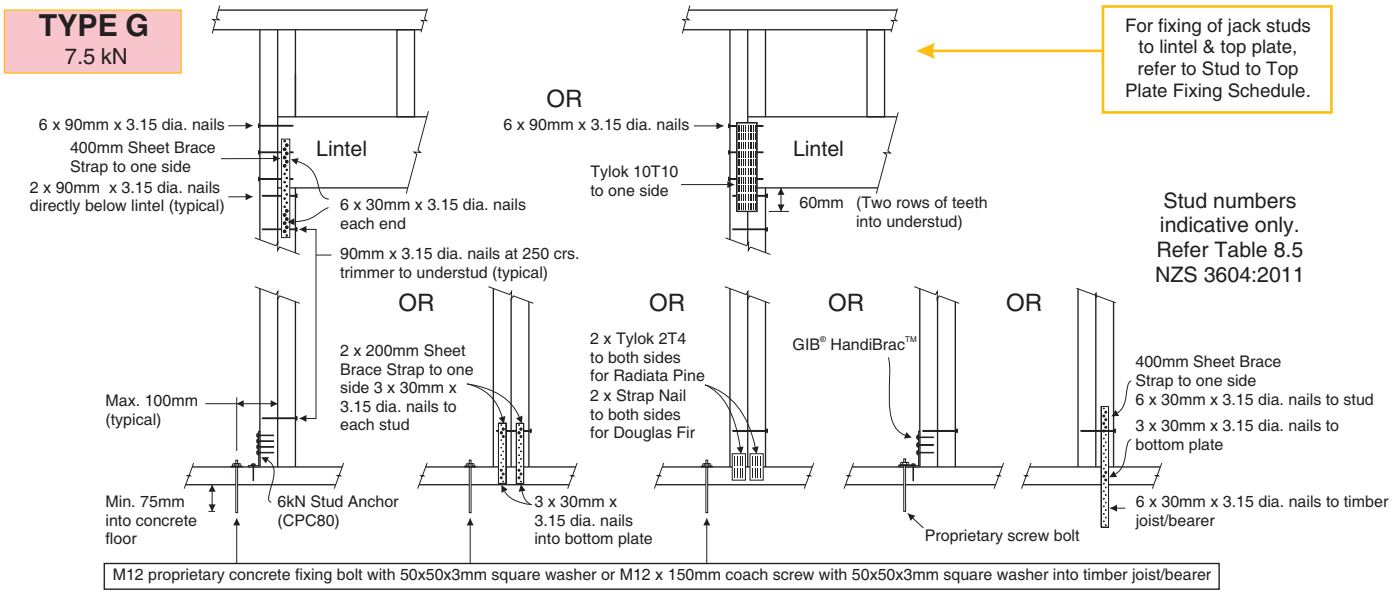
TYPE E
1.4 kN



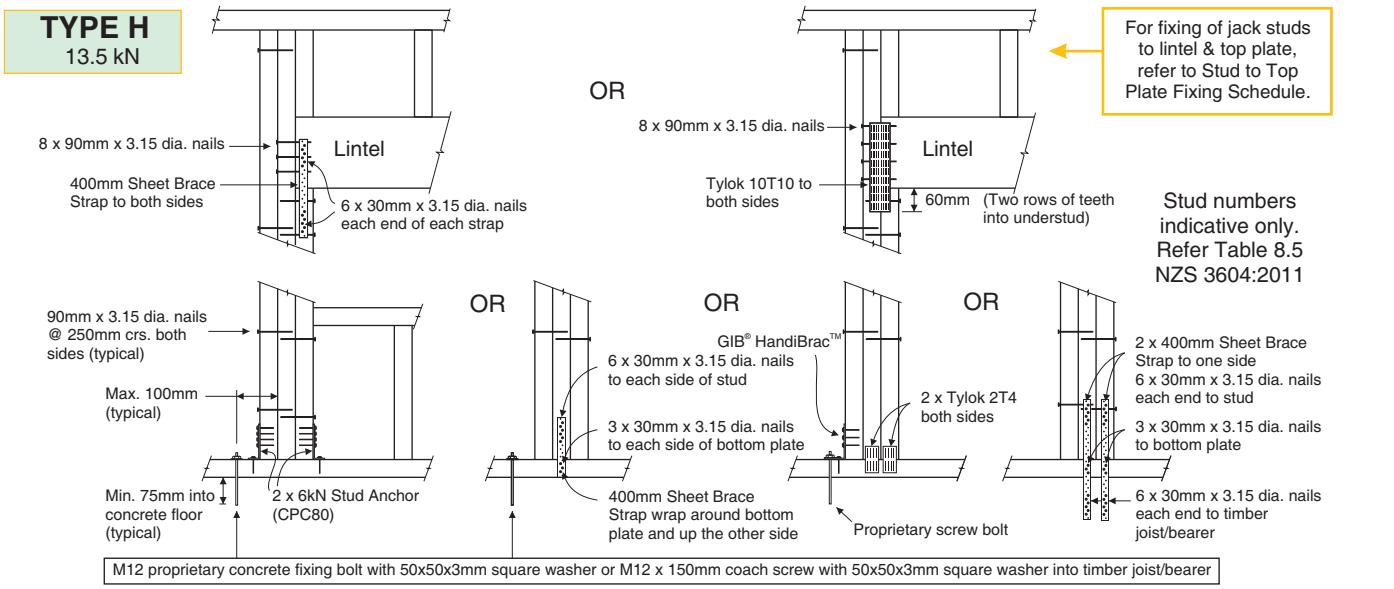
TYPE F
4.0 kN



TYPE G
7.5 kN



TYPE H
13.5 kN



MiTek New Zealand Limited

AUCKLAND
PO Box 58-014, Botany 2163
Phone: 09-274 7109
Fax: 09-274 7100

CHRISTCHURCH
PO Box 8387, Riccarton 8440
Phone: 03-348 8691
Fax: 03-348 0314

www.miteknz.co.nz

MiTek®
GANG-NAIL® LUMBERLOK® BOWMAC®

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All rights reserved.

PROLAM® products are manufactured to the requirements of AS/NZS 1328.1:1998 Glue Laminated Structural Timber, and AS/NZS 1491:1996 Finger Jointed Structural Timber under an approved quality system based on the 1S0 9000 series of standards. As such if the product is used in accordance with **PROLAM®** product literature, it will meet the durability clauses of the New Zealand Building Code B2.

Subfloor Applications:

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

External Use:

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

Preservative Treatment:

- **PROLAM®** Beams are CCA H3.2 treated as defined by NZS 3640:2003, for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.

- **PROLAM®** Posts are CCA H5 treated as defined by NZS 3640:2003 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

Storage of **PROLAM®:**

- To ensure **PROLAM®** remains straight and true at the time of installation, follow the below recommendations:

1. Store under cover so that it remains dry until installation.
2. Stack clear of the ground for good ventilation.
3. Stack on bearers to keep flat and straight.

Branded **PROLAM®:**

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

designIT® HOUSES

CarterHoltHarvey LVL

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey LVL Limited (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and SG8 components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:
1. NZS 3603:1993 Timber Structures Standard.
2. NZS 3604:2011 Timber-framed buildings.
3. AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
4. AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
5. AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.
6. AS 1720.1:2010 Timber structures. Part 1: Design methods.
7. AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 2 October 2020

For further information or advice contact:
Carter Holt Harvey LVL Limited,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Email: designit@futurebuild.co.nz
Web: https://futurebuild.co.nz/

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Specifier details:

Specifier:	chrisb@vipdesign.co.nz
Business name:	VIP Design
Email:	chrisb@vipdesign.co.nz

Project & site details:

Project:	D0088
Site address:	Lot 14 Pentecost Road
Design wind zone	High
Snow loading	Design snow zone: N4, Altitude: 15 m (sub-alpine), Ground snow load, $Sg^{1,2}$ = 0.9 kPa

1. designIT does not include any allowance for the effects of drifting and sliding of snow.
2. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

MEMBER DESIGN DETAILS

Member 1

1) Member code and description	L1 (D01) - Lintels in lower storey load bearing walls
2) Date prepared	28 October 2020

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.0 m
Floor load width 'FLW'	2.0 m
Floor dead load	40 kg/m²
Floor live load	1.5 kPa/1.8 kN
Wall type and height	Medium wall: 2.5 m
Nominal wall thickness	90 mm
Roof load width 'RLW'	4.2 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , Ce=1.0, k=0.5)

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G + \Psi_L Q^*$	6.7 mm	4.3 mm (long term)	1.5
Live load - $\Psi_s Q$	5.6 mm	1.1 mm	5.1
Snow load - S_s	6.7 mm	0.8 mm	8.4

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-8.0
1.2G + 1.5Q	0.80	-11.6
$1.2G + S_u + \Psi_c Q$	0.80	-11.0
$1.2G + W_u + \Psi_c Q$	1.00	-9.9
$0.9G + W_u$	1.00	0.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

1) Member code and description L2 (W08) - Lintels - In single or upper storey load bearing walls

2) Date prepared 28 October 2020

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.6 m
Roof load width 'RLW'	0.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , C_e=1.0, k=0.5)

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_LQ*	2.0 mm	0.0 mm (long term)	717.9
Live load - Ψ_sQ	2.4 mm	0.0 mm	4462.7
Wind load - W_s	3.0 mm	0.0 mm	1848.1
Snow load - S_s	2.0 mm	0.0 mm	1071.1

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-0.1
1.2G + 1.5Q	0.80	-0.1
1.2G + S_u + Ψ_cQ	0.80	-0.2
1.2G + W_u + Ψ_cQ	1.00	-0.1
0.9G + W_u	1.00	0.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description	L3 (W09) - Lintels in lower storey load bearing walls
2) Date prepared	28 October 2020
3) Serviceability criteria	AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.4 m
Floor load width 'FLW'	3.0 m
Floor dead load	40 kg/m²
Floor live load	1.5 kPa/1.8 kN
Wall type and height	Medium wall: 2.7 m
Nominal wall thickness	90 mm
Roof load width 'RLW'	4.2 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , C_e=1.0, k=0.5)

5) Member specification

Size, stress grade/product	Use 2/240 x 45 hySPAN
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + $\Psi_L Q^*$	8.0 mm	4.5 mm (long term)	1.8
Live load - $\Psi_s Q$	6.7 mm	1.4 mm	4.7
Snow load - S_s	8.0 mm	0.7 mm	11.7

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-11.6
1.2G + 1.5Q	0.80	-18.4
1.2G + S_u + $\Psi_c Q$	0.80	-15.7
1.2G + W_u + $\Psi_c Q$	1.00	-13.6
0.9G + W_u	1.00	-1.3

8) Installation requirements

- Provide at least 30 mm bearing at end supports
- Vertical lamination in accordance with Detail H1.

Member 4

1) Member code and description L4 (Barn Slider) - Lintels in lower storey load bearing walls

2) Date prepared 27 October 2020

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.2 m
Floor load width 'FLW'	4.3 m
Floor dead load	40 kg/m²
Floor live load	1.5 kPa/1.8 kN
Wall type and height	Medium wall: 2.5 m
Nominal wall thickness	90 mm
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , C_e=1.0, k=0.5)

5) Member specification

Size, stress grade/product	Use 2/200 x 45 hySPAN
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + $\Psi_L Q^*$	4.0 mm	0.6 mm (long term)	7.2
Live load - $\Psi_s Q$	3.3 mm	0.2 mm	15.5
Snow load - S_s	4.0 mm	0.1 mm	56.1

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-6.8
1.2G + 1.5Q	0.80	-11.8
1.2G + S_u + Ψ_cQ	0.80	-9.1
1.2G + W_u + Ψ_cQ	1.00	-7.6
0.9G + W_u	1.00	-1.4

8) Installation requirements

- Provide at least 30 mm bearing at end supports
- Vertical lamination in accordance with Detail H1.

Member 5

1) Member code and description S1 (Parapet Walls) - Studs - In single or upper load bearing walls

2) Date prepared 27 October 2020

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Stud height	3300 mm
Stud spacing	400 mm
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof load width 'RLW'	0.1 m
Rafter or truss spacing	900 mm
Roof snow load	0.6 kPa (μ_i=0.7 , C_e=1.0)

5) Member specification

Size, stress grade/product	Use 90 x 45 truFRAME
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Wind load - W_s*	20.0 mm	14.0 mm	1.4

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]	Horizontal kN
1.35G	0.60	0.0	
1.2G + 1.5Q	0.80	-0.1	
1.2G + S_u + Ψ_cQ	0.80	-0.1	
1.2G + W_u + Ψ_cQ	1.00	-0.1	0.7
0.9G + W_u	1.00	0.0	0.6

8) Installation requirements

- Wall studs to be nogged at maximum 1350 mm
- Notching of wall stud not to exceed 20 mm

Member 6

1) Member code and description	S2 (Stair Walls) - Studs - In single or upper load bearing walls
2) Date prepared	28 October 2020
3) Serviceability criteria	AS 1720.1: 2010 and AS 1720.3: 2016
4) Design inputs	
Stud height	3400 mm
Stud spacing	400 mm
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof load width 'RLW'	0.1 m
Rafter or truss spacing	1200 mm
Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , C_e=1.0, k=0.5)
5) Member specification	
Size, stress grade/product	Use 90 x 45 truFRAME
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Wind load - W_s*	20.0 mm	16.7 mm	1.2

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

		Limit States Design Reaction[2,3]	
Load case	k_1[1]	End kN[4]	Horizontal kN
1.35G	0.60	-0.1	
1.2G + 1.5Q	0.80	-0.1	
1.2G + S_u + Ψ_cQ	0.80	-0.2	
1.2G + W_u + Ψ_cQ	1.00	-0.2	0.7
0.9G + W_u	1.00	0.0	0.6

8) Installation requirements

- Wall studs to be nogged at maximum 1350 mm
- Notching of wall stud not to exceed 20 mm

Member 7

1) Member code and description	L5 (W07) - Lintels in lower storey load bearing walls
2) Date prepared	04 November 2020
3) Serviceability criteria	AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.4 m
Floor load width 'FLW'	6.2 m
Floor dead load	40 kg/m²
Floor live load	1.5 kPa/1.8 kN
Wall type and height	Medium wall: 2.7 m
Nominal wall thickness	90 mm
Roof load width 'RLW'	4.2 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof snow load	0.6 kPa, snow overhang 0.1 kN/m (μ_i=0.7 , Ce=1.0, k=0.5)

5) Member specification

Size, stress grade/product	Use 300 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + $\Psi_L Q^*$	8.0 mm	4.9 mm (long term)	1.6
Live load - $\Psi_s Q$	6.7 mm	2.1 mm	3.1
Snow load - S_s	8.0 mm	0.5 mm	16.1

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-17.5
1.2G + 1.5Q	0.80	-32.3
1.2G + S_u + $\Psi_c Q$	0.80	-23.3
1.2G + W_u + $\Psi_c Q$	1.00	-18.8
0.9G + W_u	1.00	-5.2

8) Installation requirements

- Provide at least 45 mm bearing at end supports

Notes for interpretation of serviceability data

1. 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720.

2. Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

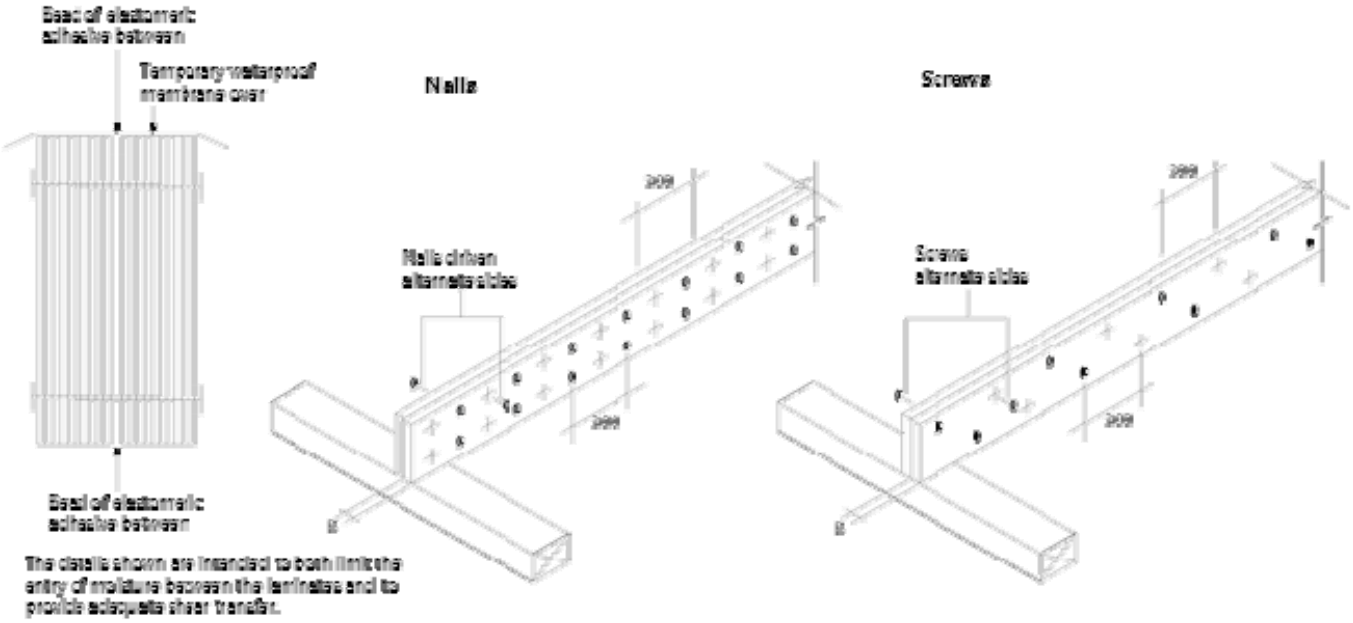
3. The limits referred are those specified in AS 1720.3 for the stated load case.

4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements detailed.

Notes for interpretation of reaction data

1. Duration of load factor 'k_1' for strength as per NZS 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

Detail H1: Vertical Lamination - Two Pieces



Section Size 'B'	Minimum Nail Diameter	Minimum Nail Length	Minimum Screw Guage	Minimum Screw Length
35	3.06 mm	75 mm	-	-
45	3.30 mm	90 mm	14 g	75 mm
63	3.30 mm	100 mm	14 g	100 mm
90	-	-	14 g	150 mm

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GIB® EzyBrace® Systems

Specification and installation manual

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

CBI 5113
AUGUST 2016

NATIONAL SUPPORT

VISIT: Winstone Wallboards Limited
37 Felix Street, Penrose,
Auckland 1061, New Zealand

POST: PO Box 12 256, Penrose 1642,
Auckland, New Zealand

PHONE: +64 9 633 0100

FAX: +64 9 633 0101
Free Fax: 0800 229 222

EMAIL: info@gib.co.nz

WEB: gib.co.nz

GIB® HELPLINE

0800 100 442

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

NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE

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

NEW GIB® BRACING ELEMENT GS2-NOM

- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute to bracing resistance.
- Potentially reduces the amount of fasteners[1]
- Encourages more even bracing distribution throughout the building.

[1] Actual savings dependent on building and bracing design

UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS

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

NEW — GIBFIX® FRAMING SYSTEM

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

BRANZ Appraised
Appraisal No.928 [2016]

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GIB EzyBrace® Systems — August 2016

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

USE ONLY THE CURRENT SPECIFICATION

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

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

PATENTS

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

Beware of substitution

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

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

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

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

Note 1 *The fastener type and length must be as required for the relevant FRR system using the perimeter fixing pattern illustrated for the relevant bracing specification.*

Note 2 *The element must be 900mm or longer. Decrease perimeter fastener centres to 100mm. The bracing corner fastening pattern, as illustrated for the relevant specification applies to all four corners of the element. Panel hold-down fixings are required.*

Note 3 *Specify traditional wall framing layout (see figure 1) where a Fire Resistance Rating (FRR) is required.*

Scope of use

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

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

Finish quality — framing and substrates

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

New GIBFix® Framing System

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

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

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

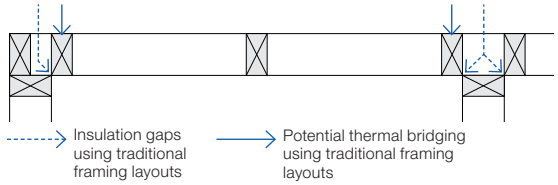
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

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

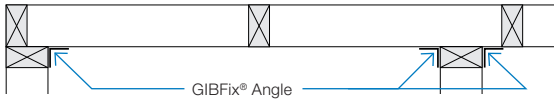
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFIX® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

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

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

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

- Reduced potential for fastener pop and joint cracking of plasterboard linings.
- Enhanced thermal performance.
- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute bracing resistance.
- Potentially reduces the amount of fasteners[1].
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

Compliance with the NZ Building Code

NZBC CLAUSE B1 — STRUCTURE

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

NZBC CLAUSE B2 — DURABILITY

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

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

NZBC CLAUSE F2 — HAZARDOUS BUILDING MATERIALS

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

NZBC CLAUSE H1 — ENERGY EFFICIENCY

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

CAD design details

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

Appraisal

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

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

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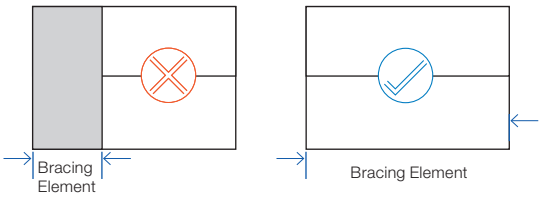
Bracing resistance

WALL BRACING LAYOUT

When designing the bracing layout, carefully consider the final finished appearance and utilise full wall lengths where possible, avoiding unnecessary fastenings in the centre of a clear wall. Using the available wall length provides additional bracing and achieves improved aesthetics.

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with the wall bracing elements. Pairs of elements may be counted on a single line provided they are no more than 2 metres apart and parallel. See figure 4.

Locate bracing evenly throughout the building and as close as practical to corners of external walls.

Space bracing lines no more than:

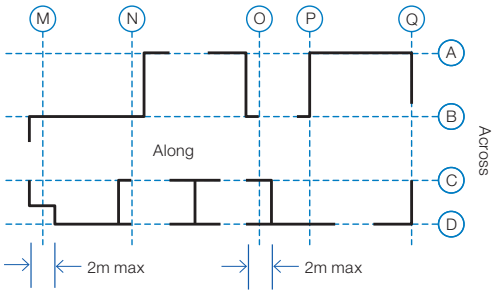
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

The construction of ceiling diaphragms is described in detail on p.18–20.

NZS3604:2011 requires that no bracing line shall have a capacity less than the greater of:

- 100 Bracing Units (BUs), or
- 15 x the external wall length (BUs) for bracing lines coinciding with external walls, or
- 50% of the total demand (D) divided by the number of lines (n) in the direction being considered (BUs).

FIGURE 4: BRACING GRID LAYOUT



The NZS3604 ‘rules’ are merely minimum guidelines and compliance with them does not in itself ensure even distribution. The designer is responsible for checking distribution. Poor distribution can cause torsional effects and localised or more significant damage in an earthquake event.

GIB EZYBRACE® SYSTEMS

The GIB EzyBrace® Specification Numbering System (and sub-components thereof) is protected by copyright and makes specification and identification of GIB EzyBrace® Systems transparent.

- 'GS' stands for GIB® Standard.
- 'BL' for GIB Braceline®.
- 'P' for plywood.
- '1' and '2' for linings one or both sides.
- ‘N’ stands for 'no specific panel hold-down fixings'.
- 'H' stands for 'specific panel hold-down fixing' required.
- 'NOM' stands for 'nominal plasterboard fixing'. This refers to the standard fixing method used to install plasterboard as shown in the current GIB® Site Guide.

Where specific hold-down fixings are specified, refer to p.15-16. GIB HandiBrac® is fully contained within the framing cavity and does not interfere with lining installation and quality of finish.

Where no specific hold-down fixings are required, the minimum NZS3604:2011 bottom plate fixings apply.

Full bracing element construction details are provided in this technical literature.

Further general design and construction information can also be found in our GIB® Bracing Supplement by visiting gib.co.nz/library.

Specifying GIB EzyBrace® elements (minimum wall length 400mm)	
Inside lining external walls.	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required. If the other side of the frame is lined with plywood consider GSP-H or BLP-H elements or use alternative proprietary bracing systems.
Internal walls (only one side available for bracing).	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required.
Internal walls (both sides available for bracing).	Nominate available length of wall as GS2-NOM elements. Change to GS1-N if higher ratings are required. Change to GS2-N if higher ratings are required. Change to BLG-H for even higher ratings. Consider GSP-H or BLP-H if the opposite side is lined with plywood.

Bracing demand

GIB EZYBRACE® CALCULATOR

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

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

DEMAND

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

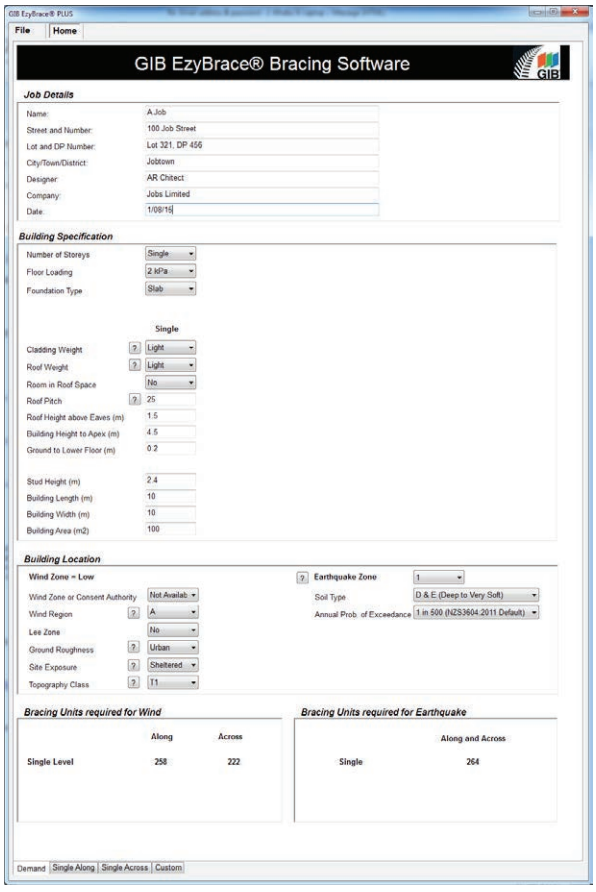
Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

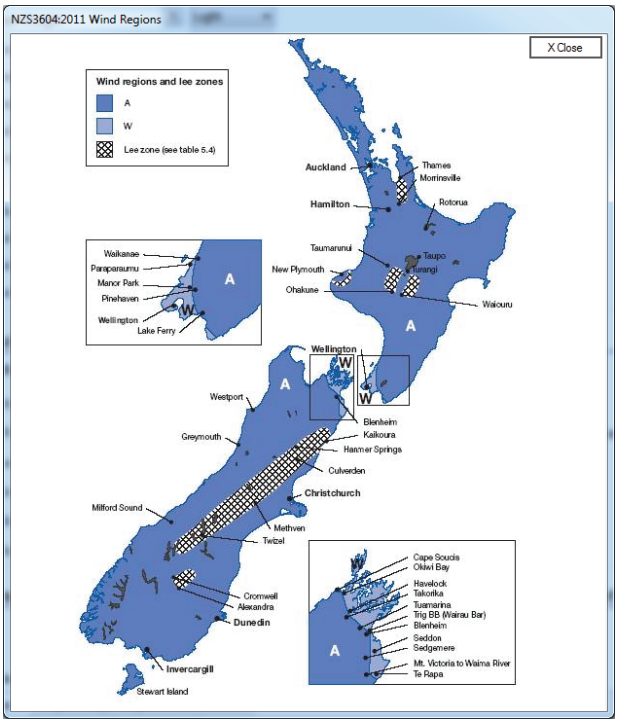
The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design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

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

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

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





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

Software functionality

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

The software compares bracing resistance achieved with demand and for wall bracing lines incorporating external walls, the external wall length can now be entered to check minimum bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check. Designers must additionally check the building layout to ensure adequate bracing distribution.

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

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

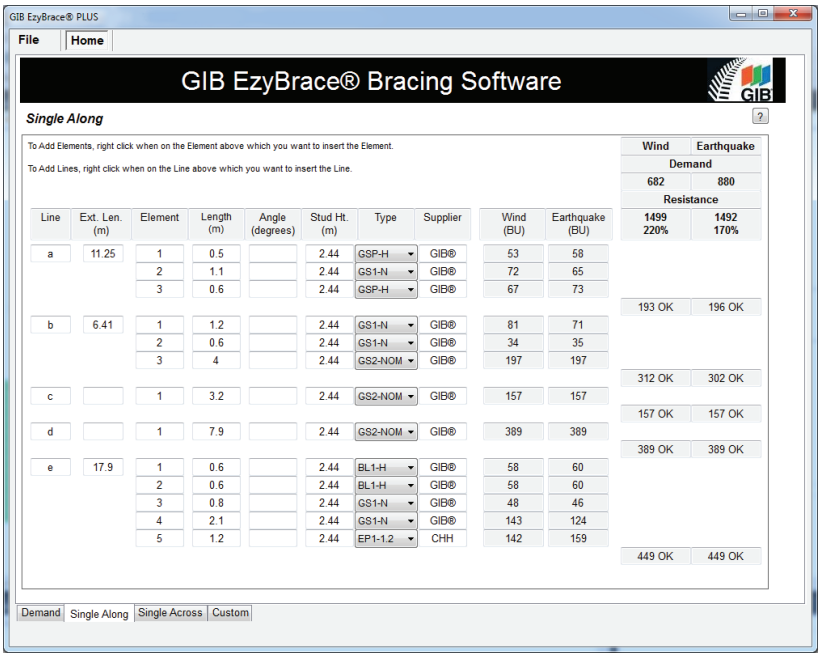
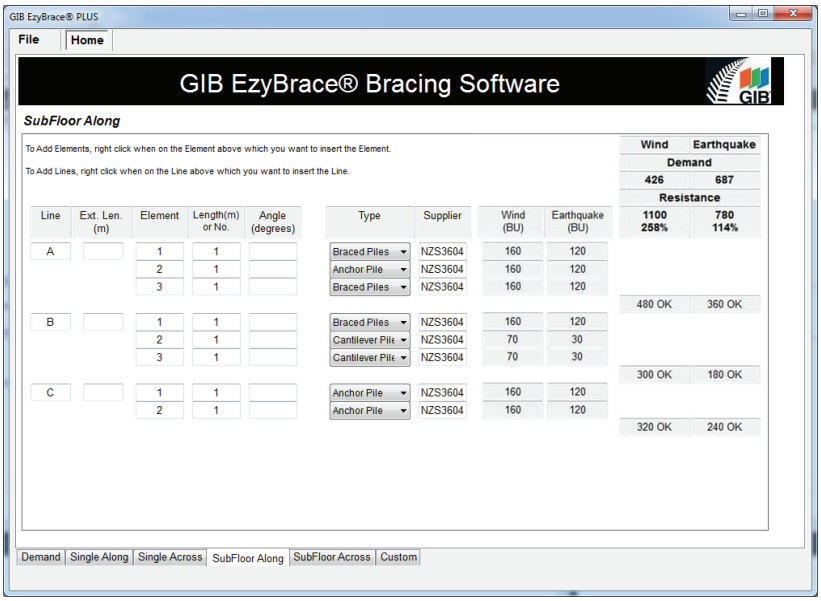


FIGURE 7: GIB EZYBRACE® 2016 — SUBFLOOR BRACING RESISTANCE CALCULATION SHEET

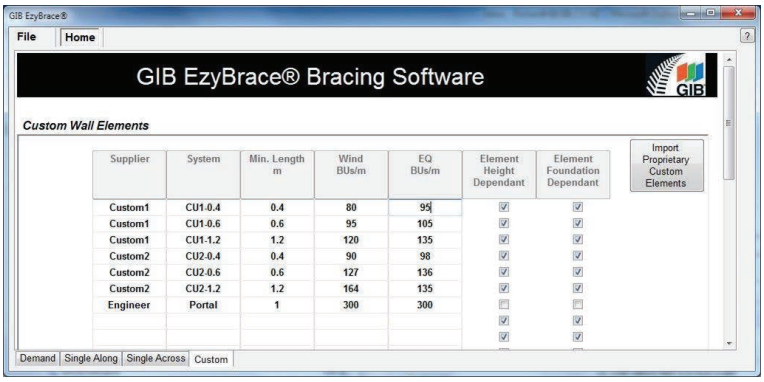


Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

Software functionality

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

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET



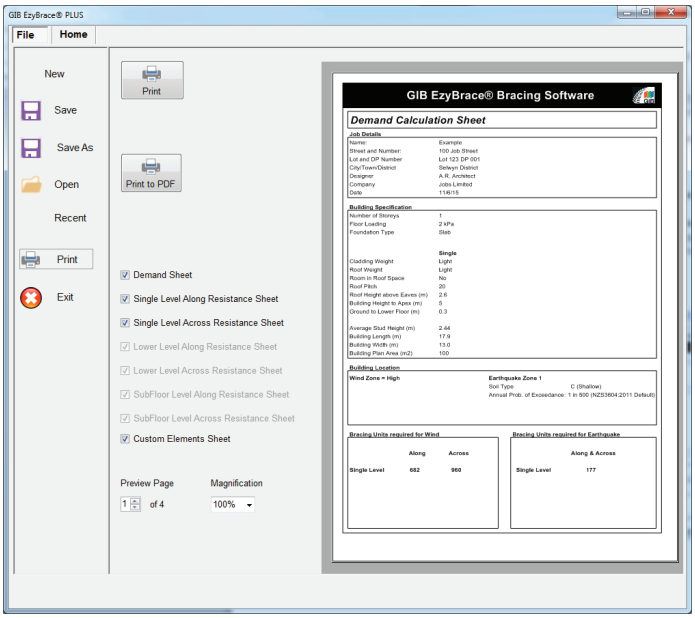
Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

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

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

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

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW



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

GIB® plasterboard linings

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

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

LIMITATIONS

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

GIB EzyBrace® Systems in water-splash areas

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

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

Renovation

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

Openings in bracing elements

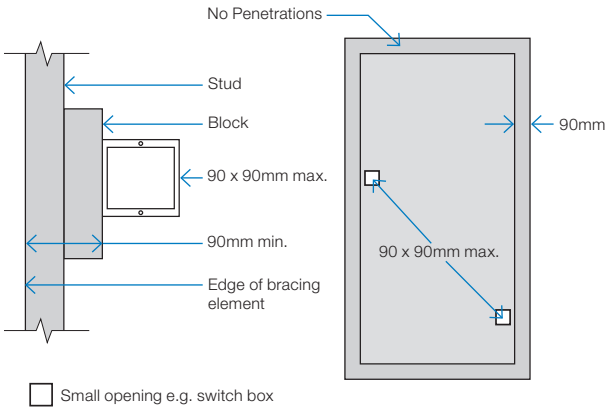
SMALL OPENINGS

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

LARGE OPENINGS

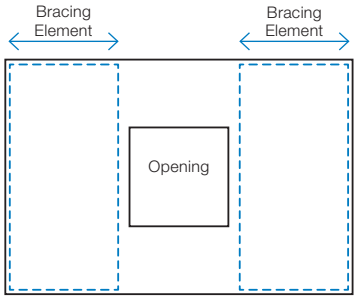
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



Timber framing

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

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

GIBFix® Framing System (alternative layout)

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

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

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

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

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

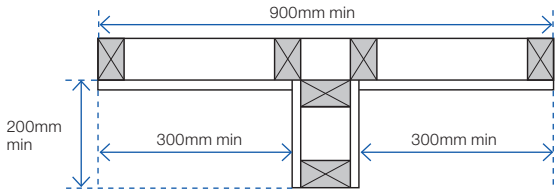
Guidelines for intersection walls

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

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

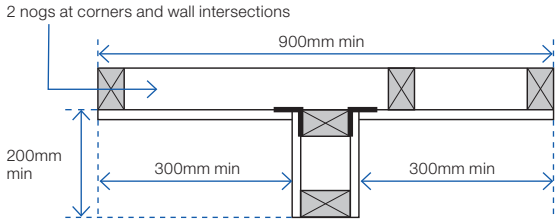
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



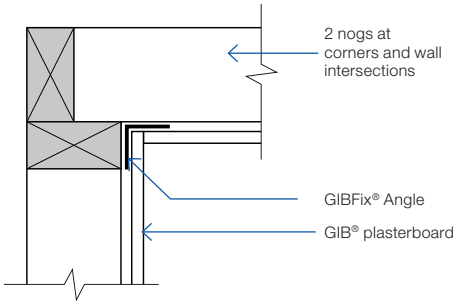
GEB002

FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



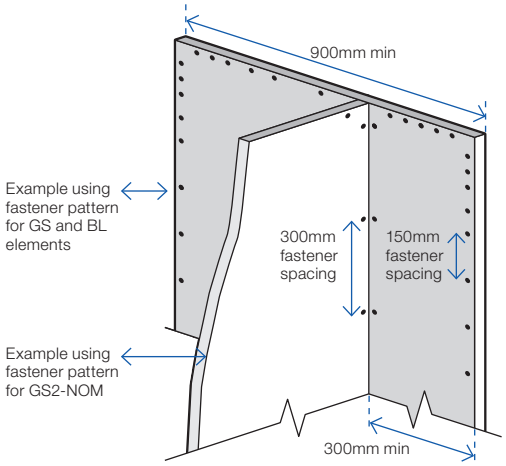
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFIX® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

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

Top plate connections

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

Parapets and gable end walls

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

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

or

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

Bottom plate fixing

TIMBER FLOOR

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

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

CONCRETE FLOOR — EXTERNAL WALL BRACING ELEMENTS

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

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

CONCRETE FLOOR — INTERNAL WALL BRACING ELEMENTS

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

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

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

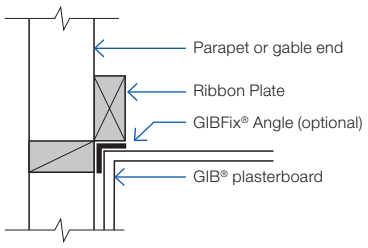
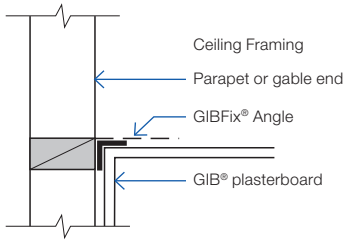


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



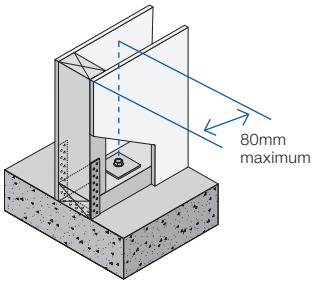
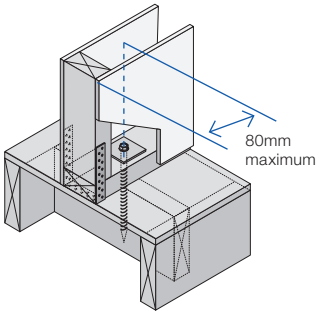
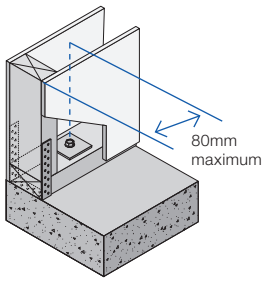
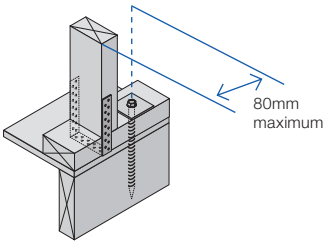
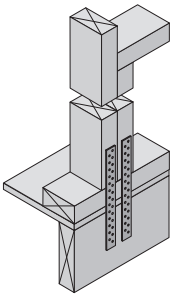
GFS003

BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

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

Bracing strap installation

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

Concrete floor	Timber floor
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.	
Internal wall	
 GEB004	 GEB005
External wall	
 GEB006	 GEB007
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.	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.
	 GEB008

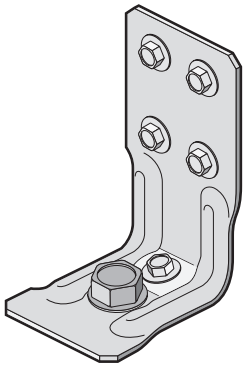
Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

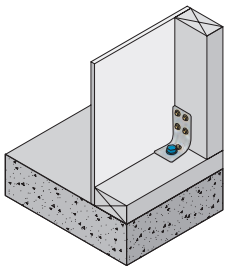
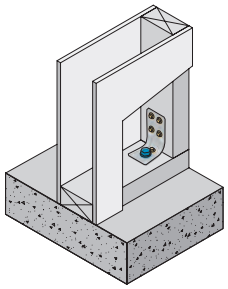
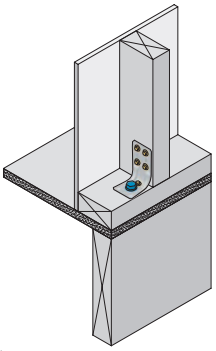
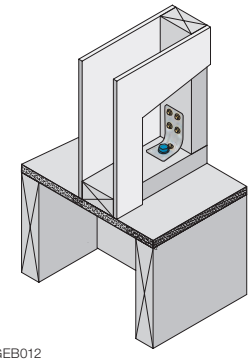
GIB HandiBrac® installation

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

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

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



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
 GEB009	 GEB010	 GEB011	 GEB012
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	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 or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

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

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

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

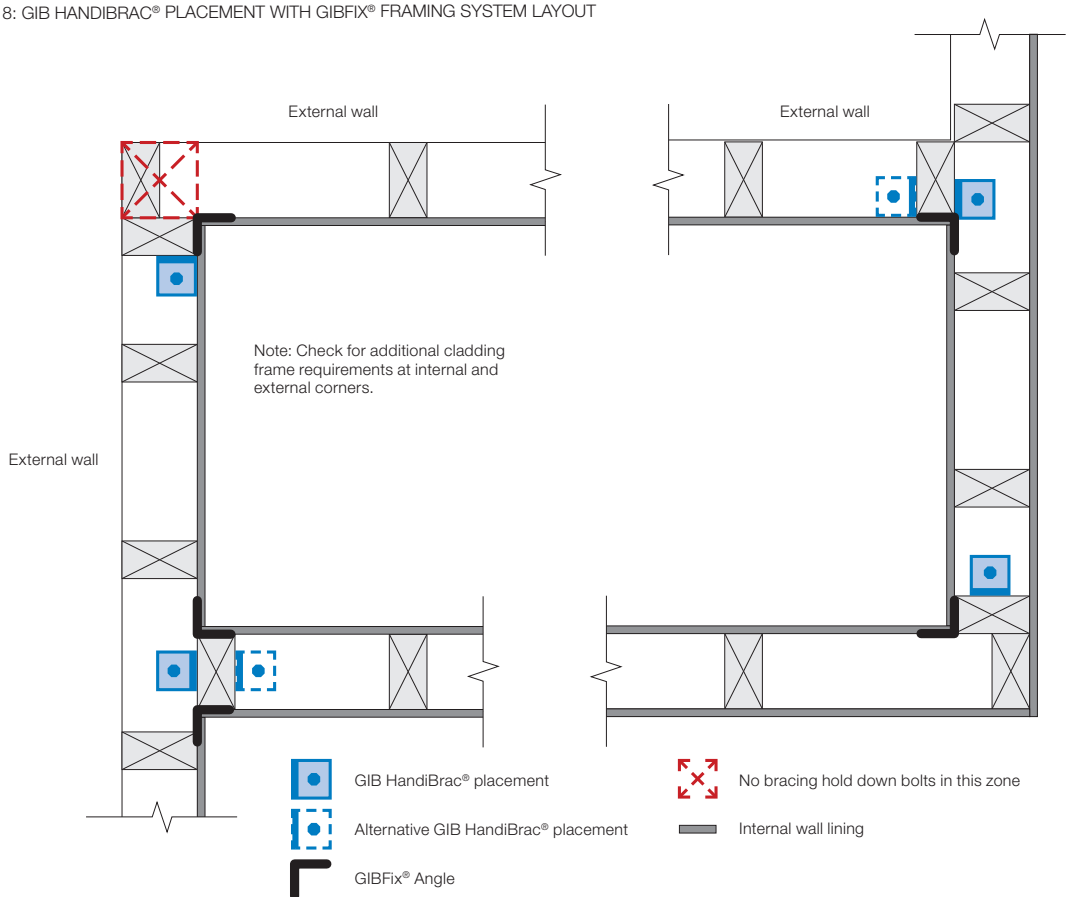
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

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

TIMBER FLOORS

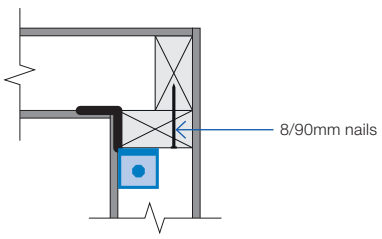
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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



GEB013

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



GEB014

Ceiling diaphragms

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

Limitations for GIB® plasterboard ceiling diaphragms

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

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

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

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

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

FIGURE 20: PROTRUSIONS AND CUTOUTS

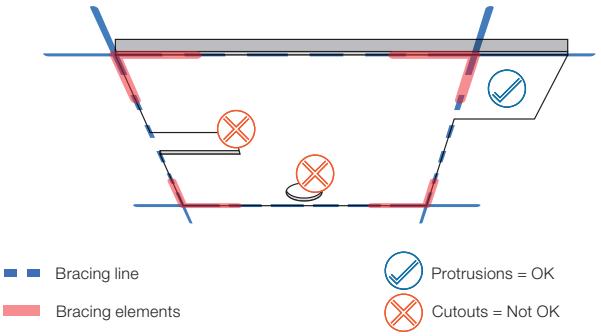


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

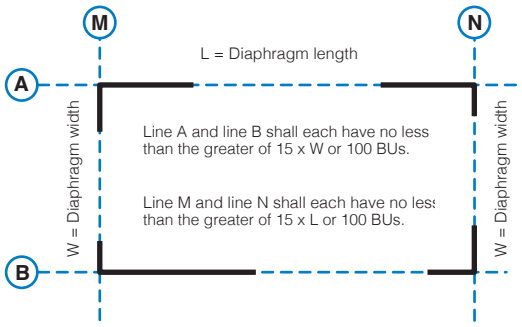
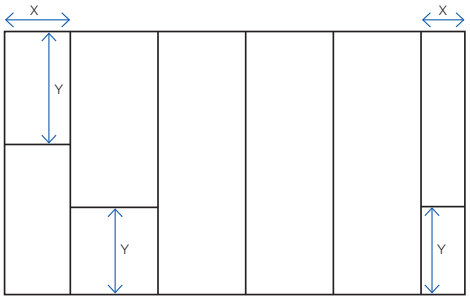
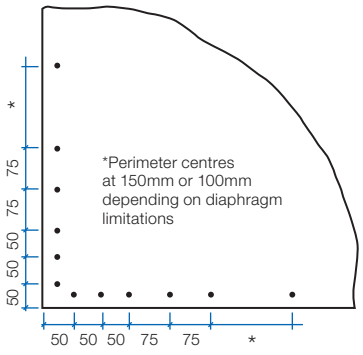


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS



X = 900mm min or 600–900mm min provided all adjacent joints are back-blocked.
Y = 1800mm min sheet lengths at ends of ceiling diaphragms.

FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



Unless stated all fastener spacings are maximums.

GEB015

Ceiling battens in ceiling diaphragms

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

Battens shall be spaced at a maximum of:
- 500mm for 10mm GIB® plasterboard.
- 600mm for 13mm GIB® plasterboard.

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

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

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

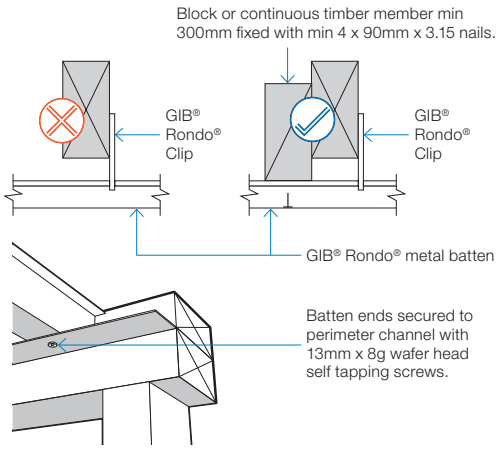
GIB® Rondo® metal battens must be fixed directly to the roof framing. If a clip system has been used, a timber block (min 300mm) or a continuous timber member can be fixed alongside the bottom chord to permit a direct connection to the batten, see figure 26.

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

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

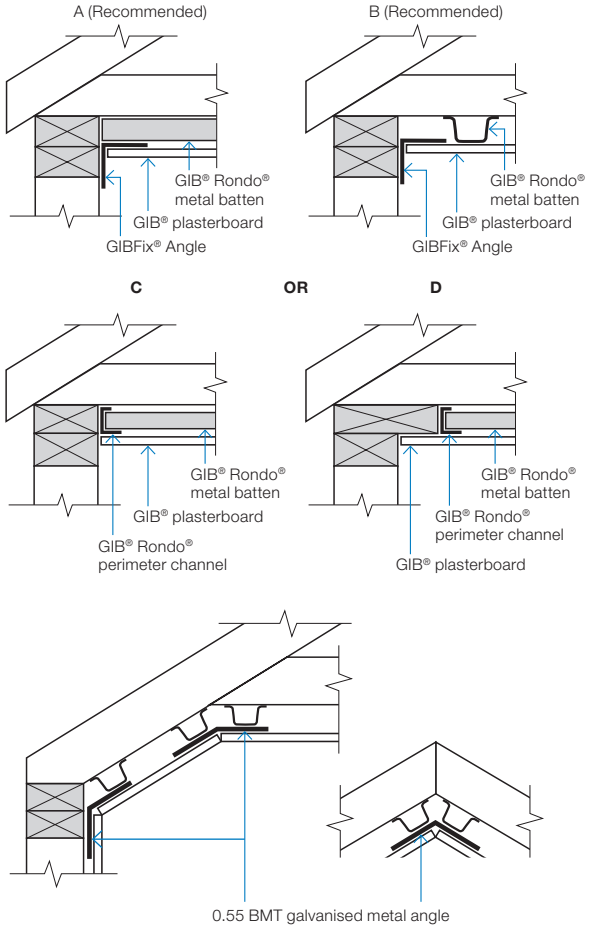
Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



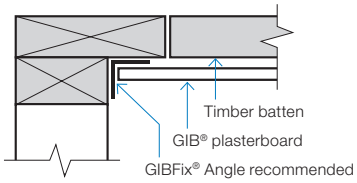
GEB016

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



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



GEB018

Openings in ceiling diaphragms

SMALL OPENINGS

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

LARGE OPENINGS

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

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

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

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

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

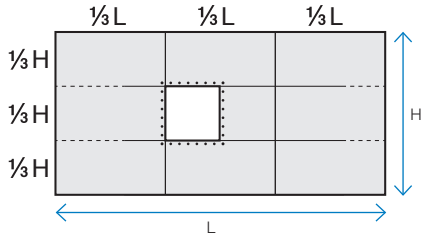
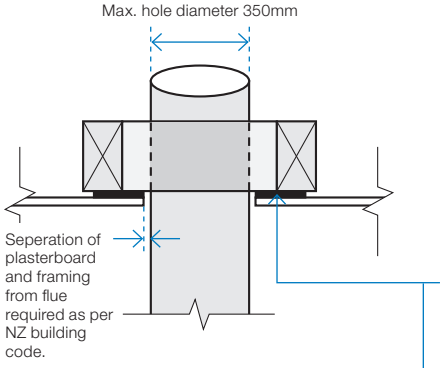
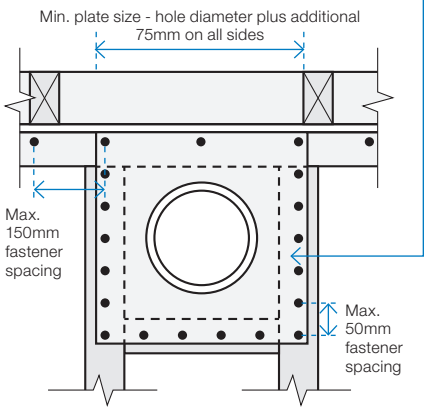


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

Section view



Plan view



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

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

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

Plasterboard ceiling not shown in plan view

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

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

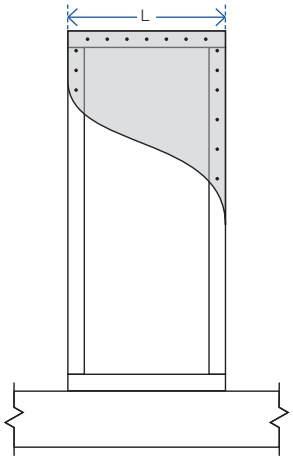
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

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

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

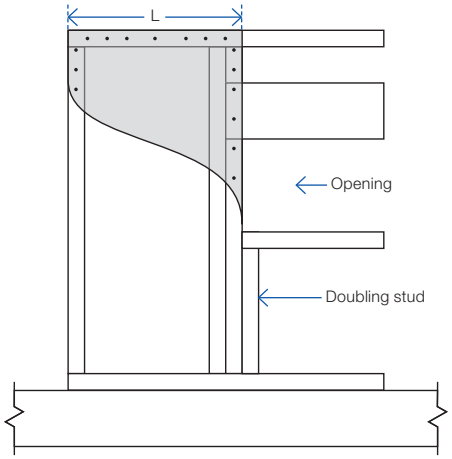
Fastener spacings and diagram scales shown in Figures 29–32 are indicative only. Refer to p.23–30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



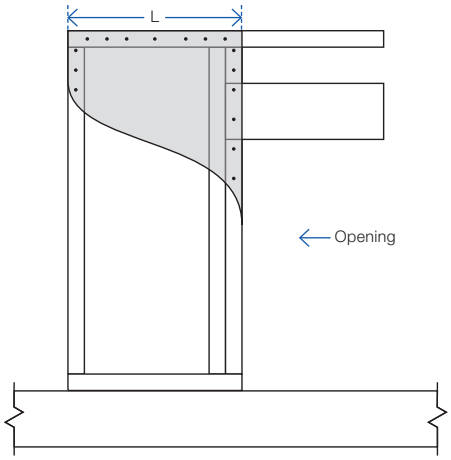
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



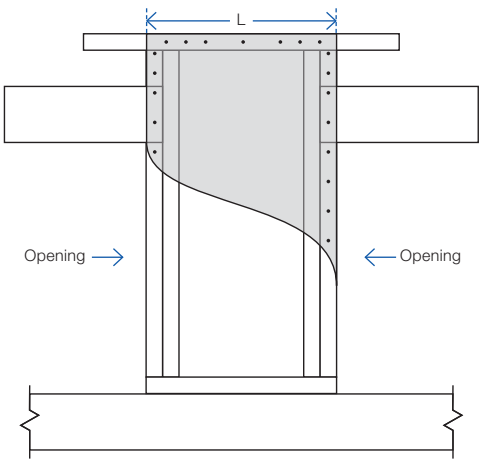
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



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

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



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

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

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

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

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

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

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

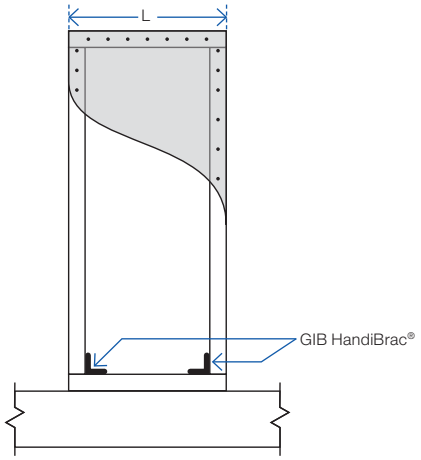
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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

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

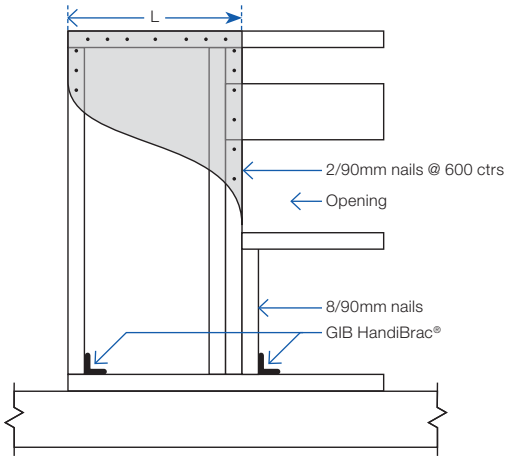
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



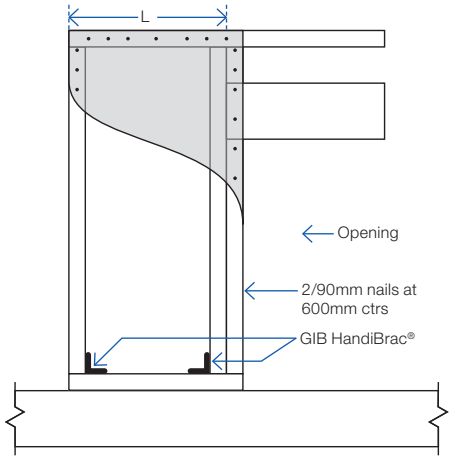
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



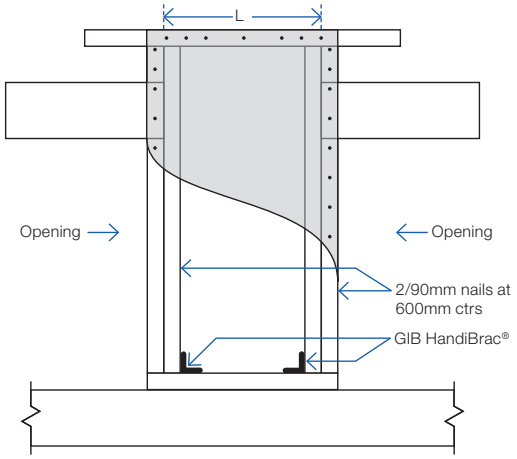
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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

GIB EzyBrace® Systems specification GS1-N

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

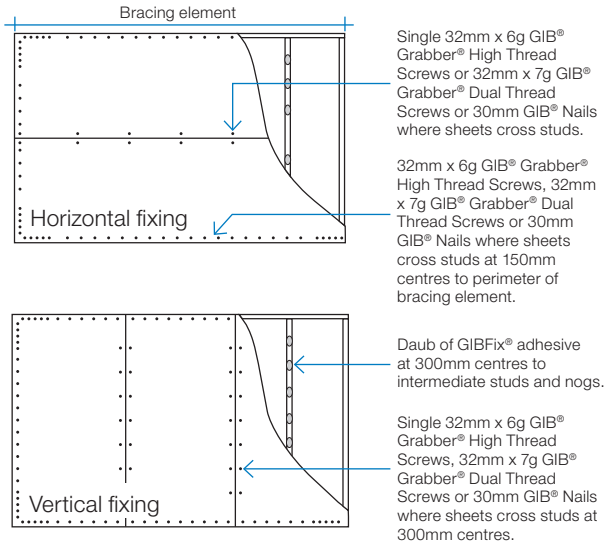
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

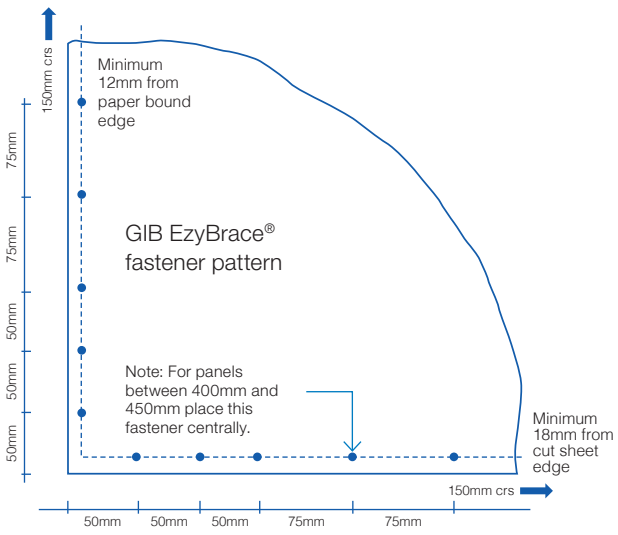
Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification GS2-NOM

Specification code	Minimum length (m)	Lining requirement
GS2-NOM	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

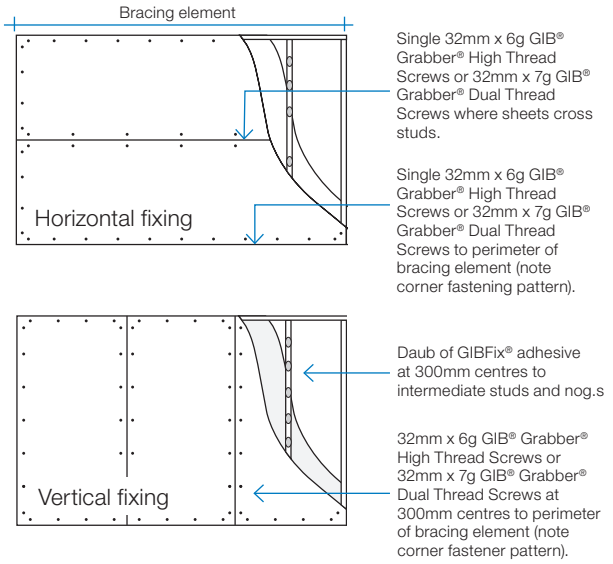
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

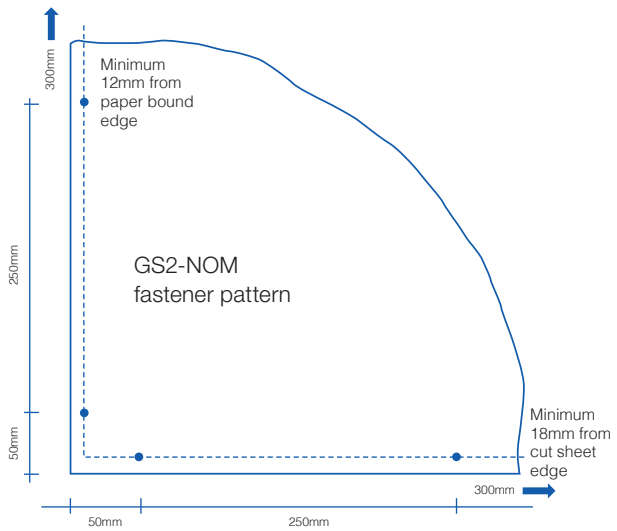
Fastener centres

50, 300mm from each corner and 300mm maximum thereafter around the perimeter of the bracing element. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

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

GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

As an alternative to using screw fixings, a continuous 6-10mm bead of solvent based GIBFix® All-Bond can be applied along the full height studs immediately adjacent to an internal door opening and at the door lintel or head trimmer. The lining is then bedded into the adhesive and installed into the rebated jamb, as shown in figure 38.

This solvent based adhesive option may only be used with GS2-NOM specification and is designed to reduce popping of fasteners around door openings on internal walls.

FIGURE 37: SCREW FIX FOR OPENINGS

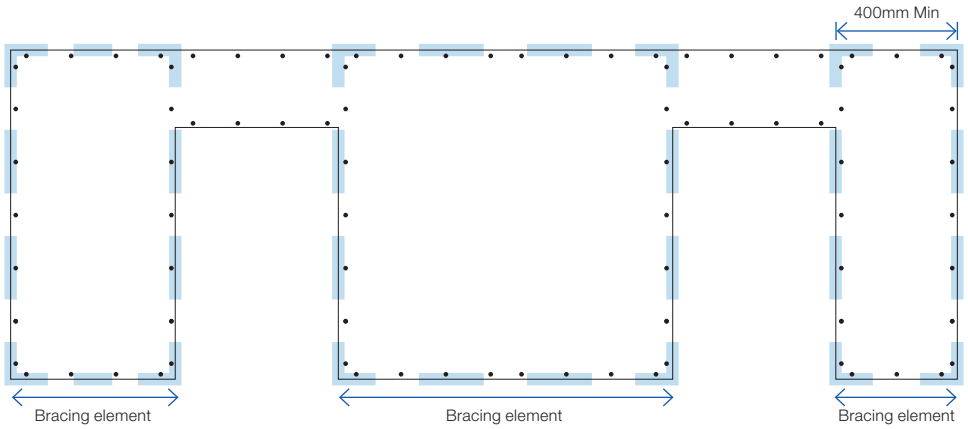
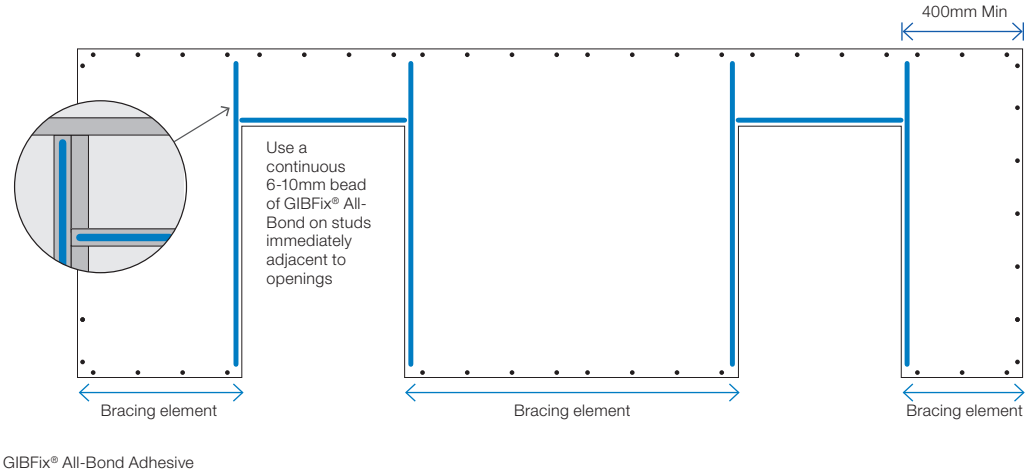
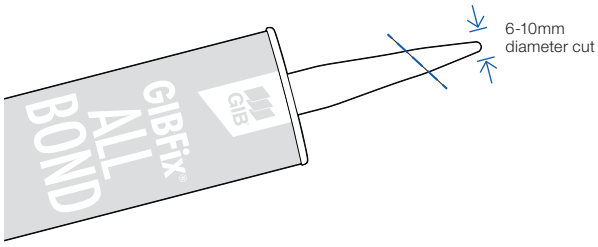


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



ADHESIVE NOZZLE APERTURE



GIB EzyBrace® Systems specification GS2-N

Specification code	Minimum length (m)	Lining requirement
GS2-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber Floor

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

Concrete floor

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

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

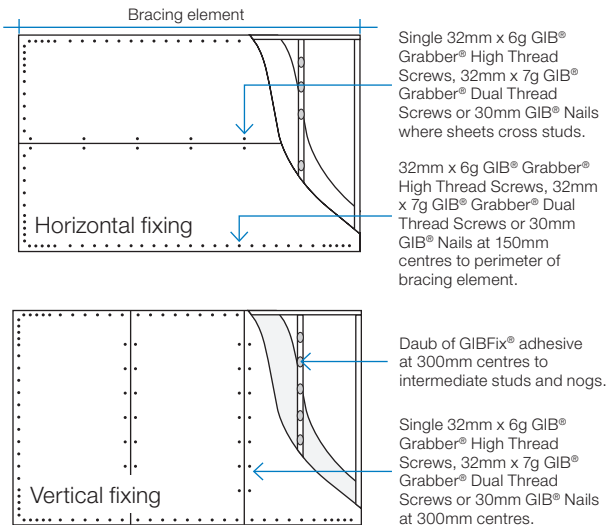
32mm x 6g GIB® Grabber® High Thread Screws,32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

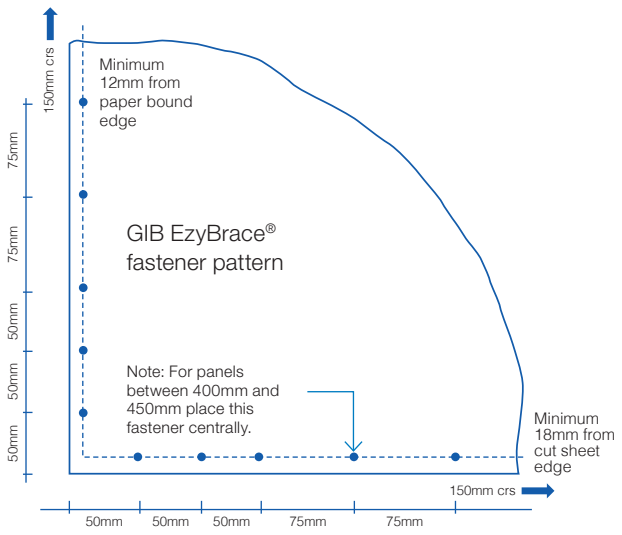
Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification GSP-H

Specification Code	Minimum length (m)	Lining requirement	Other requirements
GSP-H	0.4	Any 10mm or 13mm GIB® plasterboard lining to one side of framing and minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

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

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally, with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails.

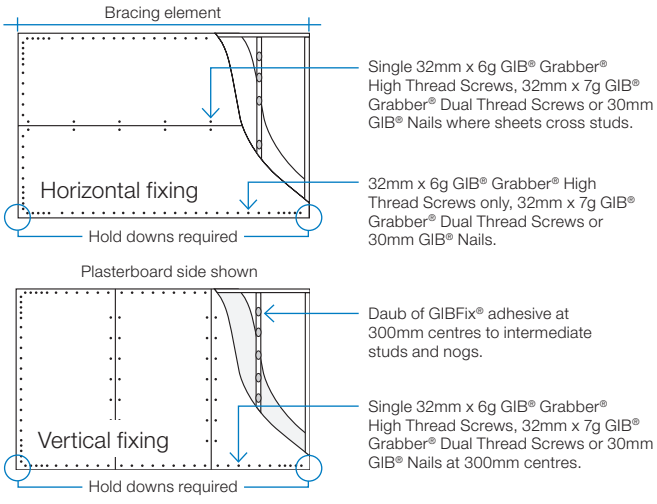
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

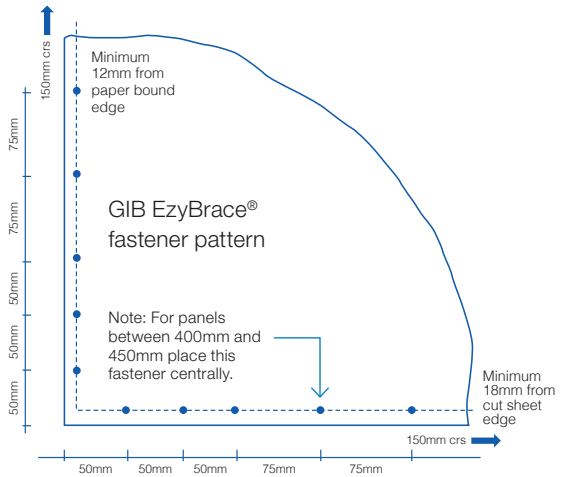
Fastener centres

GIB® plasterboard side: 50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

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

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

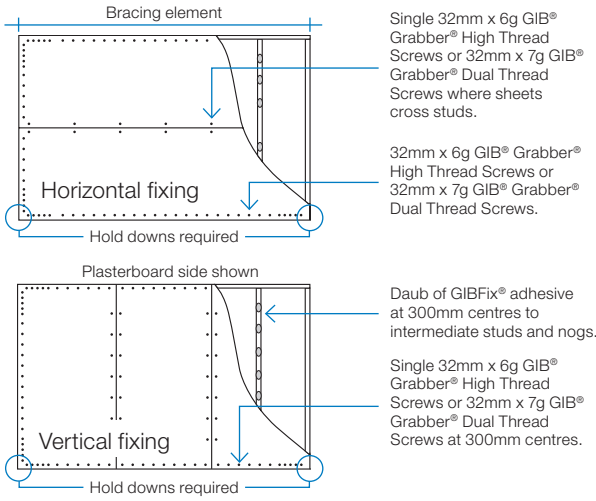
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

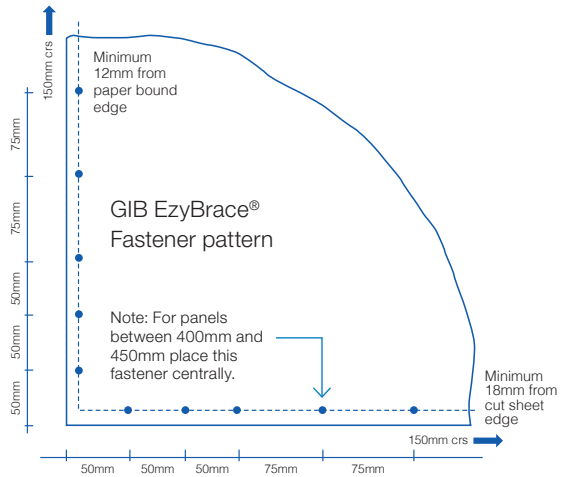
Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLG-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLG-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus any 10mm or 13mm GIB® plasterboard to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems 2011 or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus any 10mm or 13mm GIB® plasterboard lining to the other side.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws.Other side: 32mm x 6g GIB® Grabber® High Thread Screws, 30mm GIB Nails or 32mm x 7g GIB® Grabber® Dual Thread Screws.

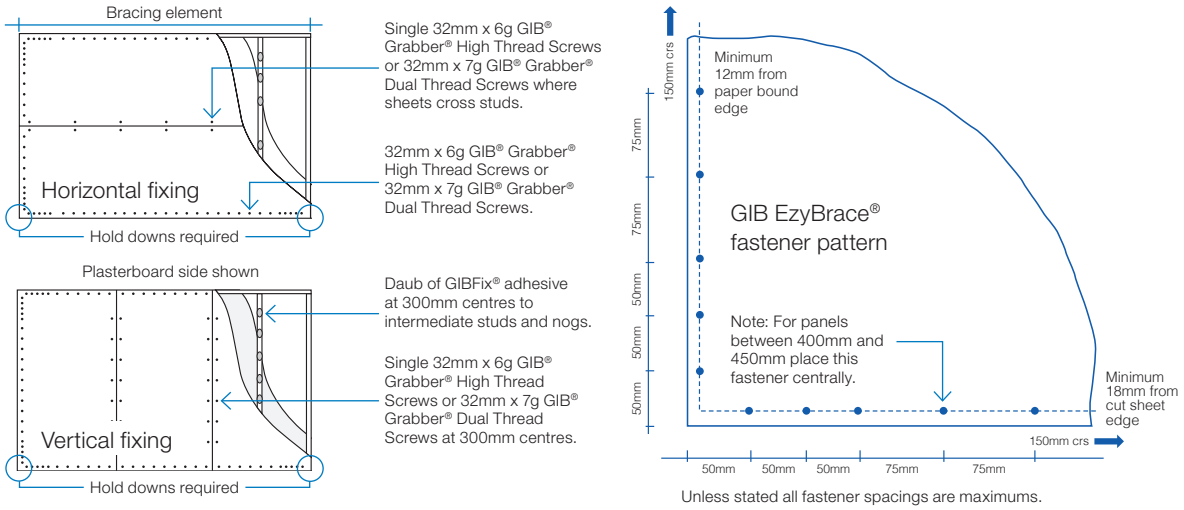
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

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

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

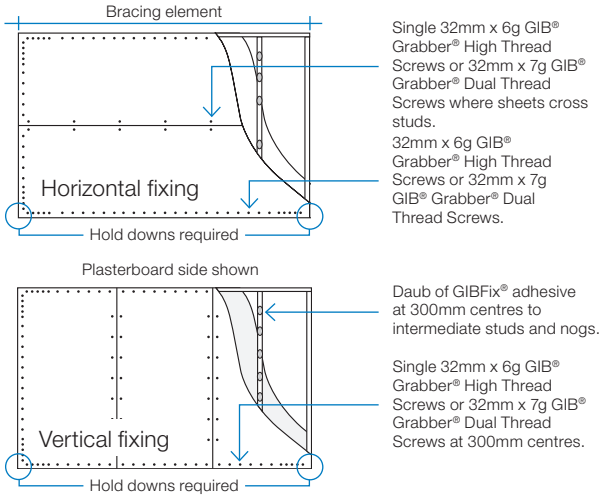
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

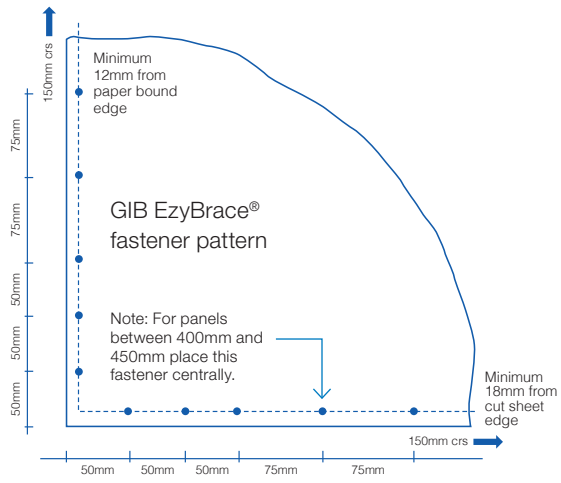
Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





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CONSENT ISSUED BC201209 - Page 315 of 689

Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

GLOBAL GREENTAG^{CERTTM}

The Global GreenTag^{CertTM} certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag.^{CertTM}

GIB® plasterboard has a Level B green rating.

DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit gib.co.nz.

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Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

PATENTS

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

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442

SECTION 4

H1 Calculations

Risk Matrix

See Sheet A3.01 & A3.02 in the Plans

VIP Design				
NZBC H1 Energy Efficiency Assessment				
Insulated Floor Plan Area:		*193.58*	m² over frame (including interior wall of garage)	
Total Floor Area		*238.86*		
Foundation Perimeter Length		*73.44*		
Calculated Areas			Wall Length X	Stud Height
North	Wall area:	41.2	*6.42*	*6.42*
	Window/Door area:	12.00		
	Wall Open Percentage	29%		
East	Wall area:	64.0	*8.00*	*8.00*
	Window/ Door area:	11.62		
	Wall Open Percentage	18%		
South	Wall area:	41.9	*6.47*	*6.47*
	Window/Door area:	3.09		
	Wall Open Percentage	7%		
West	Wall area:	60.1	*7.75*	*7.75*
	Window/Door area:	9.44		
	Wall Open Percentage	16%		
Total	ESW Wall Area	165.9		
	Entire Building Wall area:	207.1		
	Entire Buiding Window/Door area:	36.15		
	ESW Window/Door Area:	24.15		
	Percent window area:	**17.5**	**%**	
	ESW Percent window area	14.6	%	
Is the window area of the walls less than 30%?		**YES** Schedule method is ok to use		

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Natural Light:	Window Area/Room Area		
Rooms	Window Area (Glazed)	Room Area	Total
Liv/Lounge/Liv	15.82	70.35	22%
Bed 1	4.93	22.01	22%
Ensuite	0.29	4.82	6%
Bed 2	1.08	9	12%
WC	1.46	2.39	61%
Laundry	1.19	4.83	25%
Bed 3	1.12	10.53	11%
Bathroom	0.90	6.85	13%
Bed 4	1.12	11.23	10%

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Ventilation:	Vented Area/Room Area		
Rooms	Window Area (Vented)	Room Area	Total
Liv/Lounge/Liv	9.40	70.35	13%
Bed 1	3.33	22.01	15%
Ensuite	0.35	4.82	7%
Bed 2	0.58	9	6%
WC	0.32	2.39	13%
Laundry	1.74	4.83	36%
Bed 3	1.23	10.53	12%
Bathroom	0.90	6.85	13%
Bed 4	1.23	11.23	11%

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

SECTION 5

Specifications

VIP DESIGN - SPECIFICATION

MATERIALS TO BE SUPPLIED

AND

WORK TO BE DONE

FOR...

JORDAN JOYCE

AT...

29 PENTECOST, RANGIORA

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

VIP Design Ltd
158 Maces Road, Christchurch 8011
03 662 9492 I admin@vipdesign.co.nz
November 2020

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MATERIAL SCHEDULE

ITEM	BRAND	COMPLIANCE
DPM / DPC	Thermakraft Thermathene Black 250 Micron Thermakraft Supercourse 500	N/A Branz Appraisal 329 (2016)
FLASHING TAPE	Thermakraft AluBand	Branz Appraisal 878 (2014)
WALL WRAP	Thermakraft Watergate Plus	CodeMark Certificate - GM-1002
SOFFIT LININGS	James Hardie Soffit	E2/AS1
ROOF UNDERLAY	Thermakraft 215 Self Supporting Underlay	Complies with E2/AS1 Table 23. Meets performance requirements of B2 for 50 and 15 years.
PC ALUMIN JOINERY	All windows/doors to be Double Glazed. Grade A safety glass to glazing in bathroom.	As per F2/AS1, NZS 4223,
WALL CLADDING	10 Series Block Veneer on 50 & 60mm cavity.	As per E2/AS1
WALL CLADDING	EZ Panel 50mm AAC Panel	Branz Appraisal 649 (2009)
ROOF CLADDING	Profile Metal Roof Cladding.	As per E2/AS1
INSULATION	Pink Batts Insulation - R2.6 Min Walls - R3.6 Min Ceiling - R2.2 to Sound Wall - Midfloor Silencer Insulation (Optional)	Branz Appraisal 238 (2012) - Pink Batts
BRACING SYSTEMS	GIB Ezybrace System 2016	Branz Appraisal 928 (2016)
INTERNAL WALL LININGS (WET AREAS)	GIB Aqualine wet area systems.	Branz Appraisal 427 (2007)
WET AREA MEMBRANE	Ardex Superflex Wet Area Membranes	Branz Appraisal 472 (2017)
INTERNAL JOINERY	Kitchen: Formica top with 180 degree rolled front. - Wall tiles to be laid over Gib Aqualine - Impervious glass/tile splash back to wall adjacent to cooktop	

PRELIMINARY & GENERAL

OWNER: Jordan Joyce (Joyce Built)

ADDRESS: 29 Pentecost Road, Rangiora

LOCAL AUTHORITY: Waimakariri District Council

SITE (LOT/DP): LOT 29, DP 544114

SCOPE: The erection and completion in the most workmanlike manner all the works described herein and as shown on the drawings.

DOCS:

- Architectural Drawings
- Specification & Supporting Docs
- Bracing Calculations
- Truss Design Certificate
- Risk Matrix Worksheet
- Energy Efficiency Worksheet
- Ground Conditions Report
- Certificate of Title

CONTRACT: The whole of the work shall be carried out in accordance with this specification, the accompanying drawings and the New Zealand Standards Specification. Conditions of Contract for Building and Civil Engineering Construction N.Z.S. 3910 and the New Zealand Building Code 2004 & its Amendments.

STANDARDS: All work shall be carried out in accordance with the New Zealand Building Act 2004 and amendments. Acceptable solutions and verification methods as defined in the Code Handbook and approved documents and relevant N.Z.S. shall form part of this specification, along with Local Body Regulations and requirements

DIMENSIONS: Figured dimensions are to be used in preference to scaled. If any discrepancies in the plans and specification are found by the Contractor, the Designer or Owner shall be notified before the work is commenced.

T/A FEES: The Building Consent and associated fees shall be paid for by the **Client**. The Main Contractors shall ensure that all necessary Consents and/or approvals have been applied for and uplifted before commencing work. The Contractor shall keep on site the approved Consent documents and shall bring to the Designer's and/or Owner's notification, any amendments endorsed on the plans and/or specification.

INSURANCE: The Main Contractor shall insure the works for the full value of the premises when completed. The Contractor shall be held responsible for any damage or loss by fire to the works and such things as are covered by the 'Policy', until the completion of the contract. Receipts for such policies shall be lodged with the Owner before the first progress payment is made.

SUBS: Sub-contractors will be responsible to the Main Contractor for the carrying out of their respective work to a satisfactory standard and any work not accepted will be replaced at the Sub-contractor's expense.

MATERIALS: Materials shall be the best of their respective kinds as specified. All materials for which there is a New Zealand and/or Australian Standard Specification shall conform hereto. All workmanship shall be consistent with good trade practice.

ALTERNATE: Alternatives to Trade Lines/items as specified throughout this Specification shall be allowed where technical information and performance shows that the same requirements for that product are met.

TRADES: The Sub-contractor concerned shall inspect all preparatory work against which his work is to be placed and report immediately to the Main Contractor, any defects which would affect the satisfactory execution or permanence of his work and shall not proceed until such preparatory work is satisfactory. The Main Contractor shall co-operate with, attend upon, and provide all reasonable assistance for all other Sub-contractors.

TEMPORARY WORK: Each Sub-contractor shall allow to provide all necessary plant and temporary work, including temporary framing, fabrication and setting out equipment, together with all labour and tools, implements, ladders and everything necessary for the due performance of the works. He will be entirely responsible for the safety and performance and efficiency of all methods used in the carrying out of his section of the contract. The Main Contractor shall provide scaffolding during the course of the contract.

SERVICES: When the project is working with existing services the Contractor is to…
(a) Locate all underground services affected by the excavation work. Any details that are provided to the Contractor of existing private underground services are done so in good faith. The contractor is responsible for locating all existing underground services before working in any area. The Contractor is required to carry out a detection survey of the site to ensure there are no buried operative electric cables.
(b) Give all required notices to the Water, Sewage, Gas & Electricity Authorities or Companies, the territorial Authority and Telecom and other telecommunications companies and pat all relevant fees and charges.
(c) Protect existing services rectify any damage or interference to them and provide temporary services whilst repairs are being carried out.

PROTECTION: The Contractor shall protect the Owners', Council and adjoining properties and shall make good all damage caused thereto by the building operation by vehicles, or by workmen under his control. The Contractor shall be entirely responsible for all apparatus, equipment and appurtenances furnished by him or his sub-contractors.

SECURITY: The Contractor shall provide temporary fencing to the site to prevent unauthorised access. No person shall be allowed on site without the permission of the Contractors representative.

CLEANING: Upon completion of each Sub-contractor's work comprised in this contract, he shall take down and clear away all plant and temporary work involved in his section of the work and leave the building and site ready for the next Trade. All trade debris is to be removed from the site and the Works left clean with all services and mechanical parts in working order.

MAINTENANCE: Contractor & Sub-contractors shall maintain the Works for 90 days after Practical Completion, and any damage done through faulty workmanship or materials shall be made good at the Contractors expense.

COMPLETETION: At the completion of the contract the Main Contractor shall provide written guarantees specified. The Main Contractor shall be responsible for applying for and receiving from the Territorial Authority a Code of Compliance Certificate. The building shall not be occupied until a Code of Compliance Certificate has been issued. The Final Payment Certificate shall not be issued unless the Contractor is in receipt of the Code Compliance Certificate, as-built drawings and Guarantees.

HEALTH AND SAFTEY: The Contractor shall provide evidence that he has a Health & Safety Plan in operation.

SITE SAFTEY: To meet compliance with F5/AS1 – Construction and Demolition Hazards.
Toe boards will be used on the storage or access platforms to prevent materials falling off.

Temporary chain-link fences 2m high will be used to prevent access to site. Gates in the fencing will open into the site. The temporary fencing will be contained onsite and will pose no hazard or obstruction to the public.
As per above site fencing will keep public out of site. The scale of the construction means that there is no risk to the public outside the site.

TRADE SECTION: The specification is divided into trade sections for convenience and reference only, and it shall not be construed that each trade is a separate and complete contract. While reasonable care is taken to classify each trade, no claims will be admitted from Sub-contractors for work not specifically mentioned in a trade section, but which is provided for, (express or implied), elsewhere in the specification or shown on the drawings.

THIS SPECIFICATION IS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL AND ENGINEERS DRAWINGS. THE SPECIFICATION TAKES PRECEDENCE OVER THE DRAWINGS. IF ANY DISCREPANCIES IN THE PLANS AND SPECIFICATIONS ARE FOUND THE DESIGNER OR OWNER SHALL BE NOTIFIED BEFORE THE WORK IS COMMENCED.

SITE PREPARATION

PRELIM: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1/VM1, NZS 4431:1989

SCOPE: Contractor is advised to visit the site before signing a Contract Agreement to satisfy himself as to the site conditions, ground levels & all other matters affecting the execution of the works.
Clear site of vegetation & stockpile The Contractor shall assume that all trees and plants outside the building areas shall be retained. The Contractor shall be responsible for leaving the site clear and ready for final planting.
Bulk excavation to form platform
Hardfilling as required

EXCAVATION

PRELIM: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1 Appendix A, NZS 4431:1989

SCOPE: Site strip as required.
The Contractor shall employ a Registered Surveyor to set out the positions of the foundations. Reference points, datums, profiles or similar shall be established clear of the excavation to ensure they are not damaged or dislodged, and to allow easy and accurate checking at all times.
Excavate for foundation walls to the widths and depths as shown on the drawings and to an approved solid bearing. The Contractor shall clear and strip the areas on which fill material is to be placed. Saturated, weak or organic soils exposed by clearing and stripping shall be excavated and removed from site. At the discretion of the Engineer on site excavated material may be acceptable.

Excavations shall be kept free of water. Any ground water in the excavations shall be kept away be means of a sump dug clear of the excavation or by other dewatering systems as appropriate.
All footings to be approved by the Local Council Building Inspector before pouring of concrete commence.
In the event of excavations for foundations being too deep in error, the Contractor shall, at his expense, fill the excavation to the true level with mass concrete as required by an Engineer.

MATERIALS: Backfill foundation walls and service trenches with 150mm compacted layers of AP40 to a minimum density of 750kg/m3, in layers 75mm min. and 150mm max. Compacted fill shall be well-graded rock free from organic matter and top soil. All hardfill shall be compacted with a vibrating roller or plate compacter in order to achieve not less then 90% density (NZS 4402 Pt 2).
Compacted hardfill shall be placed under slabs as shown on the drawings. No compacted hardfill shall be placed under footings or foundations unless approved by the Engineer.
All compacted hardfill under slabs shall be inspected by the Engineer.
Take care to not cause damage to any waterproof coatings or polythene protecting foundation walls from ground water entry.

CONCRETE WORK (NZS3604 CONC FOUNDATION)

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC:B1/VM1 & VM4, B2, NZS 3101:1:2006, NZS 3109:1997, NZS 3112:1986,NZS 3114:1987, AS/NZS 4671:2001, AS/NZS 4680: 2006, NZS3604:2011

SCOPE: Foundation floor slab and footings on ground
Patios

MATERIALS: All concrete shall have a minimum 28 days crushing strength of 20MPa in exposure zone C or B, slump 100mm.and shall be mixed and placed in conformity with N.Z.S. 3109. Aggregate size shall be 20mm unless otherwise specified. Calcium Chloride shall not be used.

Surface finishes:

Slabs to take plaster or tiles	U2
Other slabs	U3
Top surfaces of foundation beams & pads	U2
Concrete below ground	F1
Concrete to take plaster or tiles	F2
Concrete surfaces not exposed in the completed building	F3
Concrete surfaces exposed in or outside the completed building	F5

EXPOSED AGGREGATE:

A trial run is recommended before general application to determine timing and the depth of etching required. Agitate Retarder thoroughly before use. Place concrete in formwork (3 parts cement, 4 parts sand, 6 parts aggregate by volume is a typical mix) and wood float surface covering all stones. Brush, spray or roller on Retarder liberally, to the fresh concrete surface just as the surface water disappears.
Protect the coated surface from wind, rain or hot sun. Within 12 - 24 hours after application remove retarded top layer of mortar with a stiff broom and hosed water, leaving a clean exposed aggregate surface. If extremely small aggregate is used, it is important not to start the wash off too early, as bare spots may be created. Slurry runoff from cleaned aggregate is to be ponded and vacuumed by the contractor

FORMWORK:

Provide and fit all formwork to profiles shown, properly strutted and braced in accordance with N.Z.S. 3109 to remain rigid, true to line, level and watertight during placing of concrete. Allow for setdowns for doors in slabs as required.

REINFORCEMENT:

All reinforcing steel shall be grade 500E complying with AS/NZS 4671. Reinforcing steel shall be deformed M.S. bars and plain round M.S. bars conforming to AS/NZS 4671:2001. All reinforcing shall be free from loose scale, rust and coatings such as oil or paint or anything that will prevent bond. Placing of reinforcement shall be carried out in strict accordance with the drawings or as noted herein. Bind all rods with black lacing wire and lap 40 dia. Laps lengths shall be not less than 400mm. Securely support all reinforcing with concrete blocks or P.V.C. spacers.

Allow for minimum cover of 50mm to all reinforcing unless otherwise noted.
Foundations shall be reinforced with 12mm & 16mm deformed rods.
Reinforcing mesh shall be manufactured from Grade 500E deformed bar complying with NZS 3402.

MESH TO FLOOR SLABS:

Grade 500E Ductile reinforcing mesh, reinforced with a minimum of 2.27 kg/m^{2}of Grade 500E reinforcing mesh fabric which conforms to AS/NZS 4671.

SHRINKAGE CONTROL CUTS:

Cuts to be in slab in accordance with NZS 3604:2011. Position under walls as much as possible.

BUILDING IN:

Build in as the work proceeds, all bolts, ties, etc, to allow for wastes to run under the floor and out through the foundations. Leave P.V.C. piping through foundation for power cable entry and a separate conduit for telephone cable. Cast P.V.C. pipe into foundation for water pipe entry at hose tap position. Allow for rebates for doors as required.

DPM/GEOTEXT:

Concrete floor slabs to be laid over 0.25mm Polythene (black) D.P.M. on compacted AP40 hardfill on DuraForce AS280 or Bidim A19 as per Geotech report).
All D.P.M joints shall be lapped 150mm and sealed with D.P.M. tape.

RUBBISH:

Allow to remove all rubbish from the site associated with the execution and completion of this section of the works.

DRIVEWAY:

The Contractor is to maintain and protect Public Property and that of drainage, electricity, gas, highway, water, and telephone authorities and is to make good or pay for the reinstatement of all damage thereto. Basecourse shall not be laid until the work under Drainlayer is completed and power mains have been laid and all kerb & channel and walls have been laid.

EXCAVATION & GRADING:

Excavate to 250mm below finished driveway levels and grade to required falls. Provide and lay 150mm finished thickness of sub-base material, laid and compacted in 2 layers. Sub-base material shall be approved well-graded alluvial gravel (pit run) of 65mm max size. It shall be laid at optimum moisture content and mechanically compacted to a level surface in accordance with NRB Specification F/1: Aug 1986.

BASE COURSE:

Provide and lay a 75mm finished layer of stabilised basecourse over the sub-base to driveway, finishing 25mm below the finished levels. Basecourse shall be crushed

basecourse complying with NRB Specification M/4: June 1985. Place basecourse in such a manner as to minimise segregation. Consolidate basecourse by rolling with approved steel wheel rollers at optimum moisture content. In general the laying and compaction of the basecourse shall comply with NRB Specification B/2: July 1987. The finished surface shall be dense, tight, evenly graded to falls and free of dust and loose material, and to the approval of the Designer.

FINISHING:

All concrete that is to remain visible when the building is complete shall comply with finish F6 as specified in NZS 3114:1987. The surface shall be finished to smooth even grades with no local depressions or bumps exceeding 6mm in 3m, and shall be such as to direct water into channels and sumps. Finish neatly against concrete kerbs, channels, slabs and foundations at other boundaries and at the correct surface level. Full precautions shall be taken to prevent disfigurement of any concrete work. Any disfigurement or damage shall be made good at the Contractors expense.

CARPENTRY

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, B2, D1, E2, E3, F4, G1, G3, G5, G6, G7, F4, H1, NZS 3602: 2003, NZS 3604:2011, NZS 3617: 1979

SCOPE:

- Framing
- Trusses
- Bracing
- Soffits
- Fascia
- Exterior Cladding
- Door, window & air seal installation
- Skylight
- Insulation
- Linings
- Skirting's/Architraves
- Miscellaneous Trims
- Hardware & Miscellaneous Hardware
- Installation of fittings
- Assist other trades

MATERIALS: As required on plans and in specification.

TIMBERS:

All timbers shall be of their respective kinds and grades as specified and thoroughly seasoned. Timbers shall comply in all respects with N.Z.S. 3631 National Grading Rules and Kiln dry timber framing in accordance with NZS 3602.
In general, the following grades apply-
All structural timber to be treated in accordance with NZBC Clause B2/AS1. Refer to the schedule on the working drawings.

MOISTURE CONTENT:

Framing timbers shall be left to dry to a moisture content of **18%** before internal linings may commence.

PRESERVITIVE TREATMNET:

All treated framing timbers shall be Tanalith N.C.A. preservative treatment or other approved means to the N.Z.T.P.A. & comply with NZBC B2/AS amendments dated from May 2011

GUAGING AND THICKNESSING:

Rafters, purlins, plates, studs, dwangs and all other framing timbers shall be gauged and/or thicknessed to produce regular plane faces to walls, ceiling and all other surface finishes.

FIXING OF TIMBERS:

All fixing of timbers shall be carried out in accordance with NZS3604:2011.

Framing tolerances must comply with the requirements of NZS 3604:2011. All framing must be made flush. All exposed wooden trim, and both faces and edges of all other dressed exterior finishing timbers shall be primed on all faces with approved exterior primer before being fixed in position.

DAMP PROOFING:

Provide between all faces of framing timbers in contact with concrete, place a full length and width damp proof course (Thermakraft – Supercourse 500) – Brans Appraisal 329.

BUILDING WRAP: NON-RIGID

Thermakraft Watergate Plus breathable wall underlay (CodeMark Certificate GM-1002), fixed in accordance with NZBC: E2/AS1 and manufacturers technical literature.

AIR BARRIER: Thermakraft Watergate Plus breathable wall underlay is CodeMark appraised as a non-rigid air barrier. Building wrap to be installed to walls which are not lined on the internal face e.g. Garage walls or gable ends.

Building wrap must be installed horizontally and be continuous around corners. The wrap must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints. Where studs are at greater than 450mm centres, polypropylene strap or additional vertical cavity battens must be installed at maximum 300mm centres to prevent bulk insulation bulging into the cavity.

Flexible sill and jamb flashing tapes complying with NZBC E2/AS1, Paragraph 4.3.11 must be used around all penetration openings. All penetrations must have internal air seals applied.

PRIMING:

Priming shall be Taubmans Exterior Wood-primer or equal approved. Prime all faces, edges, back joints and abutting surfaces of all exterior finishing timbers. All exterior joinery shall not be exposed for more than 6 weeks. Any surface so exposed, shall be reprimed.

WALL FRAMING:

Frame up walls to sizes and at centres as per drawings, plumb and true to line in accordance with section 8 of NZS3604:2011.
Chimney wall framing to be non-continuous studs between a top plate in line with the top plate of the main structure.
Fit 25x1mm strap horizontally wrapped around chimney top plate and fixed back to the top plate of the main structure and fix with 6/30x2.5mm nails.

CONCRETE SLABS

NON-BRACING EXTERNAL WALLS:

Secure bottom plate with Lumberlok bottom plate anchors at maximum 900mm crs with 1x 75x4mm concrete nail adjacent to anchor minimum 70mm from edge and slab.

NON-BRACING INTERNAL WALLS:

Secure bottom plate with 75x8mm shot fired fastenings with 16mm washers, spaced at 600mm centres, within 150mm from each end of plate.

BRACED EXTERNAL WALLS:

GS1-N - Secure bottom plate with MiTek bottom plate anchors as above, if a MiTek bottom plate anchor is not within 150mm from each end of the bracing element provide M12 bolt fixing with 50x50x3mm washer within 150mm from each end of bracing element.

BRACED EXTERNAL AND INTERNAL WALLS:

GSP-H, BL1-H, BLP-H

Secure bottom plate as per non-braced walls fixings as above.
With additional GIB Handibrac fixings at both ends of bracing element to stud/plate junction with screw bolt to give a minimum uplift strength of 15kN (Bowmac or similar).

BRACED INTERNAL WALLS;

GS1-N, GS2 - Secure bottom plate with 75x3.8mm shot fired fasteners with 16mm washers, spaced at 150mm and 300mm from each end of bracing element and 600mm centres thereafter.

BLG-H - Secure bottom plate as per non-braced internal wall fixings as above.
With additional GIB Handibrac fixings at both ends of bracing element to stud/plate junction to give a minimum uplift strength of 15kN (Bowmac or similar)

REFER TO GIB EAZYBRACE SYSTEM TECHNICAL LITERATURE IN SUPPORTING DOCUMENTS FOR FIXING REQUIREMENTS OF SELECTED BRACING ELEMENTS.

BRACED EXTERNAL WALLS:

EP1, EP2, EPG, EPGs

Secure bottom plate as per non-braced walls fixings as above.
With additional GIB Handibrac fixings at both ends of bracing element to stud/plate junction to give a minimum uplift strength of 15kN (Bowmac or similar)

REFER TO GIB EAZYBRACE SYSTEM TECHNICAL LITERATURE IN SUPPORTING DOCUMENTS FOR FIXING REQUIREMENTS OF SELECTED BRACING ELEMENTS.

ROOF FRAMING: PREFABRICATED TRUSSES

Frame up roof with gang nail trusses and framing timbers as indicated on the drawings. All trusses and rafters shall be secured with "Z" nails or framing anchors as per truss design/pre-nailers.

- Fabricator of trusses shall provide a Registered Certificate for truss design.
- The contractor that did the truss design is to also fabricate the frames and trusses unless otherwise instructed by the designer

LINTELS & BEAMS:

Sized as per truss design by truss designer, if not sized on truss design then to be sized to meet tables in Section 8 NZS3604:2011.
Build in timber beams as shown. All beams to have minimum 50mm landing onto wall plates and shall be double studded under and blocked to provide support.
Lintels to be fixed to prevent uplift as per plans and Figure 8.12 NZS3604:2011.

CEILINGS:

13mm Gib board linings to be fixed on 310 Rondo ceiling battens at 600mm with NZ18 perimeter angle fixing in accordance with manufacturers specifications.
Note ceiling linings and batten spacings differ where ceiling diaphragms are specified, refer to the drawings.

INSULATION:

R3.6 Fibreglass batts to ceilings
R2.6 Fiberglass batts to all external walls and walls between dwelling and attached garage.

R2.2 Fiberglass batts to Sound Wall
Silencer Insulation (Optional)

BRACING:
ROOF BRACING:
Designed and covered by the truss designer as part of there truss design to meet B1.

WALL BRACING:
Selected bracing elements as per bracing plan. To be installed and fixed in strict accordance with manufacturer's technical literature.
Ensure studs are also fixed in accordance with bracing manufacturer's technical literature.
Refer to bracing plan, bracing schedule and calculation sheets.

CEILING DIAPHRAM:
Provide and fix GIB plasterboard for ceiling diaphragm as per GIB Ezybrace systems technical literature.
Diaphragms not steeper than 25deg and not exceeding 12m in length any GIB plasterboard may be used provided perimeter fixing is at 100mm centres.

FIXING:
Fasteners are placed at 100mm *(or 150mm as below)* centres around the ceiling diaphragm WITH the corners fastened using the GIB Ezybrace 2011 fastener patterns. *Perimeter centres at 150mm or 100mm depending on diaphragm limitation refer to technical literature.*

- Fastening shall be no less than 12mm from sheet edges and not less than 18mm from sheet end.
- Sheets to be supported by ceiling battens at no more than 450mm centres for 10mm GIB plasterboard and at no more than 600mm centres for 13mm GIB plasterboard.
- Use full width sheets where possible, at least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see GIB Site Guide).
- Openings are allowed within the middle third of the diaphragm's length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimensions shall exceed a third of the diaphragm's width.

EXTERIOR LININGS:
Provide and fix 4.5mm HardieFlex eaves/soffits lining, V butt jointed.

10 SERIES MASONRY VENEER

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, B2, E2, NZS 4210:2001, SNZ HB 4236:2002, AS/NZS 2699:2000

SCOPE: 10 Series Masonry Veneer external wall cladding as per drawings.

MATERIALS:
BRICKS:
10 series Block Veneer (Vi Block or Firth), factory-manufactured of uniform colour and texture, free from chipping. (Finish TBC by owner)

MORTAR:
In accordance with manufactures specifications.

TIES & LATTICE MESH:

Ties in accordance with E2/AS1 Table 18A for Seismic Zone 2 & New Zealand Concrete Masonry Manual (Stack Bond) – 5.5
Ties shall be hot-dipped galvanised and fixed in accordance with above and manufacturers specifications.

Lattice mesh to be installed in accordance with New Zealand Concrete Masonry Manual (Stack Bond) attached with supporting docs.

VENEER LINTELS: (where shown on drawings)

Veneer lintels in accordance with E2/AS1 Table and or (Firth Two Storey Brick Veneer Solutions) with Hot Dip Galv Finish (Painted/Top coated to suit aluminium joinery) or suitable alternative external steel treatment.

REBATE:

x2 coats of Mulseal or similar to rebate in accordance with E2/AS1.

FLASHINGS:

All wall openings, penetrations, intersections, connections, windows sills, heads and jambs must be flashed prior to brickwork installation. The building wrap must be appropriately incorporated with penetration and junction flashings. Materials must be lapped in such a way that water tracks down to the exterior on the face of the building wrap.

FLEXABLE FLASHING TAPE:

Selected compliant flashing tape to be installed as per manufactures specifications over building wrap or RAB as selected in carpentry section of the spec.

VENTILATION:

To NZS 4210. Provide where exposed to the weather above foundations and slabs at the bottom of all veneers, a 75 mm x 10 mm weep hole at 800 mm centres.

ARCHITECTURAL MASONRY SEALING:

Exterior coatings must comply with CCANZ CP 01; 2011 like below or similar.
Sto S-Protect system apply 2 flood-coats WS405 leave 5 days to catalyze and apply 3 coats StoProtec by approved applicator. Note refer to StoProtect Veneer Specification.

WORKSMANSHIP: Construct and complete walls to an acceptable Architectural Masonry finish.
Different block types will always vary in finish and colour as they are never made from the same batch and have different densities. Minor chipping and variations to surface appearance are not recognised as block defects, and should be expected. Completed exposed walls should be viewed from a distance of not less than 6.1 metres under diffused light when assessing. This complies with the requirements of ASTM C90

MAINTENANCE: Building Owners are responsible for the maintenance of the brick veneer system. Annual inspections must be made to ensure that all aspects of the cladding system, including flashings remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress, must be repaired immediately. Weep holes must be kept clear of dust, dirt, spider webs and the like to ensure that moisture can continue to drain from the cavity.

COMPLETION: On completion, clean down all bricks, remove blemishes, mortar disfigurements, etc.
Remove all rubbish from the site associated with execution and completion of this section of the works

EZ PANEL 50mm AAC PLUS RENDER SYSTEM

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract.

STANDARDS: NZBC: B1 B2, F2,

SCOPE: Supply & fix EZ Panel 50mm AAC plus render system as per drawings.

MATERIALS:

SUBSTRATE:

NZS:3604 compliant timber Frame - 50mm AAC Panel on 50x 21mm VH EPS Battens.

COATING SYSTEM:

Standard Render (6-8mm Meshed) – Client to confirm prior to install.

STANDARD FINISH:

Client to confirm prior to install.

PAINT SYSTEM: Standard

2 Coats of 100% acrylic based paint.

QUALIFICATIONS:

Use only LBP registered plasterers licensed to apply the EZ Panel 50mm AAC + exterior render systems.

FINISH SAMPLE:

Submit one 300 mm x 300 mm sample of the selected texture finish and colour for approval. Obtain signature of acceptance on sample and return to the Registered Plasterer.

MAINTENANCE INSTUCTIONS:

Refer to EZ Panel Lightweight Concrete Cladding System Installation Guide located in supporting docs.

PRODUCER STATEMENT:

If the project has a building consent, then a producer statement shall be supplied by the plasterer in the form as required by the BCA.

WARRENTY:

Warrant this system under normal environmental and use conditions against failure. Refer to Refer to EZ Panel Lightweight Concrete Cladding System Installation Guide located in supporting docs.
Materials: 15 years by Resene Construction Systems - Materials only
Execution: 5 years by Registered Plasterer - Workmanship only.

COMPONENTS:

All components used in the construction of the EZ Panel system are to be as specified in the manufactures document and install in accordance with recommended guidelines.

HEAD FLASHINGS:

Refer to EZ Panel Lightweight Concrete Cladding System Installation Guide located in supporting docs.

SEALANT:

Bostik SafeSeal or equivalent BRANZ Appraised Sealant

Sealant must comply with WANZ requirements for adhesion to powder coated aluminium.

INSTALLATION: Refer to specific manufacture's installation guidelines in supporting docs.

CLEANING: Remove debris, unused materials and elements from the site relating to the plaster system application. Replace damaged, cracked or marked elements. Leave the whole of this work to the required standard.

FINAL ONSITE ASSISTANCE: Final Onsite Assistance by Resene Construction Systems Registered plasterer and Resene Construction Systems project assessor of the entire finished cladding to take place immediately after completion of the wall cladding work and any defects or subsequent damage made good immediately.

THIS SPECIFICATION MUST BE READ IN CONJUNCTION WITH EZ PANEL 50mm AAC PLUS RENDER SYSTEM AND TECHNICAL DRAWINGS.

INTERIOR LININGS

GIBRALTOR BOARD

10mm or 13mm GIB Gibraltor board shall be used as lining material throughout the construction, taped and stopped and left ready for respective finishes.
All Gibraltor board shall be fixed in accordance with the Manufacturer's instructions and specification, to *no. 4 finish* for painting. All Gibraltor board shall be sealed before finishes are applied. All linings are to be screw fixed.
10mm or 13mm GIB Aqualine to Bathroom
GIB Softline external corners
Other linings as required for bracing requirements
Bathrooms and ensuites will be lined with GIB Aqualine
Wet areas not specified as GIB Aqualine will be paint sealed with gloss or semi-gloss paint as per E3/AS1

SKIRTINGS ARCHITRAVES & TRIM:

Provide and fix selected pine or MDF skirtings, all mitred and scribed to jambs. Fixed with brads and/or construction adhesive.

SEALANTS:

All sealants used on this job shall be Expandite or equal approved, as recommended by the manufacturer.

- Silaflex MS - where a paintable sealant required
- Silaflex RTV - use for glass and cement
- Silaflex N - use for metal work
- Silaflex B - use for concrete, brick and timber

AIR SEALS:

Install between reveal or frame and the wrapped opening of windows, doors and other penetrations.
To be self-expanding polyurethane foam (or sealant) installed over PEF backing rod in accordance with manufacturer's technical literature to comply with E2/AS1 9.1.6 Air Seals.

FASCIA:

As per plans – Generally Colorsteel fascia fixed on brackets at 900mm crs.

HARDWARE:

As selected and required as per drawings and building regulations.

ACCESS HATCH:

Proprietary *a*ccess hatch to ceiling as shown on plans, generally 600x600mm minimum size, to be installed in between 900mm truss centres.

SKYLIGHT:

Velux sized and flashed as per drawings and supporting documentation. Refer to additional supporting documentation for installation details.

WORKMANSHIP: Co-operate with all other trades in setting out their work. Cut for, attend on and make good all other trades. Provide all fastenings, fixings, blocks and backings, unless otherwise specified for securing the work of other trades.
Work shall finish true to line and face and erected, plumb and level. Framing shall be accurately cut and fitted together, finely spiked, bolted, or connected as shown or specified. Punch all nails in exposed work. Where proprietary timber connectors are used, they shall be used strictly in accordance with the Manufacturer's instructions. All workmanship shall comply with N.Z.S.3604:2011 and The New Zealand Building Code Handbook and approved documents.

ROOFING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: E2/AS1, NZ Metal Roof and Wall Cladding Code of Practice.

SCOPE: Roof cladding to dwelling and garage as indicated on drawings.

MATERIALS:

Selected Profile Metal Roofing
Dimond / Veedek or equal long-run colorsteel roofing and accessories

BMT	0.4mm
Grade	G300
Product	Colorsteel G2z
Colour	To be advised
Profile	Corrugated / Trapezoidal profile - Asymmetrical
Flashings	Coated to match Colorsteel roofing

FIXINGS:

To be in accordance with manufacturer's technical literature. The roofer shall supply & fix all roofing, including tile battens, hips, ridges, valleys etc. all in accordance with manufacturer's technical literature instructions.
Obtain guarantee Provide 10-year guarantee against water penetration due to faulty material or workmanship.

UNDERLAY:

Thermakraft 215 Self-Supporting Roof Underlay to full roof area Installation
Underlay shall be:
Layed with minimum numbers of laps
Lapped at all side and end laps by minimum 150mm.
Self-supporting underlays, laid to maximum 1.2m span between adjacent supports.

11 degree roof pitch or higher = Run underlay horizontally or vertically
10 degree roof pitch or lower = Run underlay horizontally only

FIXING:

In strict accordance with manufacturer's installation instructions.

The roofer shall supply & fix all roofing, including purlins or battens (metal tile roofing), hips, ridges, valleys etc. all in accordance with manufacturer's instructions.

Obtain guarantee provide 10-year guarantee against water penetration due to faulty material or workmanship.

ALUMINIUM WINDOWS & DOORS

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, B2, E2, E3, F2, G4, G7,NZS 4211:2008 – Specification for performance of windows, AS/NZS 4403:1996, NZS 4223-Glazing Standards
Powder Coating shall be in accordance with BRANZ Building Information Bulletin 218, and British Standard 6496 of Powder Coating.

SCOPE: Site measure openings to be fitted with joinery units
- Doors
- Windows
- Flashings
- Garage doors
- Skylights Velux

MATERIALS:

ALUMINIUM:

All sections are to be extruded from 6063 alloy, T5 temper. Windows shall use 35mm sections with condensation channels and 3 ply bituminous fabric flashings. Manufacturer of windows and performance of windows shall comply with N.Z.S 4211.

HARDWARE:

Colour Matched Hardware, Double Tongue Latches.

REVEALS:

To be 20mm solid timber, H3.1 treated, mitred and grooved to take linings.

GLASS:

As specified in glazing section. Double Glazed (excluding Garage), (obscure glass to wet areas).

COLOUR:

Powder coated selected colour with a consistent minimum thickness of 50 microns to all surfaces.

GARAGE DOOR:

Selected garage door installed in accordance with manufactures guidelines.

FLASHINGS:

Colorsteel, colour to match.

SKYLIGHT:

Velux Double Glazed, sized as per plans.

FIXING:

The window subcontractor is to supply all head flashings in accordance with E2/AS1 unless otherwise arranged.
The window sub-contractor shall provide a warranty covering all sections of the work in the supply, fixing and glazing of all windows and doors, for a period of Five (5) years.

EXTERIOR JOINERY

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: E2, G4

SCOPE: Site measure openings to be fitted with joinery units

- Front Entry door & sidelights
- Skylight Velux

MATERIALS: Standard profiles run from solid, complete with 2 weather grooves, in powder coated aluminium frame.

FIXINGS: In accordance with best trade practice.
Mortice and tenon housing and dwelling shall be used wherever practical. Screws shall be used in preference to nails or brads and glue blocks shall be fitted wherever required.
All joints shall be accurately cut and fitted and well glued.
Nails and brads shall be neatly punched, and holes suitably stopped.

INTERIOR JOINERY

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B2, G1, G2, G3. NZS 3610:1979

SCOPE: Allow to take delivery from the Joiner of all joinery specified in doors and fittings and build in to complete the installation as shown on the drawings. Refer to Kitchen design if applicable.

- Doors
- Skirting/Architraves/trims
- Kitchen Joinery
- Rails & Shelves to wardrobes & cupboards
- Laundry Bench

MATERIALS: Doors: hollow core, paint finish, Pressed Panel MDF, or Grooved MDF, or Flush
Panel MDF doors with 30mm grooved jambs to take wall linings. Hung on 1 ½ pairs butt hinges.
Aluminium Sliders with Gib Panels to Bedroom wardrobes
Any cavity sliders to be CA sliders complete with all hardware.
Stack sliders complete with all hardware
Single Door to have Glass Tops
Hardware as shown in schedule of Fixtures & Fittings

KITCHEN JOINERY:

Allow to fabricate and install kitchen units in Prefinished MDF with laminate finish such as Melamine or equal.
Bench top with (180 degree) rolled front (impervious and easily cleaned for hygiene as required by G3/AS1)
Impervious glass splash back to wall adjacent to cooktop for hygiene reasons as required by G13/AS1.

- 2mm PVC to all edges
- Laminated internal carcase and shelves.
- Drawers on metal drawer slides, with cutlery inserts.

- Overlay doors on spring load hinges.
- Overlay drawer fronts.
- Shelves on adjustable shelf studs.
- Pantry cupboards with 5 no adj. shaped shelves.
- Selected Handles
- Selected sink and drainer.
- Selected sink mixer
- Make allowances for appliances. Ensure neat tight fit.
- Stairs

SHELVES & CUPBOARDS:

Cupboards and robes shall be to a trim height of 2m with sliding doors in a grooved frame. Provide 18mm prefinished MDF board shelves, all edges banded, to robes and 3 shelves to other cupboards.

LAUNDRY BENCH:

As per Kitchen manufacturer in accordance with G3/AS1

STAIRS:

As per plans, in accordance with D1/AS1. Concealed stringers, with oak veneer or similar finish.

WORKSMANSHIP: All joinery shall be constructed in accordance with the best trade practice.

Accurately set out, neatly executed and finish all joinery work, both in the shop and on the job. Exposed timber shall be brought to a first-class finish, properly dressed and glass papered with arrises off.

Site Measure: Before manufacture of joinery, measure on the job and verify that All dimensions shown are correct or are adjusted so that all joinery will correctly fit the space provided. No extra will be paid in respect of work arising through failure to measure and verify. The Joiner shall ensure that all exterior joinery is correctly made in respect of any dimensional variation occurring in the building.

TIMBER:

All timbers shall be of their respective kinds and grades, specified in accordance with NZS 3631 National Grading Rules. All timber must be dried to a moisture content from 10% - 14%, based on dry oven kiln weight. Timber showing signs of faulty or excessive kiln drying will be rejected.

Any preservative treated timber used for exterior joinery shall have been treated by the Tanalith C.A. non-leaching process. Dipped treatment is NOT acceptable for exterior use. Joinery and finishing timber must be stacked and protected under cover until required for use.

TIMBER GRADES:

Interior Carcase Work & Frames 18mm MDF. Exterior doors Exterior approved only.

HARDWARE:

Supply and fix all hinges, cupboard catches, friction stays, and any other hardware specified herein or on the drawings, for particular fittings.

All hardware forms part of this sub trade and shall be fixed in the shop before fabrication.

All exterior joinery for a paint finish shall be primed before leaving the joinery shop.

FINISHING:

All exposed timber shall be brought to a first-class finish, properly dressed and glass papered with arrises off for respective finishes.

TIMBER JOINERY:

The assembly of all joinery shall be appropriate to the nature of the job and consistent with good trade practice. Mortising, tenoning, grooving, matching, tonguing, housing and rebating shall all be employed as necessary and where detailed, to provide a first-class job. All joinery timbers shall be machine dressed on all four faces. All joints shall be accurately cut and fitted and well glued to develop the full strength of the joint. Screws shall be used in preference to nails or brads and glue blocks shall be fitted wherever required.
Nails and brads shall be neatly punched, and holes suitably stopped.
Allowances shall be made during assembly for shrinkage and measures shall be taken to prevent undue warping or twisting. All exposed timber shall be bought to a first-class finish by machine glass papering or hand finishing to a fine finish.

PLUMBING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B2, C/VM1, E1, E3, G1, G2, G3, G4, G10, G12, G13, AS/NZS3500
AS/NZS 2918 log burners, NZS 7601:1988, 7602:1977, 7643:1979, NZS 4305, AS/NZS 4936:2002, AS/NZS 5065:2005.

SCOPE: New water connection from boundary.
Plumbing to WC's, tub, shower, bath, vanities, wash hand basins, sink, dishwasher, waste disposal unit
Waste pipes to GT's, and vent pipes.
WC installations & connections
Instant gas
Installation & connection of HWC, NZS 4606:1989, including tempering valve.
Water supply as required to fridge
Flashings to windows, doors, vents, flue etc.
Fascia/Spouting & downpipes,
External hose taps
Heat pump condensate drain to discharge to foul water drainage system

MATERIALS:

PIPING:

All hot and cold water polybutylene pipes with copper fittings installed in accordance with G12/AS1 Table 1 and AS/NZS 4020.
All piping shall be run in the ceiling cavity or wall framing and shall be lagged in all positions, both hot and cold. All pipework shall be adequately supported, and the full installation shall comply with the N.Z.B.C. water supply conditions.

COLDWATER SUPPLY:

Allow to connect and supply new dwelling with the existing water supply which is on the site.
All supplies to wet areas shall be in 20mm dia. with 15mm dia. branches as required.

PLUMBING FIXINGS:

As selected by client or builder.

LAUNDRY TUB:

Allow to supply and install Laundry Tub or sink, complete with taps and valves.

WASTES:

Supply and install UPVC, diameters as shown on drawings laid down to the sizes supplied by the N.Z.B.C. and approved documents. Wastes shall run in the wall framing and not be exposed on exterior. All wastes to be laid so as to enter gully traps below grating.

FLASHINGS:

Provide and fix proprietary EPDM flexible boot flashing to all roof penetrations.
Dektite type – as per manufacturer's technical literature suitable for roof penetrations 0 - 510mm.
Provide 0.45mm Endura Colorsteel flashings to window heads to Builder for building in.
Sealant used in conjunction with metal shall be Selleys Dow Corning 780 Silicone Sealant.

UNDER NO CIRCUMSTANCES SHALL LEAD FLASHINGS BE USED.

GAS HOT WATER:

Install selected instant gas hot water system as per manufacturer's technical with hot water pipes to be fitted to each fixture.

Electric thermostats and energy cut-off devices shall comply with NZS 6214 or AS 1308.
Energy cut-off devices shall be designed to:

a) Be reset manually, and
b) Disconnect the energy supply before the water temperature exceeds 95°C.

RELIEF VALVE DRAINS SHALL:

a) Be of copper pipe,
b) Have no restrictions or valves,
c) Have a continuous fall from the relief valve to the outlet,
d) Discharge in a visible position which does not present a hazard or damage to other building elements (except when used in association with free outlet storage water heaters),
e) Have a minimum diameter of the same size as the valve outlet,
f) Have the number of changes in direction plus the length of the relief drain (in metres) not exceeding 12
For example: 7 metres of pipe allows the total number of bends to be 5.
g) Be connected to a relief valve in accordance with the valve manufacturer's specification,
h) Comply with NZBC G12 Paragraph 6.7.3 when relief valve drains are combined, and
i) Comply with Paragraphs 6.7.4 and 6.7.5 when freezing is likely.

SAFE WATER TEMPRATURES:

Hot water delivery to any sanitary fixture used for personal hygiene shall not exceed 55degrees.
This shall be achieved by installing tempering value between the outlet of the water heater and the sanitary fixture. Tempering values shall comply with NZS4617 or AS1357.2.
Storage water heater control thermostat shall be set at a temperature of not less than 60 degrees to prevent growth of legionella bacteria.

FASCIA AND SPOUTING:

Colorsteel, selected colour, complete with downpipe droppers for rectangular or round downpipes as noted on plans.

DOWNPIPES:

Shall be Colorsteel or similar rectangular or round (refer to plans for sizes) fixed to buildings with 2x brackets, all straight and plumb, and finishing 75mm above grating.
PVC Spreaders from upper roofs.

HEAT PUMP CONDENSATE & HWC RELIEF DRAINS:

To discharge into foul water drainage system OR over nearest planting area.

WORKSMANSHIP: All workmanship shall be of the best trade practice and executed by a Licensed Plumber and Drainlayer in accordance with the Building Act 1991 and The New Zealand

Building Code Handbook and approved documents and to the Local Authority's satisfaction. Obtain all permits and pay all Fees.

MATERIALS: All materials shall be of their best respective kinds and shall conform to the N.Z.S. applicable. All materials, pipes and fittings shall be copper and/or U.P.V.C. complying with the relevant NZS for sewer and storm water drainage, as required by the N.Z.B.C. Cement, sand, etc, used shall be as specified under 'Concrete'. Supply and install all fittings and materials required to complete the job.
All waste or water pipes in or under concrete floors and all other hot water piping shall be fully lagged. All pipework shall be concealed. Subject all water installations to a full water test. Take separate supplies to serve showers. Ensure shower supplies are not affected by the draw off from any other fixture.

DRAINAGE

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, E1, G1O, G13, NZS3500, AS/NZS 5065:2005, AS/NZS1260, AS/NZS1547

SCOPE: Pipe to existing foul water lateral on site
Pipe to existing stormwater lateral on site
Installation of Gulley Traps
Backfill
Surface water sump
Foul water drainage pipe to onsite connection.

MATERIALS: 100mm diameter UPVC pipes. All pipework shall be concealed.
Backfill with excavated material.

WORKSMANSHIP: Excavate for storm water and foul water drains, to the required depths and gradients to provide a disposal system in compliance with the N.Z.B.C. and to the satisfaction of the Local Drainage Inspector. After drains have been inspected, tested and approved, the trenches and other excavations shall be backfilled in accordance with The New Zealand Building Code Handbook and approved documents. If drains are installed in different positions to those indicated on the drawings, the Drainlayer shall supply an as-built drawing with accurate dimensions.

COMPLETION: At completion, leave the whole of the plumbing and fitting system, water supply and flashing in good working order, free from leaks, defects and with all waste materials removed.

GASFITTING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: G2, G3, G4, G5, G10, G11, AS/NZS 5601:2013, NZS 7646:1978

SCOPE: Installation of Gas cylinders and piped connections to fittings.
- Installation of Gas Fire
- Installation of Gas cooking appliances.
- Instant gas hot water

MATERIALS: To nominated approved appliances.

INSTALL: To be by craftsman Gasfitter, who shall supply Owner with a Certificate of Compliance, to be carried out in strict accordance with manufacturer's installation instructions.

Gas bottles over 25L capacity should be securely held in place by brackets fastened to wall. Cylinders should not be supported by other cylinders.
Cylinders should be installed on supporting firm bases such a concrete, 50mm above surrounding surface which falls away from building envelope.

Gas bottles over 25L (9KG) are NOT to be located inside.

COMPLETION: Provide Gasfitting Certificate of Compliance – Gas Safety Certificate on completion of works as part of Code Compliance requirements for council.

ELECTRICAL

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B2, F7, G4, G8, G9, NZ Electrical Codes of Practice ECP50 & ECP051, NZS 6703: 1984

SCOPE: The work comprises the provision of…

- Underground mains supply from junction box at boundary and supply to meter box.
- Installation of flush type switchboard with M.C.B.'s where shown on the plan.
- Wiring of circuits to serve all lights, power points and fittings.
- Electrical Fixtures and fittings: All electrical installations to be in accordance with NZECP 51:2001 & NZBC G9.
- Temporary power as required
- Earthing system
- Power outlets.
- Lights: Interior & exterior. All lighting to be in accordance with NZBC D1 & G8
- Cooktop & wall oven installations.
- Rangehood installation.
- Waste Disposal
- Heater installations
- Extract Fans: Ventilation of Sanitary & Laundry rooms: Refer to floor plan
- Heated towel rail installations
- Telephone Jacks
- TV Jacks
- TV Aerial (digital)
- Door Bell
- Undertile Heating to Kitchen, bathroom, Ensuite
- Gas Hob ignition
- Gas hot water
- Heat pump
- Smoke Alarms: F7/AS1 3.2.2 and 3.2.3: for positions refer to floor plan. Installation is to be carried out in conjunction with manufacturers' instructions, AS/NZS4514 and the Building Code requirements.
- Coiled cable for landscaping by others
- Security system wiring

FITTINGS: Co-ordinate with the Local Authority in the establishment of loadings and requirements for the site.
The supply to the house shall be single phase and neutral. Meter board box shall be fabricated from galvanised sheet metal and installed within selected exterior wall cladding as per plans and elevations. Box shall have sufficient space for supply metering night rate metering and any other controls required by the Power Authority.

All wiring shall be heavy T.P.S. of required size. All plug and switch plates shall be P.D.L. flush type. Each power outlet to be switched. Arrange with the General Contractor for layout of work and for provision of nogging, blocking or cutting, etc. All wiring to be concealed.
Light switches and power outlets shall be P.D.L. 600 Series, white finish.
Switchboard shall be P.D.L. Distribution Board flush fittings or equal approved with circuit breakers.
Exterior lighting if it is noted on the plans or electrical fixtures and fittings.
Fittings as per client selection or electrical fixtures and fittings. All positions and types to be selected and confirmed by client with contractor.
All recessed downlights shall be CA rated meeting the requirements of NZE. Downlights are to be positioned 50mm from combustible timber; however, insulation can be abutted as the downlights are CA rated.
RCD fittings to Bathroom & Ensuite.
Exterior Grade fittings for external use
Smoke Detectors (Battery): Ionisation type, 10-year lithium powered, hush and test facility, inbuilt sounder (mini. 85dBA), surface mounted, tamper proof, guaranteed for life of battery, and minimum UL listed.

INSTALL: All installation to be in accordance with NZECP 51:2001, NZBC G8 & NZBC G9, NZBC D1 (minimum illuminance of 20lux to access route).
Total of 20lux of luminance for the total wattage required per m2 of floor area as shown in NZBC G8/AS1 table.

WORKSMANSHIP: All workmanship shall be of the best trade practice and executed by a Registered Electrician and to the satisfaction of the Local Authority's Inspector.
Obtain and pay all necessary permits and charges incidental to this contract. In all cases, work shall comply with the N.Z.B.C. Electrical Wiring Regulations, 1976 and amendments and any New Zealand Electrical Codes of Practice applicable to this work.
On completion, leave the entire electrical installation in perfect working order, passed and approved by the Local Electrical Power Authority.
Clear away all debris.

GLAZING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: F2, NZS 4223 parts 1, 2 & 3:2016, NZS 4211:2008

SCOPE:

- Aluminium Joinery glazed off site.
- Double Glazing
- Glazing to Front door & Sidelight
- Skylight glazing
- Mirrors
- Hob Splashback
- Shower screen/door to proprietary showers

MATERIALS: Glass: All glass shall be free from waves, bubbles, leaching and other imperfections.
Standard Unit: 4mm glass / 12mm air gap / 4mm glass.
Slider Unit: 5mm glass / 8mm air gap / 5mm glass.
Safety Panel: 4mm toughened glass / 8mm air gap / 6.38mm laminate.
Mirrors: 750mm wide to suit vanities, polished edge.
Hob Splashback to be Satinlite glass with holes and domes.
Obscure glazing to all wet areas.

GRADE A SAFTEY GLASS:
As per plans – to comply with NZS:4223:2016

BATHROOMS:

Grade A safety glass: Glazing within 2000mm of floor level
Framed shower screen and bath enclosures

RESTRICTOR STAYS TO MEET F4:

(Are required when possible height of fall from an open window is more than 1m)
Ensure Restrictor stays are provided to opening windows when the lower edge of the opening is less than 760mm above finished floor level.
Ensure restrictors are fitted to limit the maximum opening so that a 100mm diameter sphere cannot pass through it.
Or a 760mm high barrier protecting the opening of solid construction or with vertical members its full height.

PAINTING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B2, E2, G7

SCOPE:

- Soffits
- Exterior wall cladding
- Front door
- Interior walls & ceilings
- Interior doors & window reveals
- Skirting's/architraves & trims
- 10 Series Brick Sealing

MATERIALS: Dulux Tradeline in unopened containers **OR** similar compliant brand. Client or Architect to confirm alternate selection prior to commencement of anywork.

CEILINGS:	Flat Finish
WALLS:	Low Sheen Finish Doors
WET AREAS / REVEALS:	Satin Enamel Finish as per E3/AS1
EXTERNAL CLADDINGS:	Acrylic self-priming paint (2x coats)
BRICK SEALING:	In accordance with manufacturers specifications.
INTERNAL:	All Gibraltor board shall have sealer applied over No. 4 stopping finish, all in accordance with the Gib Board Manufacturer's specification. 1 coat Gib sealer or 1 undercoat, 2 top coats acrylic 3 coats polyurethane for clear finish
WALLPAPER:	Size walls, hang plumb
COLOURS:	All colours to be as selected and approved by Owner and developer (if applicable) (Maximum of 4 colours from white base)

APPLICATION: Thoroughly prepare all surfaces, rub down between coats and leave a first-class finish. Stop all cracks and nail holes, etc. No painting shall be done under adverse weather conditions. All paintwork shall be 3 coats in 1 undercoat and 2 top coats. All work shall be of the highest standard, performed by skilled tradesmen in accordance with best trade practice, using tools and equipment suitable for ensuring a first-class job.
No external work shall be done during frosty or inclement weather. Any work damaged by dust, rain or any other cause shall be rubbed down and recoated. The top and bottom edges of all doors etc. shall be painted to the same number of coats as the exposed faces. No coat of paint, varnish or polish shall be applied until the undercoat is perfectly dry and hard. All finished surfaces shall be left smooth, even and free from brush marks, lap marks,

corner dribbles or other trades. All fittings, fixings and hardware shall be removed before preparatory processes are commenced and shall be refixed on completion of the painting. Adequately protect all finished work, including glass from paint splashes.

On completion, clean down all surfaces involved, including glass, rubbish, splashes and blemishes, etc. Remove all rubbish and leave ready for occupation.

TILING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, B2, D1, E2, E3, G3, NZS/AS 1884:1985

SCOPE: This section of work includes the waterproof membrane, supplying, laying, grouting and sealing of tiles as shown in schedule of Fixtures & Fittings

MATERIALS: Selected tiles in accordance with above standards.

LAYING: 1 row of tiles above vanities, basins & benches or as per interior designer.
Tiling shall be carried out following the guidelines and practices described in the BRANZ publication: Good Tiling Practice", October 1996.
Set out is to be confirmed at the time of selecting tiles and before work is commenced.
Tiles shall be fixed straight and even with no ridges. Cracked or chipped tiles shall NOT be used.
Where required tiles shall be cut using a saw to produce straight edges with no chips or cracks. Cut tiles shall be laid with cut edges concealed from view.
Joints to tiles shall be finished smooth and be sealed against moisture.
Seal bottom edge of tiles at benches with selected colour-matched silicone type sealant.
Sealant to be fungus resistant.
Grouting of tiles to be sealed once dry to stop moisture penetration inwards.
Interior tiles shall be laid over GIB Aqualine as shown on drawings.
GIB Aqualine is suitable as a substrate for tiling up to the following weights: 10mm GIB Aqualine up to 20kg/m^2, 13mm GIB Aqualine up to 32kg/m2. If tiles weigh more than that then James Hardie Villaboard is to be used up to its capacity.

WATERPROOFING MEMBRANES:
Waterproofing to extend to 1.5m radius from rose on floor, 1.5m along walls and 1.8m above finished floor level.
A waterproof membrane must be applied to all lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation.
The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproofing membrane over the lining and the jointed areas.
Waterproof membranes must be fully cured and dry prior to application of tiling adhesive.
Embed reinforcing mats in the membrane at all internal corners of the shower (including floor/wall junctions)

GUARANTEES: The tiles shall provide a Guarantee to cover against defective workmanship and materials supplied by him for a period of not less than 2 years after Certified Practical Completion.

FLOOR COVERINGS

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

STANDARDS: NZBC: B1, B2, D1, E2, E3, G3, NZS/AS 1884:1985

SCOPE: Interior rooms as required as shown in schedule of Fixtures & Fittings
Gas fire hearth 26mm min Eterpan sheet with tiled finish or similar over.

MATERIALS:

CARPET: On underlay with Smoothedge & Naplock bars.

VINYL: 2m thick min, approved adhesive. Ensure moisture content of concrete is below maximum level.

TILES: Selected times with appropriate slip resistance in accordance with acceptable solutions.

EROSION AND SEDIMENT CONTROL PLAN

PRELIMINARY: Please also refer to the Drainage Plan and Rainwater & Drainage Sections of this Specification.

SCOPE: The main contractor will use the relevant erosion and sediment control measures to meet the requirements for this site. Provide protection for neighbouring sites from rubbish or sediment contamination.

APPLICATION: EROSION CONTROL

Minimum existing vegetation and soil will be removed from the site,
Sediment Control measures will be in place before earthworks begin
Earthworks will keep to a minimum.
Stockpiles will be delivered as late as possible, located within the sediment control zone, and protected from runoff and covered where necessary.
Trenching will where possible be done at one time for all services.

Contractors will be requested to set out, dig, and backfill trenches in a such as way as to minimise erosion and runoff.
Hard wastes will be placed in the bins provided by the Company.
Clients will be encouraged to landscape and cover exposed soil on their site as soon as possible.

SEDIMENT AND RUN-OFF CONTROL

Upslope water will be diverted from the site where possible.
Sediment controls will be placed at the bottom of the site to minimise runoff leaving the site. These may involve sediment fencing, supplemented with straw bales on steep areas.
Existing vegetation will be used where possible to minimise runoff
Sump inlets will be protected from sediment runoff.
Storm water down pipes will be connected as soon as practicable to the permanent Storm water system once the roof is laid.
Contractors will be required to comply with these control measures
Wash down and wet trade runoff will be trapped and controlled on site
Sediment control measures will be regularly inspected and maintained.

SITE ACCESS

Stabilised access from the road to the platform will be provided.
A runoff diversion bund will be included in the site access way if required.
Sediment on footpaths and roads will be removed as soon as practicable

LANDSCAPING

PRELIMINARY: Refer to the Preliminary Section of the Specification for clauses equally binding on all sections of this contract

SCOPE: Required minimum landscaping in accordance with territorial authority. Refer to landscaping plan if applicable for more information.

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~~

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the futurebuild® range

FUTUREBUILD® STRUCTURAL LVL hy ONE® | FUTUREBUILD® STRUCTURAL LVL hy SPAN® | FUTUREBUILD® LVL TRUSS CHORDS hy CHORD® | FUTUREBUILD® STRUCTURAL LVL BEAMS hy 90® | FUTUREBUILD® LVL ENGINEERED I-JOISTS hy JOIST® | FUTUREBUILD® LVL SCAFFOLD PLANKS hy PLANK® | FUTUREBUILD® LVL FORMWORK BEAMS tru FORM® | FUTUREBUILD® LVL FORMWORK EDGE BOARDS edge FORM®

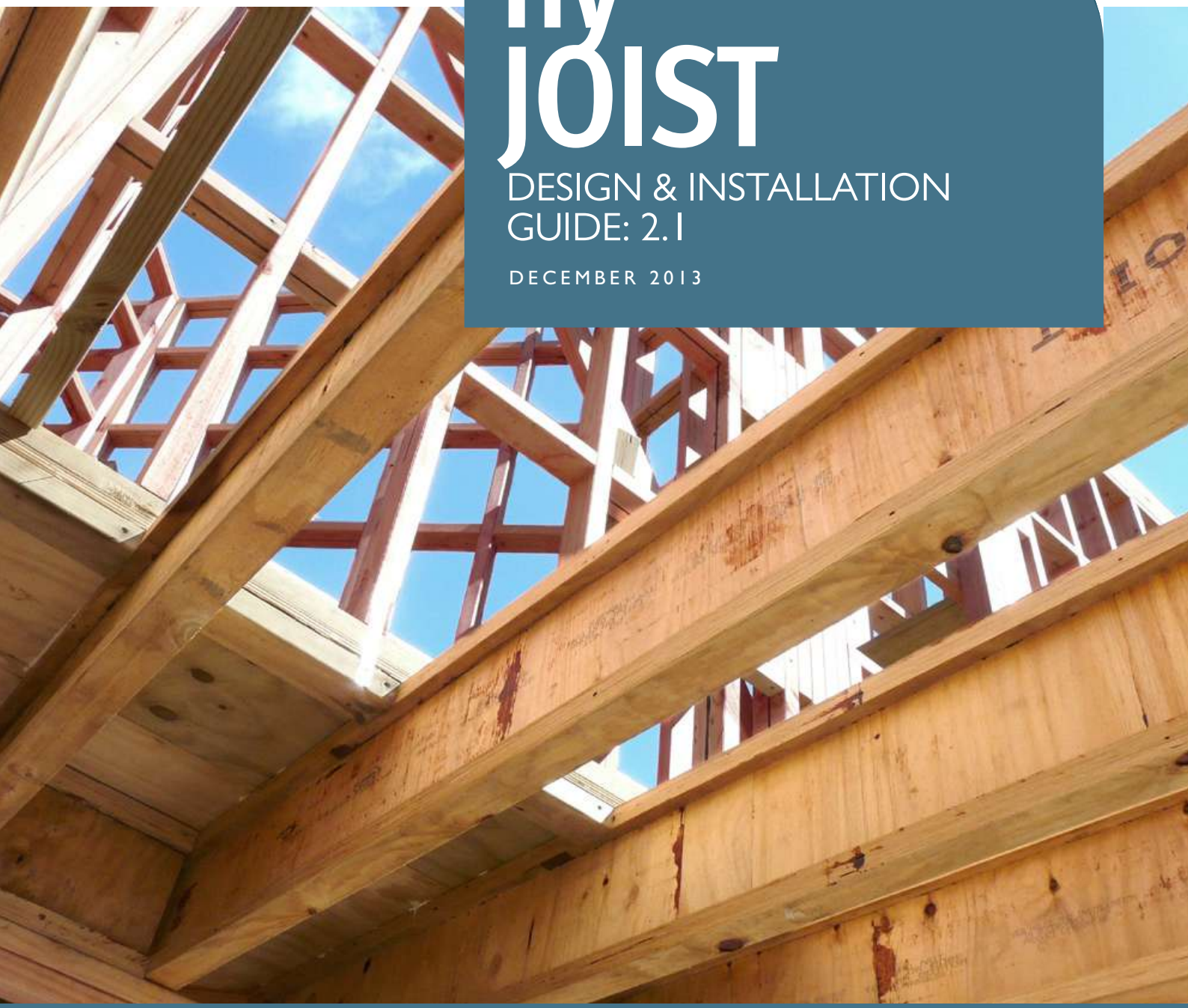
FUTUREBUILD® STRUCTURAL LVL

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

hy JOIST

DESIGN & INSTALLATION GUIDE: 2.1

DECEMBER 2013



CarterHoltHarvey Woodproducts New Zealand

Information contained within this manual is specific to the hyJOIST® range of LVL products and cannot be used with any other LVL products no matter how similar they may appear.

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FUTUREBUILD®
STRUCTURAL LVL

hy JOIST

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1.0 hyJOIST® OPTIONS RANGE

1.1 MORE OPTIONS FOR MORE ECONOMICAL FLOOR JOIST LAYOUTS

Select the economy section (HJ240 63, HJ300 63 & HJ360 63) of appropriate depth to accommodate the spans of the main area of the floor. Cater for any larger spans in the floor area using the wider flange options of corresponding depth.

Quality and performance

- Product quality – Engineered Wood Products Association of Australasia 'Product Certified' for peace of mind
- Technical support – experienced engineering support, simply call 0800 808 131
  - 'on-the-ground' specialist technical representatives, willing and able to help
- Responsible conservative design – 'maintaining the standard for consistency of performance'
- 'Off the shelf' convenience – readily available, ex stock via a building merchant, simply cut to length and install
- Treated – Optional LOSP treatment to H3 (equivalent to H3.1) as defined in AS/NZS 1604.4 (refer to treatment technical note on www.chhwoodproducts.co.nz)

Design

Consider the 'hyJOIST® SELECTION GUIDE' on page 3, summarising key parameters involved in selection of the appropriate joist sections. Information contained in this publication applies for floor joists used in houses. For more information refer either to this publication or designIT® software as set out in the following table. Use of designIT will provide a wider range of options and allow more optimum design.

For specific design of hyJOIST members, refer to the Limit State Design Information in the Specific Design Guide available from www.chhwoodproducts.co.nz

PRODUCT CERTIFIED tested STRUCTURAL LAMINATED VENEER LUMBER paa ENGINEERED WOOD

JAS-ANZ

The information contained in this manual relates specifically to hyJOIST LVL products manufactured by Carter Holt Harvey® Woodproducts and cannot be used with any other manufacturer's LVL product no matter how similar they may appear.

Alternative LVL products can differ in a number of ways which may not be immediately obvious and substituting them for products is not appropriate and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code.

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TABLE 1: hyJOIST®

Design information	Literature	designIT
Spanning capabilities	✓	✓
Bearing requirements	✓	✓
Blocking for lateral support	✓	✓
Transfer of wind / earthquake forces through the floor depth	✓	
Web holes – permitted locations related to size, shape and span	✓	✓
Details for limited notching of flanges (at end supports only)	✓	
Hangers, brackets and fixing requirements for support of joists	✓	✓
Framing for stair voids		✓
Cantilevers for balconies	✓	✓
Joists supporting parallel load bearing walls	✓	✓
Joists supporting perpendicular load bearing walls (including cantilevers)		✓
Continuous hyJOIST® blocking for support of load bearing walls	✓	✓
Joists supporting alternative floor mass & floor live loads		✓

1.2 hyJOIST® SELECTION GUIDE

TABLE 2:

Dimensions for Detailing					hyJOIST® Section Code	Weight of 5 metre length	Maximum Hole Size For Services 2	Span — Floor joists for Houses					
		Flange Width (mm)						Single Span		Continuous Span		Balcony Cantilever 3	
Overall Depth	Clear Distance Between Flanges	45	63	90				Joist Spacing (mm)					
		Flange Outstand (mm)						450	600	450	600	450	600
		18	27	39				Recommended Span Range (m)				Maximum (m)	
200	119	HJ200 45			HJ200 45	14.8kg	118 mm	3.5 to 3.8	3.1 to 3.6	4.0 to 4.5	3.7 to 4.2	1.0	0.9
240	159		HJ240 63	HJ240 90	HJ240 63	20.5kg	158 mm	4.4 to 4.9	4.0 to 4.5	5.0 to 5.5	4.5 to 5.1	1.3	1.2
					HJ240 90	28.8kg		4.9 to 5.4	54.5 to 5.0	5.6 to 6.1	5.1 to 5.6	1.5	1.4
300	219		HJ300 63	HJ300 90	HJ300 63	22.0kg	218 mm	5.0 to 5.5	4.6 to 5.1	5.6 to 6.3	5.2 to 5.8	1.5	1.4
					HJ300 90	30.9kg		5.6 to 6.1	5.2 to 5.7	6.4 to 7.0	5.9 to 6.4	1.7	1.6
360	279		HJ360 63	HJ360 90	HJ360 63	23.6kg	278 mm	5.6 to 6.2	5.2 to 5.7	6.3 to 6.8	5.6 to 6.8	1.7	1.6
					HJ360 90	33.0kg		6.3 to 6.8	5.8 to 6.3	7.2 to 7.8	6.7 to 7.1	1.9	1.8
400	319			HJ400 90	HJ400 90	34.4kg	318 mm	6.8 to 7.2	6.3 to 6.7	7.6 to 7.9	6.7 to 7.1	2.0	1.9

1. Used to determine the thickness of packing to pack web flush with flanges
2. Refer to page 9 / designIT® for permitted hole locations and limitations 3. Refer to page 10 / designIT for further design information

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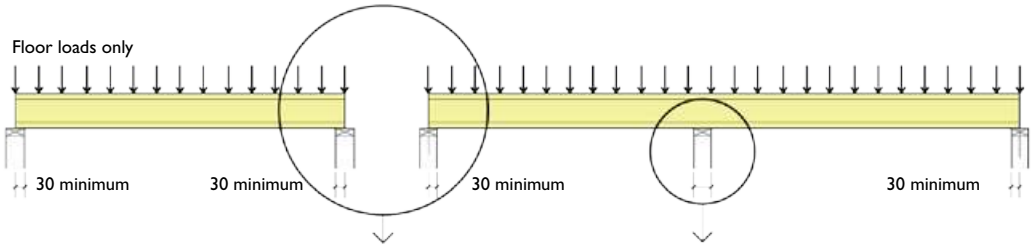
1.3 BEARING SUPPORT

FOR JOISTS NOT TRANSFERRING LOAD FROM UPPER WALLS

FIGURE 1

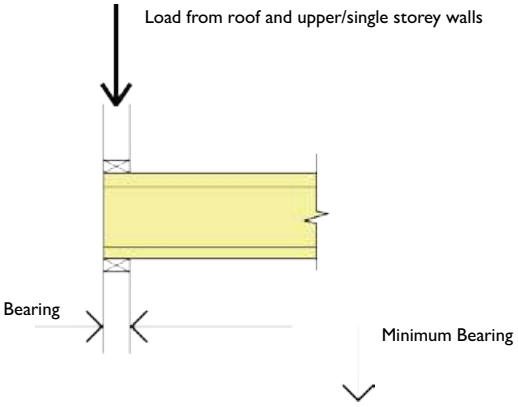


	End Supports Single Or Continuous Spans	Intermediate Supports Continuous Span	
JOIST SPACING (mm)	ALL	450	600
MINIMUM BEARING (mm)	30	45	65

designIT® may give reduced bearing requirements for specific cases.

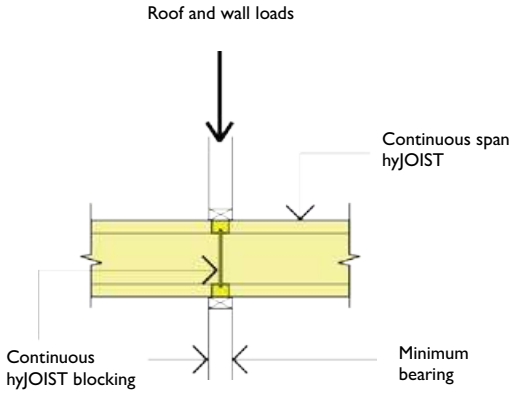
FOR JOISTS TRANSFERRING UPPER STOREY WALL AND ROOF LOADS AT SUPPORTS

FIGURE 2 End supports — single or continuous spans



For joists supporting load bearing walls at end supports, provide bearing as specified in the table below or alternatively install continuous hyJOIST® blocking/'rimboard'/boundary joist.

FIGURE 3 Intermediate supports — continuous spans



Minimum bearing to be as for joists supporting floor loads only. Load bearing wall to be supported by continuous full depth hyJOIST® blocking.

TABLE 3:

LOAD TYPE	JOIST SPACING (mm)	
	450	600
	MINIMUM BEARING (mm)	
LIGHT ROOF	45	651
HEAVY ROOF	65	902

1. If web stiffeners installed bearing may be reduced to 45 mm
2. If web stiffeners installed bearing may be reduced to 65 mm
3. For all cases bearing may be reduced to 30 mm if continuous full depth blocking or compression blocks are installed
4. Web stiffener installation as per Detail F6
5. designIT may give a reduced bearing requirement

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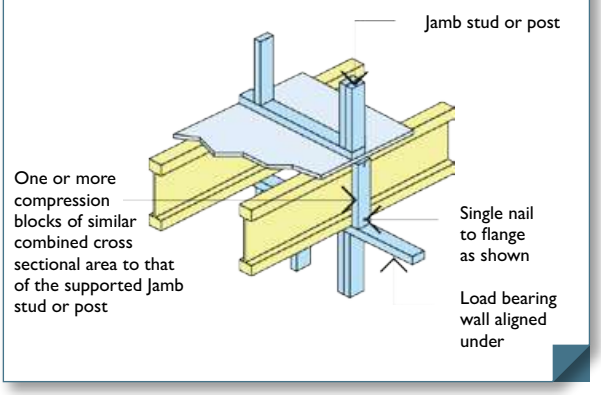
Concentrated loads from jamb studs/posts

Use compression blocks to transfer loads through to supports as shown. Refer to Detail F18.

For lower storey of 2 storey construction

Continuous full depth hyJOIST® blocking should be installed to transfer compression loads from load bearing walls to the supports. In most cases continuous hyJOIST blocking will be adequate to support the roof, wall and floor loads. Refer to designIT for confirmation.

FIGURE 4



1.4 SUPPORT

TABLE 4: JOIST HANGERS FOR hyJOIST®

hyJOIST® Section Code	Manufacturer Or Distributor	Face Mount Hangers				Top Mount Hangers [3]
		Full Depth		Partial Depth [2]		
		Hanger Code	Minimum No Of Nails To Bearer	Hanger Code	Minimum No Of Nails To Bearer	Hanger Code
HJ200 45	Pryda			FB47/176	10	LT200/50
	Mitek	JH47190	8	JH47120	8	
HJ240 63	Pryda	LF235/65	8	FB 65/170	12	LT240/65
	Mitek	IBHF24065	8			IBHT 24065
HJ240 90	Pryda	LF235/90	8	FB 94/152	12	LT 240/90
	Mitek	IBHF 24090	8			IBHT 24090
HJ300 63	Pryda	LF290/65	8	FB 65/170	12	LT300/65
	Mitek	IBHF 30065	8			IBHT 30065
HJ300 90	Pryda	LF290/90	10	FB 94/152	12	LT 300/90
	Mitek	IBHF 30090	10			IBHT 30090
HJ360 63	Pryda	LF340/65	10	FB 65/170	12	LT 360/65
	Mitek	IBHF 36065	10			IBHT 36065
HJ360 90	Pryda	LF 350/90	10	LF 290/90	10	LT 360/90
	Mitek	IBHF 36090	10			IBHT 36090
HJ400 90	Pryda	LF 390/90	12	LF 350/90	12	LT 400/90
	Mitek	IBHF 40090	12			IBHT 40090

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SKEW ANGLE BRACKET FOR OBLIQUE JOISTS

FIGURE 5

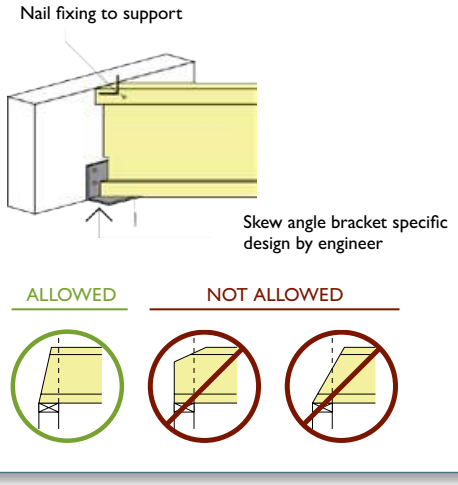
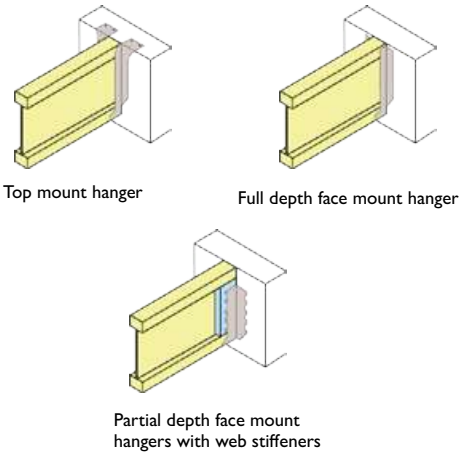


FIGURE 6



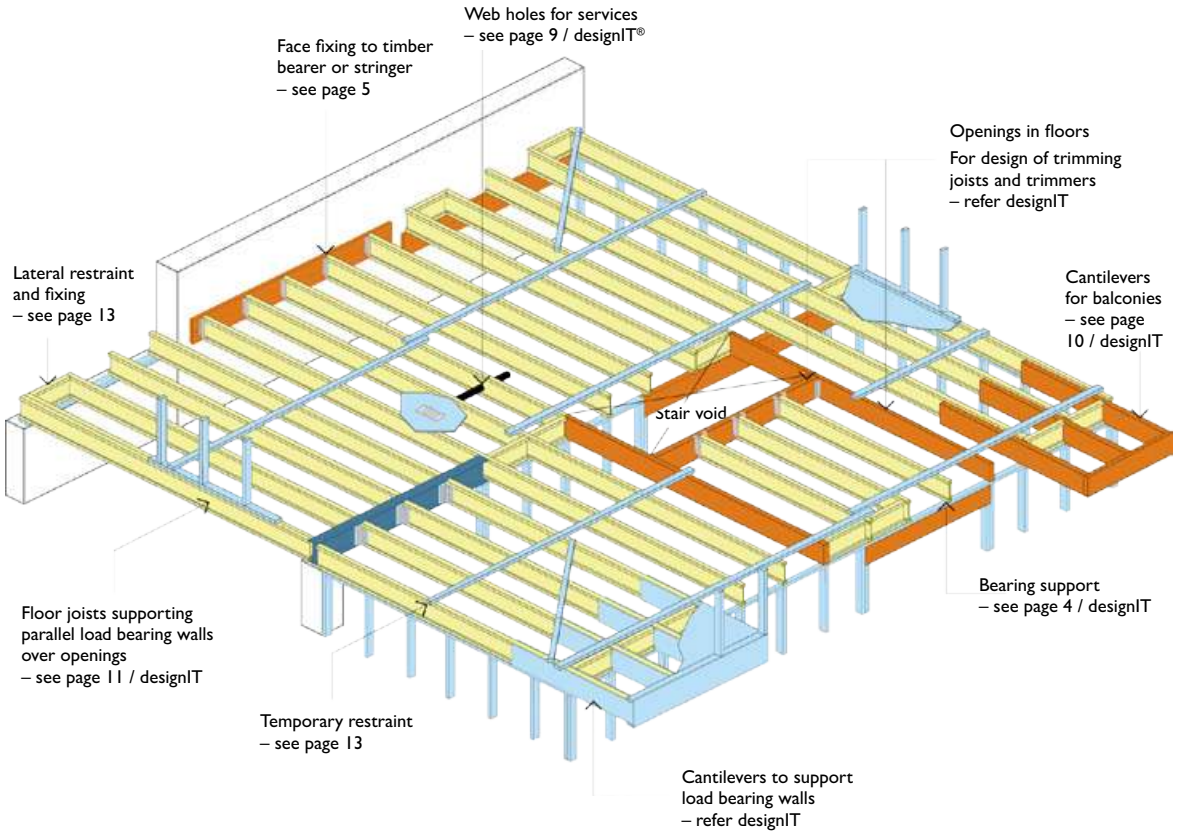
1. Nailing specified is for brackets face fixed to hySPAN®, MSG8 or VSG8, J5 (or better) timber bearer or stringer.
2. Brackets to be installed strictly in accordance with bracket manufacturers' recommendations. Note, nails for FB hangers are 35 x 3.15 flat head type; for all other hangers 40 x 3.75 flat head nails are specified.
3. Fix top mount hangers with 4, 35 x 3.75 flat head nails.

Storage

Prior to installation hyJOIST® should be stacked on level bearers, at least 150 mm clear of the ground and kept dry.

1.5 TYPICAL FLOOR LAYOUT

FIGURE 7



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1.6 TRANSFER OF WIND AND EARTHQUAKE FORCES BETWEEN FLOORS

The design of houses includes quantification of lateral loads due to wind and earthquake. Racking forces determined for design of upper level bracing must be able to be transferred through the floor depth to the lower level. Racking forces in the direction of the joists are catered for by the considerable longitudinal shear capacity of the joists. For forces perpendicular to the joists, blocking and/or perimeter 'rimboard' and their associated fixings (installed to provide lateral restraint) may or may not be adequate. In particular, the fixing of the floor diaphragm to 'rimboard'/blocking and in turn, fixing of 'rimboard'/blocking to the supports must be adequate to resist the horizontal racking force used for design of the upper floor wall bracing system.

Blocking using hyJOIST® with the required fixing is a practical and easy to install solution.

FIGURE 8

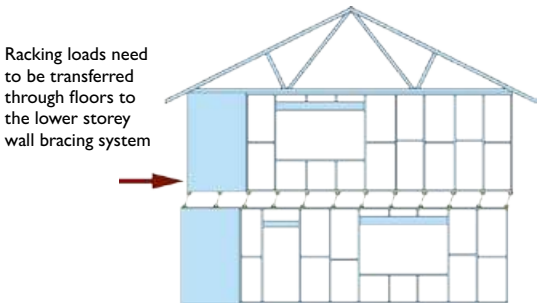


FIGURE 9: Using plywood closures – at external walls

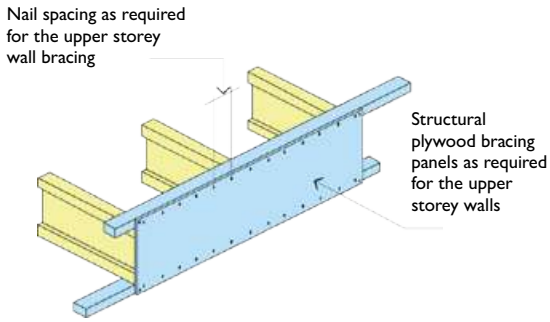
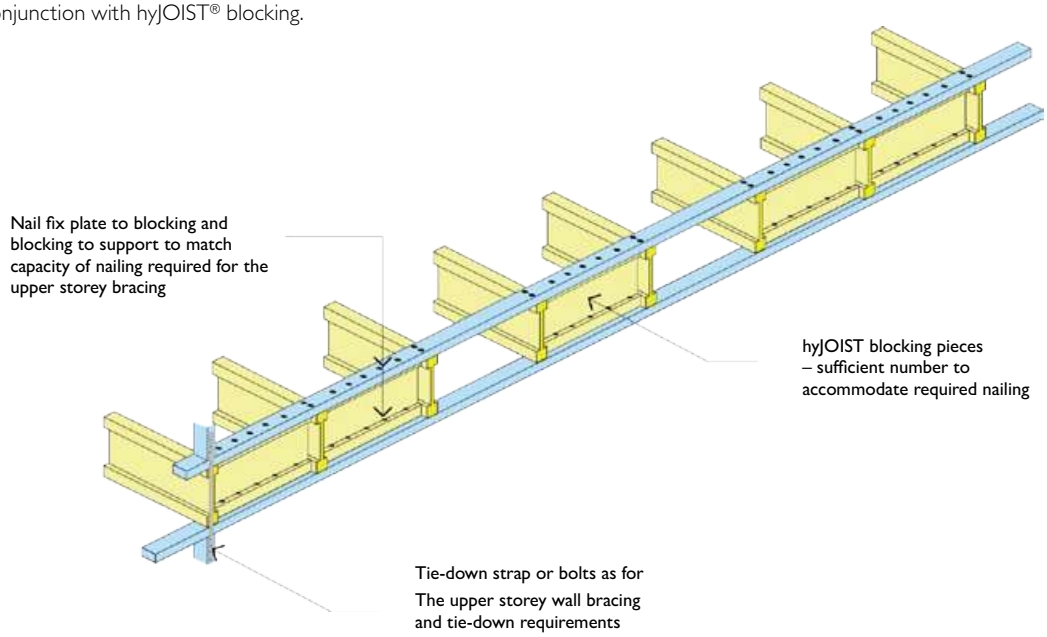


FIGURE 10: Using hyJOIST® blocking – external and internal walls

At external walls, 'rimboard' may be used in conjunction with hyJOIST® blocking.



1.7 WEB HOLES FOR hyJOIST®

Holes may be cut through the web of hyJOIST provided they are located within the central part of the span as specified below. For hole sizes other than those included below refer to the web hole calculator in designIT®. For cases involving non-uniform loading or where the possibility of locating the hole closer to supports needs to be assessed, use the web hole option in the floor joist calculator in designIT.

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FIGURE 11: Circular & Rectangular Holes

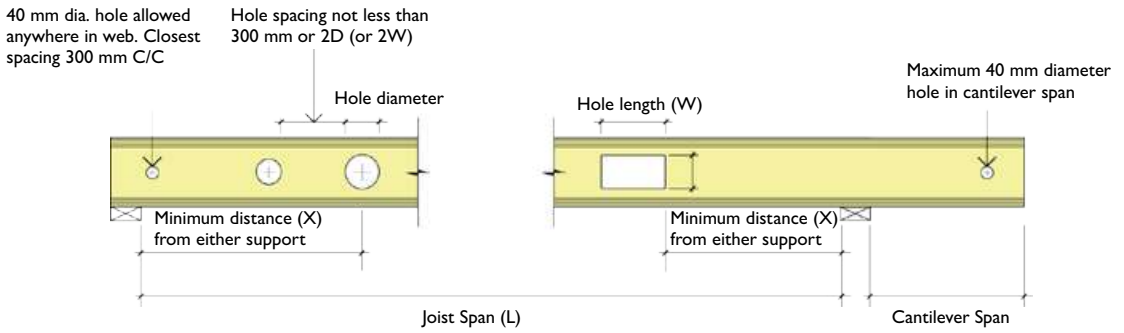
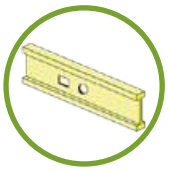
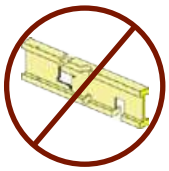


TABLE 5:

hyJOIST® section code	Maximum hole diameter (mm)	Minimum distance from support 'x'	Hole diameter (mm)			
			Ø80	Ø110	Ø125	Ø150
			Circular holes – minimum distance 'x' from support – (m)			
HJ200 45	ø118	0.34L[1]	0.16L	0.28L	N/A	N/A
HJ240 63	ø158	0.38L	0.12L	0.21L	0.26L	0.33L
HJ240 90	ø158	0.38L	0.12L	0.21L	0.26L	0.33L
HJ300 63	ø218	0.41L	0.10L*	0.15L	0.18L	0.24L
HJ300 90	ø218	0.41L	0.10L*	0.10L*	0.14L	0.20L
HJ360 63	ø278	0.42L	0.3 m*	0.08L*	0.11L	0.16L
HJ360 90	ø278	0.40L	0.3 m*	0.3 m*	0.3 m*	0.05L*
HJ400 90	ø318	0.40L	0.3 m*	0.3 m*	0.3 m*	0.08L*



Do cut in web area as specified



Do not cut, notch or bore through flange

* Minimum distance from any support is 0.3 metres.
Example, if actual span 'L'= 4.0m then minimum distance 'X' from hole to support (see diagram) is 0.34 x 4.0 = 1.36m

TABLE 6:

hyJOIST® section code	Hole size		Permitted locations for rectangular holes							
	Height (mm)	Length (mm)	L	Actual Span 'L' in metres							
			X	Minimum distance from the side of the hole to any support – (m)							
HJ200 45	118	250	L	≤ 3.8	4.0	4.2	4.4	4.5			
			X	0.34L	1.38	1.59	1.80	1.90			
HJ240 63	158	330	L	≤ 3.5	5.5						
			X	0.38L	2.13						
HJ240 90	158	330	L	≤ 5.8	6.0	6.1					
			X	0.38L	2.36	2.45					
HJ300 63	218	400	L	≤ 5.2	5.4	5.6	5.8	6.0	6.2	6.3	
			X	0.41L	2.25	2.39	2.54	2.69	2.83	2.91	
HJ300 90	218	400	L	≤ 6.4	6.6	6.8	7.0				
			X	0.40L	2.73	2.88	3.04				
HJ360 63	278	500	L	≤ 5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8
			X	0.42L	2.37	2.49	2.62	2.75	2.88	3.02	3.15
HJ360 90	278	500	L	≤ 7.2	7.4	7.6	7.7				
			X	0.40L	2.97	3.10	3.17				
HJ400 90	318	600	L	≤ 8.0							
			X	0.40L							

Interpolate to obtain values of 'X' for spans intermediate between the values given
Notes:
1. Data applies for floor joists supporting uniform loads (and concentrated live load not exceeding 1.8 kN).
2. Hole locations closer to supports may be possible for some load and support conditions; refer to the 'floor joist calculator' in designIT software or contact Carter Holt Harvey.
3. Spacing between holes to be not less than 300 mm or twice the width (or twice the diameter) of the larger hole.
4. Not more than three holes with width or diameter greater than 80 mm in any span.
5. For cantilever spans holes greater than 40 mm diameter are not permitted.
6. Not more than one rectangular (or square) hole per span.

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1.8 CANTILEVERS FOR BALCONIES

Balcony cantilevers, subject to external weather exposure can be provided using H3.2 preservative treated and protected outriggers as per Details F11 and F12. For weather proofed applications H3.1 treated hyJOIST® can be cantilevered to provide balcony support as per Detail F13.

Outriggers can be dry stress-graded timber or hySPAN®, either nested against the hyJOIST web and bearing on the top of the bottom flange or placed adjacent to the hyJOIST bearing directly on the support. Diagrams illustrating these configurations are shown below.

Some options for outriggers are included in the following table. These have all been determined for 2 kPa balcony floor load. For other floor loads and to consider other options refer to designIT®.

hySPAN outriggers are not recommended for use in weather exposed applications . MSG Pine may be treated to H3.2 level for weather exposed balconies.

TABLE 7:

hyJOIST® section code	Joist spacing (mm)	Maximum balcony cantilever (m)	Outrigger options	
			Nested outrigger	Adjacent outrigger
HJ200 45	450	1.0	No Suitable Depth Option	150 x 45 hySPAN 190 X 45 MSG8
	600	0.9		150 x 45 hySPAN 190 X 45 MSG8
HJ240 63	450	1.3	2/150 x 45 hySPAN®	200 x 45 hySPAN 240x 45 MSG8
	600	1.2	2/150 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
HJ240 90	450	1.4	2/150 x 45 hySPAN	Not Recommended
	600	1.3	2/150 x 45 hySPAN	
HJ300 63	450	1.5	200 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
	600	1.4	200 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
HJ300 90	450	1.7	2/200 x 45 hySPAN	Not Recommended
	600	1.6	2/200 x 45 hySPAN	
HJ360 63	450	1.7	240 x 45 hySPAN	240 x 45 hySPAN 290 x 45 MSG8
	600	1.6	240 x 45 hySPAN	240 x 45 hySPAN 290 x 45 MSG8
HJ360 90	450	1.9	240 x 63 hySPAN	Not Recommended
	600	1.8	2/240 x 45 hySPAN	
HJ400 90	450	2.0	300 x 45 hySPAN	Not Recommended
	600	1.9	300 x 45 hySPAN	

1. Cut from larger hySPAN section with clearance between flanges

FIGURE 12: Adjacent Outrigger

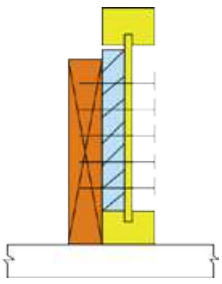

FIGURE 13: Nested Outrigger

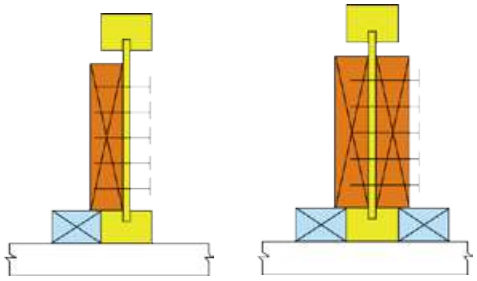

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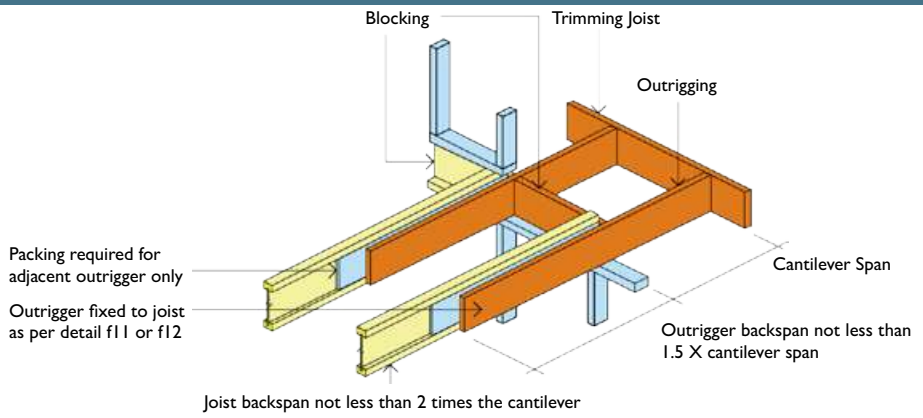
FIGURE 14



1.9 JOISTS SUPPORTING PARALLEL LOAD BEARING WALLS

TABLE 8:

hyJOIST® section code	Light roof & ceiling											
	Roof load width (m)						Roof load width (m)					
	1.8	2.4	3.6	4.8	6.0	7.2	1.8	2.4	3.6	4.8	6.0	7.2
	Maximum single span (m)						Maximum continuous span (m)					
HJ200 45	2.7	2.5	2.2	2.0	1.7	1.5	2.9	2.5	2.0	1.6	1.3	1.2
2/HJ200 45	3.5	3.3	3.0	2.8	2.6	2.4	4.1	3.9	3.4	3.1	2.7	2.3
HJ240 63	3.5	3.2	2.9	2.6	2.2	1.9	3.8	3.3	2.5	2.1	1.8	1.5
2/HJ240 63	4.5	4.3	3.9	3.6	3.3	3.1	5.4	5.2	4.5	4.1	3.5	3.0
HJ240 90	4.0	3.8	3.4	3.1	2.945	2.545	4.970	4.380	3.480	2.880	2.380	2.080
HJ300 63	4.2	3.9	3.5	3.245	2.945	2.545	5.080	4.490	3.490	2.890	2.390	2.090
2/HJ300 63	5.1	4.9	4.6	4.3	4.0	3.8	6.1	5.8	5.1	4.6	4.270	3.980
HJ300 90	4.7	4.5	4.145	3.865	3.465	2.965	5.6	5.0##	3.9##	3.2##	2.7##	2.4##
HJ360 63	4.7	4.545	4.145	3.765	3.465	3.065	5.5##	5.1##	3.9##	3.2##	2.7##	2.4##
2/HJ360 63	5.7	5.5	5.1	4.8	4.6	4.445	6.1	6.0	5.5	5.290	4.8##	4.4##
HJ360 90	5.2	5.045	4.765	4.065	3.465	2.965	5.9##	5.0##	3.9##	3.2##	2.7##	2.4##
HJ400 90	5.645	5.345	4.965	4.065	3.465	2.965	5.8##	5.0##	3.9##	3.2##	2.7##	2.4##

TABLE 9:

hyJOIST® section code	Heavy roof & ceiling											
	Roof load width (m)						Roof load width (m)					
	1.8	2.4	3.6	4.8	6.0	7.2	1.8	2.4	3.6	4.8	6.0	7.2
	Maximum single span (m)						Maximum continuous span (m)					
HJ200 45	2.2	1.8	1.3	NS	NS	NS	1.8	1.5	NS	NS	NS	NS
2/HJ200 45	2.9	2.7	2.3	2.1	1.7	NS	3.3	2.9	2.1	1.7	1.4	1.2
HJ240 63	2.8	2.4	1.7	1.4	NS	NS	2.3	1.9	1.4	NS	NS	NS
2/HJ240 63	3.7	3.4	3.0	2.7	2.2	1.9	4.4	3.8	2.7	2.2	1.8	1.5
HJ240 90	3.3	3.045	2.345	1.845	1.545	1.345	3.180	2.580	1.880	1.480	1.280	NS
HJ300 63	3.445	3.145	2.345	1.845	1.545	1.345	3.190	2.590	1.890	1.490	1.290	NS
2/HJ300 63	4.5	4.1	3.6	3.245	3.045	2.545	4.965	4.570	3.790	2.990	2.490	2.090
HJ300 90	4.045	3.665	2.765	2.165	1.765	1.565	3.6##	2.9##	2.1##	1.7##	1.4##	1.2##
HJ360 63	3.965	3.665	2.765	2.165	1.765	1.565	3.6##	3.0##	2.2##	1.7##	1.4##	1.2##
2/HJ360 63	5.0	4.7	4.245	3.865	3.565	2.965	5.470	4.990	4.2##	3.4##	2.8##	2.4##
HJ360 90	4.565	3.765	2.765	2.165	1.765	1.565	3.6##	2.9##	2.1##	1.7##	1.4##	1.2##
HJ400 90	4.565	3.765	2.765	2.165	1.765	1.565	3.6##	2.9##	2.1##	1.7##	1.4##	1.2##

Notes:

1. NS signifies the calculated span is less than 1.2 m.
2. Bearing for single span joists or the end supports of continuous joists, provide at least 30 mm bearing unless signified otherwise by a subscript value adjacent to the quoted maximum span. For the intermediate supports of continuous span joists, provide at least 65 mm bearing unless signified otherwise by a subscript value adjacent to the quoted span - ##, signifies that web stiffeners are required together with a bearing of 90 mm.

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2.0 hyJOIST® INSTALLATION

By separating design considerations from installation requirements the intention is to help builders and designers sort out 'who does what' and minimise the potential for critical matters to 'slip between the cracks'.

There are some aspects of installation that can be regarded by designers and builders as 'basic requirements' to be adopted for installation in the absence of other or additional requirements specified in the design documentation. Requirements that fit into this category are defined and detailed under 'Basic Installation Requirements'.

Other aspects, are categorised as 'Installation details requiring design and specification' because they need selection and individual specification in the design documentation to ensure the design intent is communicated to the builder.

This guide provides a variety of details specific to the use of hyJOIST® floor systems for houses and similar buildings. Details contained in this publication have been appropriately engineer designed and/or tested to determine their suitability. In addition, many details in NZS 3604 and other industry publications are equally applicable to hyJOIST as for conventional timber joisted floors – use them. We do however, caution against any assumption that details published for other I-Joist products are suitable or sufficiently complete for use with hyJOIST.

In all cases it is assumed that installation will be carried out in accordance with a joist layout drawing showing the location, size (section code) and maximum spacings of joists together with reference to any special requirements not included in this guide as 'basic requirements'.

2.1 BASIC INSTALLATION REQUIREMENTS

Installation requirements specified in this section should be assumed to apply as minimum requirements in the absence of additional or other requirements specified in the design documentation.

2.2 JOIST PLACEMENT

Joists should be accurately placed at not more than the nominated maximum centre to centre spacing so as to provide the support required for flooring and load bearing walls or posts.

2.3 FIXING TO SUPPORTS

Joists are to be fixed accurately in position at supports using nails or screws as per Detail F5.

2.4 SUPPORTS

Supports shall be level, dry and have at least the rigidity implied by good framing practice and/or the design criteria specified for supporting components in NZS 3604. (A moisture barrier is recommended where support is directly to masonry or brickwork). Brackets available for use with hyJOIST are listed on page 5.

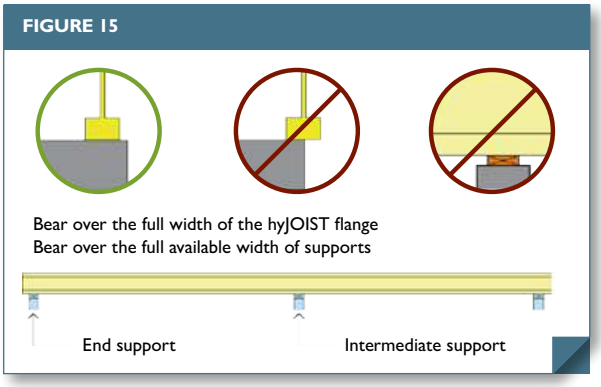
2.5 BLOCKING AND BEARING AT SUPPORTS (FOR SUPPORT OF GRAVITY LOADS)

General

- Bearing should be provided to the full width of the hyJOIST bottom flange
- It is good practice to bear over the maximum available width of supports
- Use of web stiffeners can reduce the required bearing however this needs to be specified in the design documentation
- Continuous blocking provides support for load bearing walls directly aligned above supports. At end supports, 'rimboard' or boundary joists can be used as an alternative to continuous blocking to support a load bearing wall

In the absence of any alternative specification in the design documentation bearing support details can be referred on page 4

FIGURE 15



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2.6 LATERAL RESTRAINT

Intermittent blocking (or equivalent) at supports

The fundamental requirement is to install joists plumb and hold them upright at supports.

The simplest and most effective way of achieving this is to install square cut hyJOIST® blocking but alternative methods such as the use of 'rimboard', boundary joists, metal strap/brace or plywood closures are acceptable.

For installation of blocking, 'rimboard', boundary joist, metal strap/brace or plywood enclosures refer to Details F1, F2, F3 and F17.

FIGURE 16

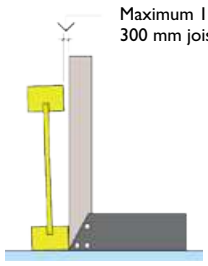
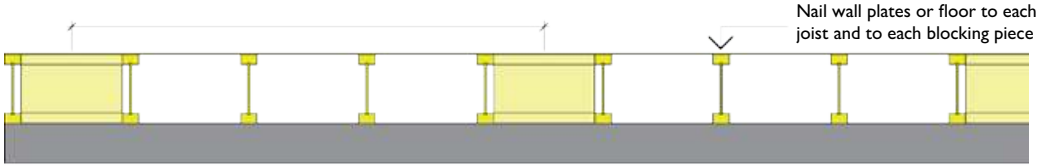


FIGURE 17



2.7 INTERMEDIATE RESTRAINT (BETWEEN SUPPORTS)

For best performance, the top flange of hyJOIST should be held straight between supports – (no more than 1 mm per metre of span deviation from straight).

Before loading joists and attachment of flooring:

- Install blocking (or equivalent) at supports as described above, and
- between supports, install temporary battens braced back to a point of rigidity (no more than 2.5 metres apart) to hold the top flange of each joist straight between supports
- For installation of flooring, progressively work across the floor removing battens as required

Note: Intermediate blocking is not required and can be a source of annoying nail creaks in the finished structure

FIGURE 18

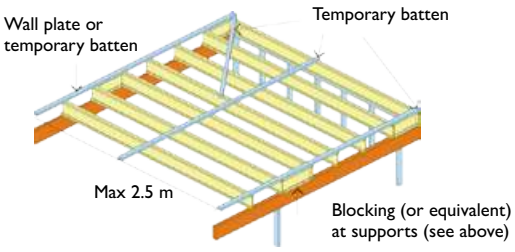
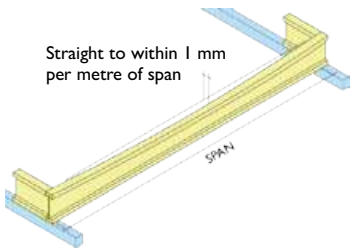


FIGURE 19



Fixing of Flooring

Flooring may be nailed to joists and to blocking using either 2.8 mm diameter nails, hand driven or 2.5 mm diameter nails, machine driven. Alternatively, for sheet flooring self-drilling Type 17 screws may be used. Fastener lengths should not exceed the lengths given in Table 1. Nail or screw spacing should be at centres recommended for the particular flooring type. Where nail centres are less than 50 mm it is good practice to stagger their location so as to avoid the possibility of splitting. It is strongly recommended that flooring adhesive is used in conjunction with nailing.

TABLE 7:

Flooring Thickness	15-21 mm	25 mm
Maximum Nail/Screw Lengths	50 mm	57 mm

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2.8 NOTCHING/CUT BACKS/HOLES WITH hyJOIST®

Notches or holes in flanges

Flanges may not be notched, planed or bored except as noted below

1. At end supports only, one or both flanges may be notched to a maximum depth of 12 mm (per flange) as shown in Detail F7
2. At end supports flanges may be chamfer cut but not beyond the line of the support
3. Do not bore holes through flanges. Holes up to 6 mm for installation of nails or screws at supports allowed

Notches or holes in webs

1. At end supports webs may be notched to accommodate the flange of a steel supporting beam within the limitations specified
2. Holes may be cut through the web of hyJOIST® for the installation of service pipes and ducts but there are limitations on the placement, size and shape of holes. In general, larger holes must be located closer to midspan. Guidance on the positioning of web holes is given on page 9. Alternative locations may be specified in the design documentation for specific load and support cases.

FIGURE 20

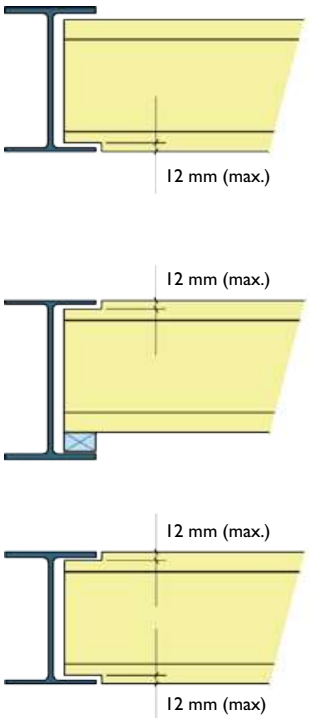


FIGURE 21

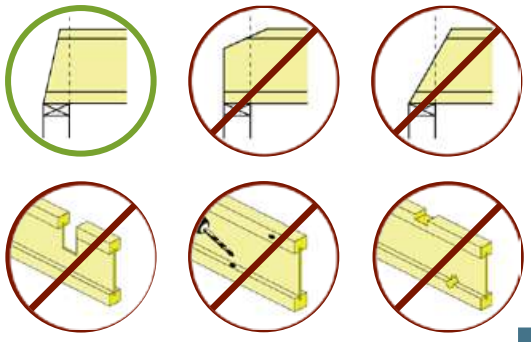


FIGURE 22

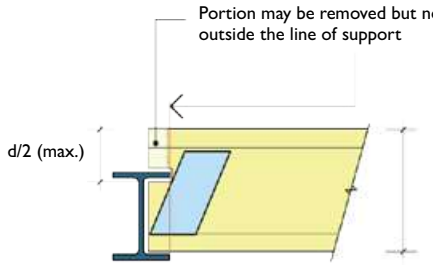
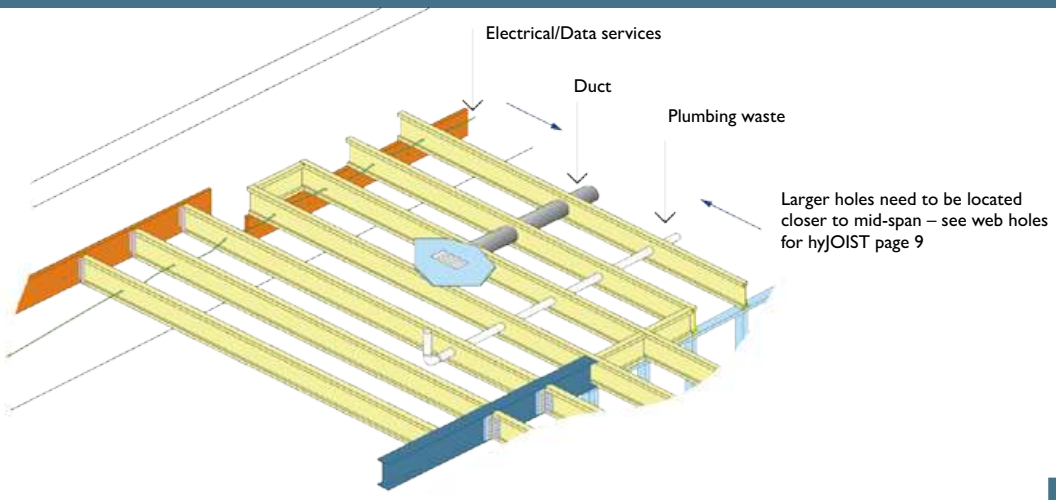


FIGURE 23



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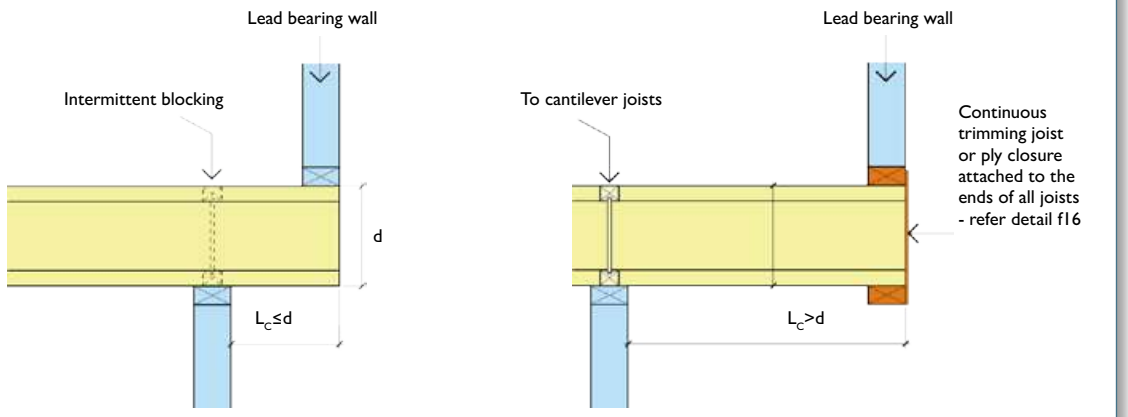
2.9 METHOD FOR FRAMING CANTILEVERS SUPPORTING LOAD BEARING WALLS

Some or all of hyJOIST® cantilevered to support a load bearing wall may require reinforcement. This requirement needs to be considered in design and specified in the design documentation. Details for reinforcement are given in Details F21 and F22.

Regardless of whether reinforcement is required or not, cantilevers with span greater than the joist depth are to be installed with continuous blocking at the cantilever support and a trimming joist (or equivalent) providing load distribution at the ends of the cantilevered joists. The use of a trimming detail helps to both stiffen the balcony and limit long term differential deflections. For installation see Detail F15.

Short cantilevers ($L_c \leq d$) may need reinforcement but intermittent blocking only is needed at the cantilever support and the trimming joist need not be included – see Detail F14.

FIGURE 24



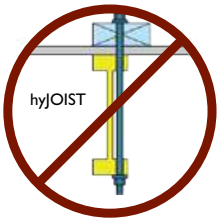
2.10 TIE DOWN AND TRANSFER OF LATERAL FORCES THROUGH THE FLOOR

Requirements for tie down and bracing should be specified in the design documentation.

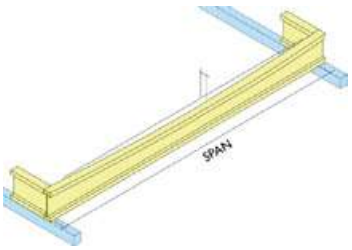
Tie Down

In general, tie down details applicable for solid timber joists as specified in NZS 3604 can also be used with hyJOIST except that bolting through the flanges of hyJOIST is not permitted.

Detail F9 and TD1 – TD5 show how bracing walls may be tied down to a hyJOIST floor system.



Do not bolt through joists



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Transfer of lateral forces through the floor

Lateral wind and earthquake forces determined for the upper storey must be transferred through the floor to the top plate (and the bracing system) of the lower storey. Where these forces are perpendicular to the direction of joists, intermittent blocking or the fixings to 'rimboard' or boundary joists are not likely to be adequate to transfer the full extent of the forces. For most external walls the simplest answer is to just continue the upper storey bracing (and associated tie-down) through the floor to the top plate of the lower storey wall.

Alternatively, or where continuation of bracing is not possible, such as where joists or outrigger joists are cantilevered (or for internal walls) it is recommended that sufficient blocking is provided to accommodate the nailing attachment of the upper storey wall bottom plate to the blocking and the blocking bottom flange to the top plate of the lower storey wall to match the capacity of the nailing of the upper storey bracing to the bottom wall plate. Tie-downs using metal strap or tie rods at the beginning and end of each braced portion of the wall should be carried through the floor to lower storey wall.

FIGURE 25

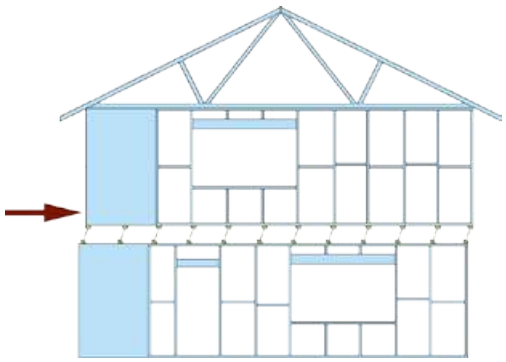
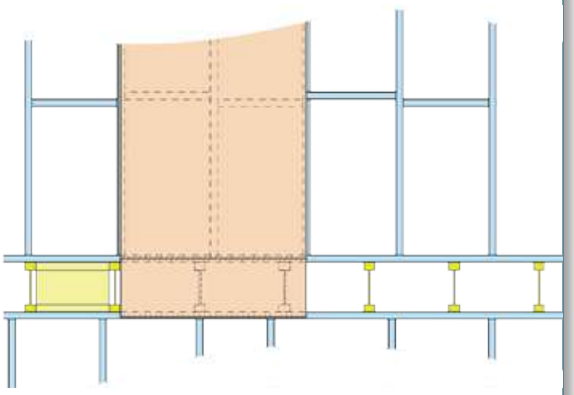
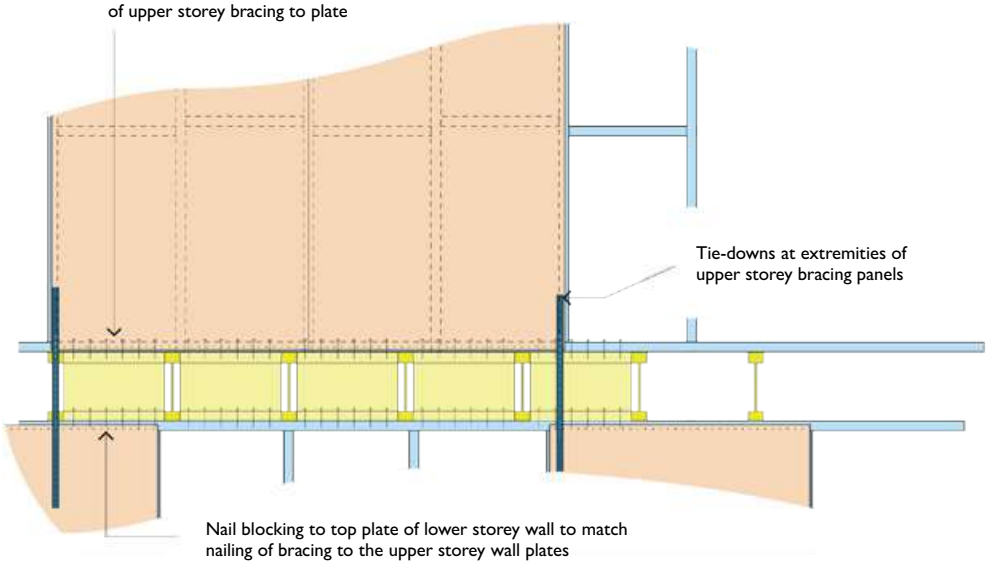


FIGURE 26



Continue bracing for the upper storey through to the top plate of the lower storey wall

FIGURE 27



Product faults

Faults in manufacture do sometimes occur and faulty product may from time to time reach the market despite even the most stringent controls of the manufacturing process and quality. Please let us know if you receive any product that you have concerns with – call 0800 808 131 even if you have solved the problem and a claim 'is not worth the hassle'. We want to know so that we can do better.

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3.0 INSTALLATION DETAILS REQUIRING DESIGN & SPECIFICATION

The following items need design and specification in the design documentation to communicate the requirements for installation.

- Joist sizes and spacing for span, loading and flooring
- Method of framing around openings in floors (eg stair voids)
- Method of framing balcony cantilevers
- Reinforcement requirements for cantilevers supporting load bearing walls
- Bearing and support requirements differing from that specified under basic requirements for installation
- Details for tie-down and transfer of lateral forces through the floor beyond that specified in the basic requirements
- Specification of web holes and permitted locations (not within the scope of tables on page 9)

Framing around floor openings

The size of members needed to frame around floor openings needs to be determined in design and specified in the design documentation for installation.

For convenience the depth of the trimmers and trimming joists are usually chosen to be the same as the depth of the floor joists. The ease of connecting and the greater strength and stiffness of hySPAN® relative to depth in comparison with hyJOIST® makes hySPAN the ideal material for framing both the trimmers and the trimming joists.

Trimmers and the supporting trimming joists may in some cases be hyJOIST, where structurally adequate. These can be connected using top mount hangers see Joist Hangers for hyJOIST on page 5 and Detail F10.

Methods of framing balcony cantilevers

Balcony cantilevers are frequently exposed to wetting and in this circumstance there is a high risk of decay with subsequent loss of strength of the balcony structure. hyJOIST and hySPAN are not suitable for use in fully weather exposed applications but can be treated to a H3.1 level for protection against low level rot and decay and are ideal for use in weather protected balconies. For fully exposed balconies H3.2 treated outriggers can be specified and installed with confidence.

Design should include specification of either the 'adjacent' or 'nested' outrigger detail and the specification of the outrigger material. Outrigger length and quantities can be determined and the installation performed in accordance with the specified detail.

For weather protected or internal balcony cantilevers Detail F13 may be used.

FIGURE 28

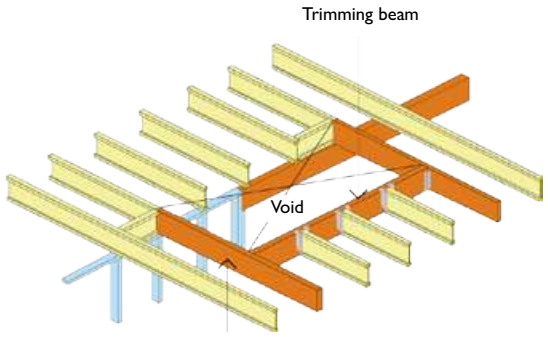
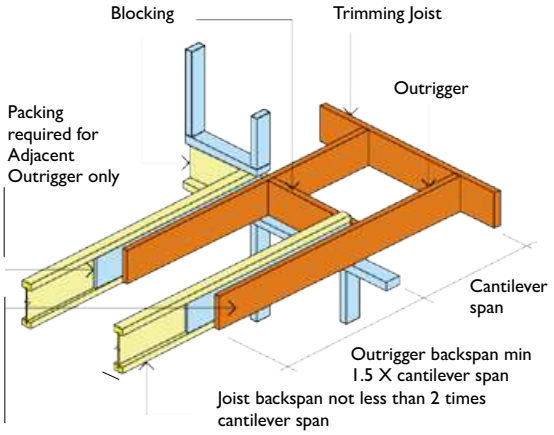
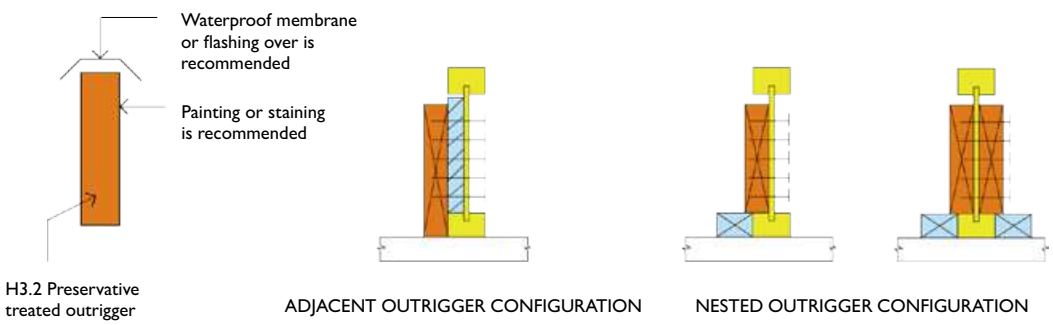


FIGURE 29: Balcony cantilevers using outriggers



Outrigger fixed to joist as per detail f11 Adjacent Outrigger (as illustrated above) detail f12 Nested Outrigger

FIGURE 30



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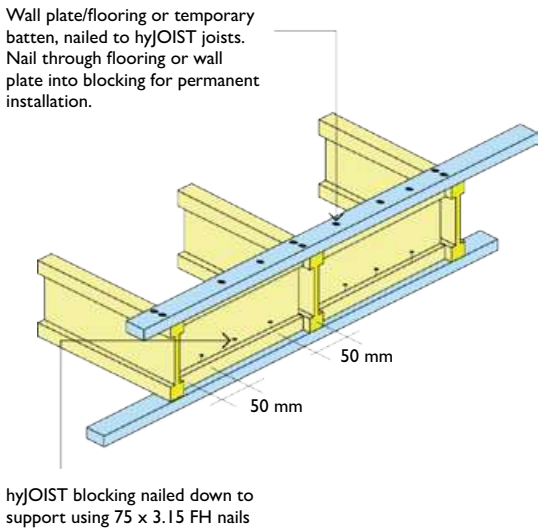
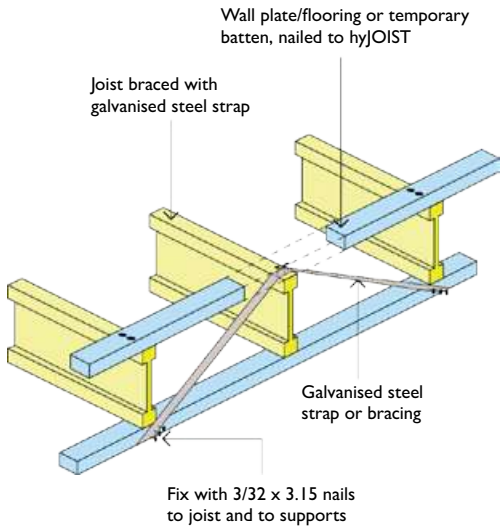
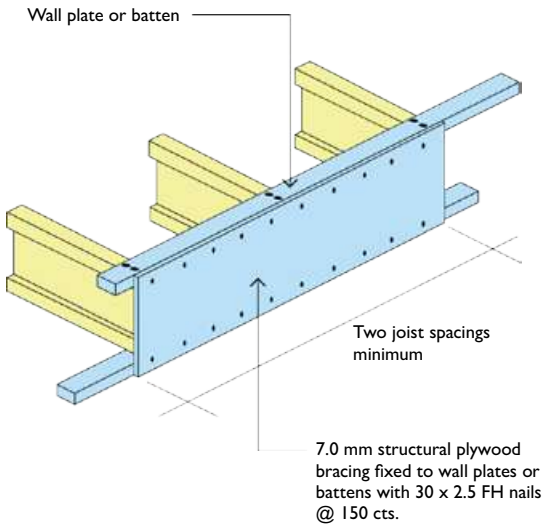
DETAIL F1: End restraint – blocking with hyJOIST®



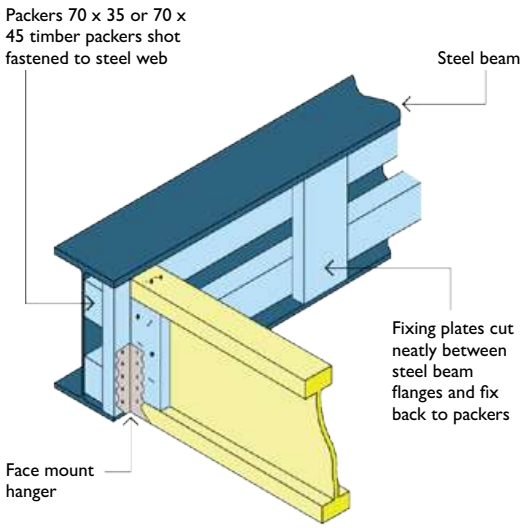
DETAIL F2: End restraint – using steel strap or bracing



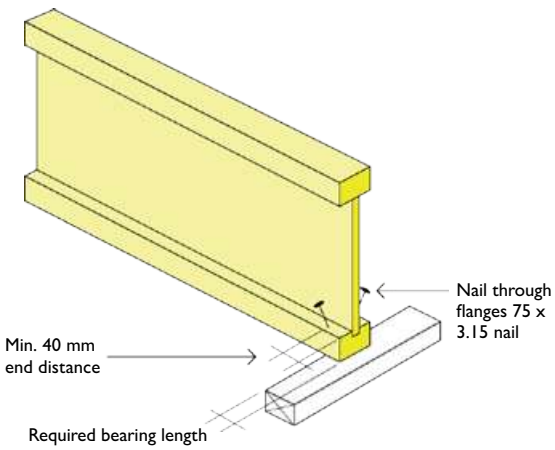
DETAIL F3: End restraint – using ply or hardboard bracing



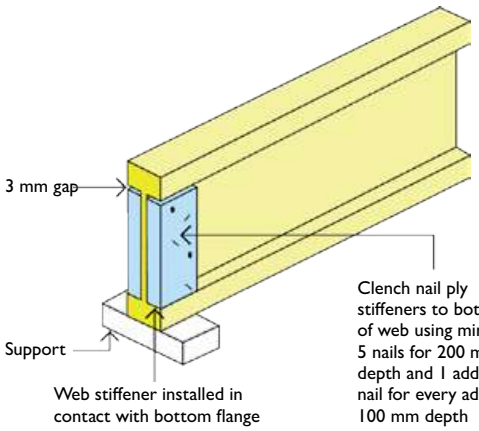
DETAIL F4: Fixing hyJOIST® to steel beams – using face mount hangers



DETAIL F5: Nailing down to supports



DETAIL F6: Installation of web stiffeners



	45 mm flange	63 mm flange	90 mm flange
Stiffener/packer thicknesses*	18 mm	27 mm	39 mm
Nail length	50 mm	75 mm	100 mm

*Plywood of appropriate thickness is available as an accessory product

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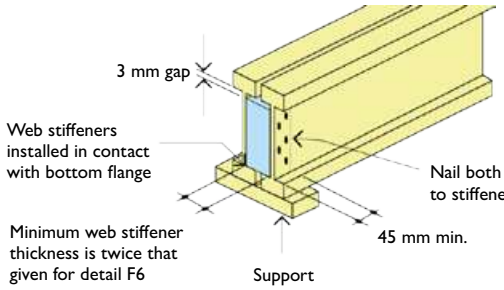
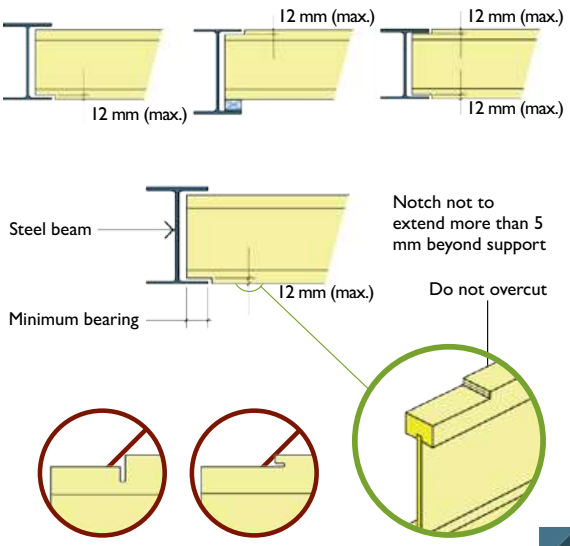
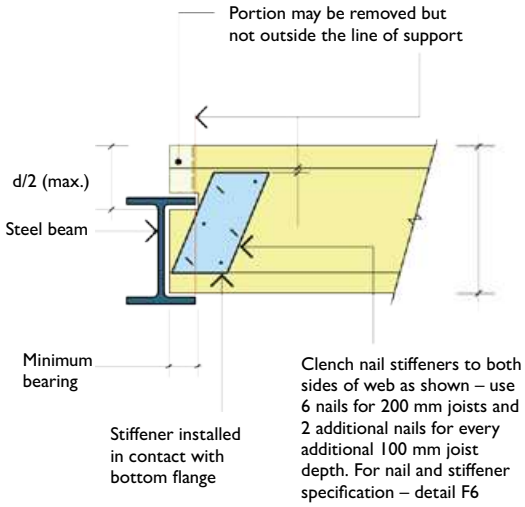
DETAIL F6A: Web stiffeners for double joists



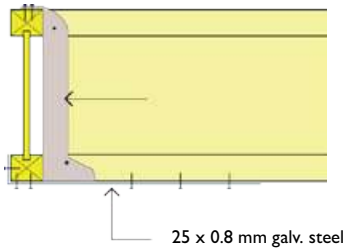
DETAIL F7: Notching of flanges at end supports



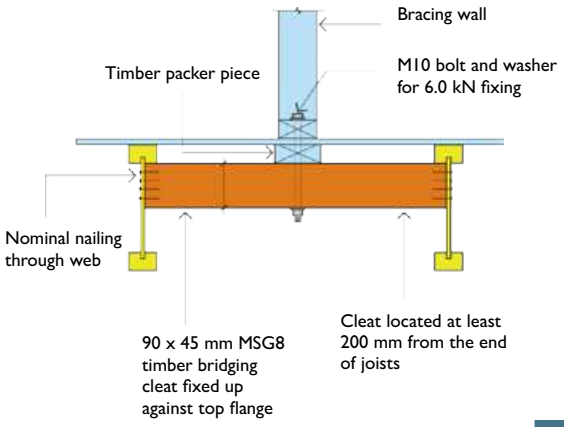
DETAIL F8: Notching of webs for steel beam flange



DETAIL F10: hyJOIST®/ hyJOIST connection



DETAIL F9: Tie-down to internal bracing wall



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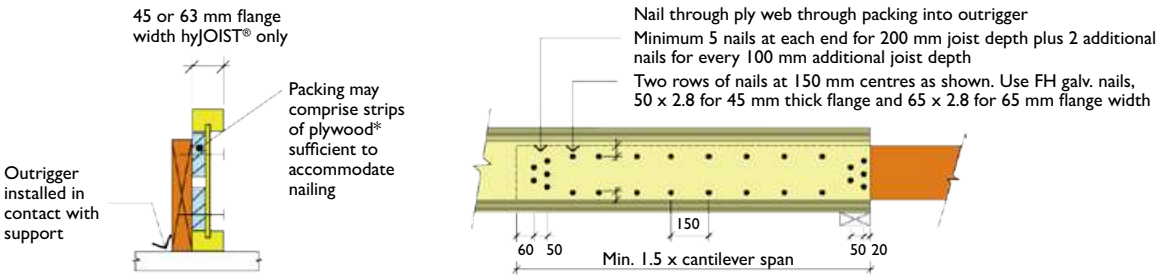
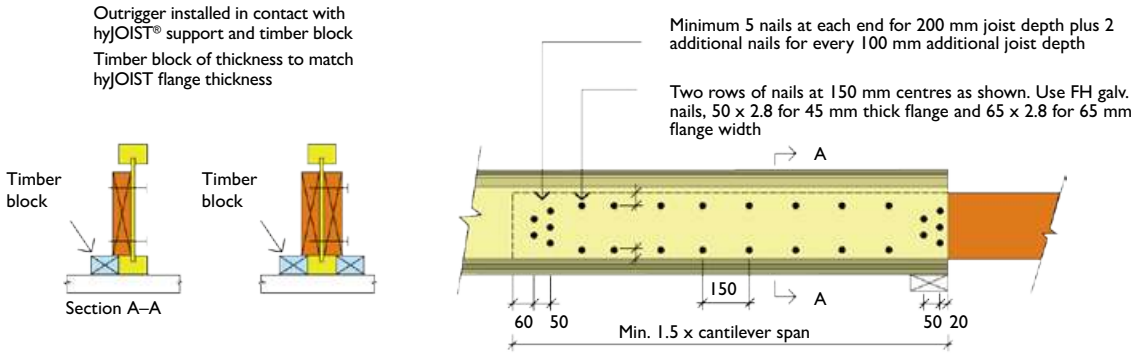
DETAIL F11: Adjacent outrigger



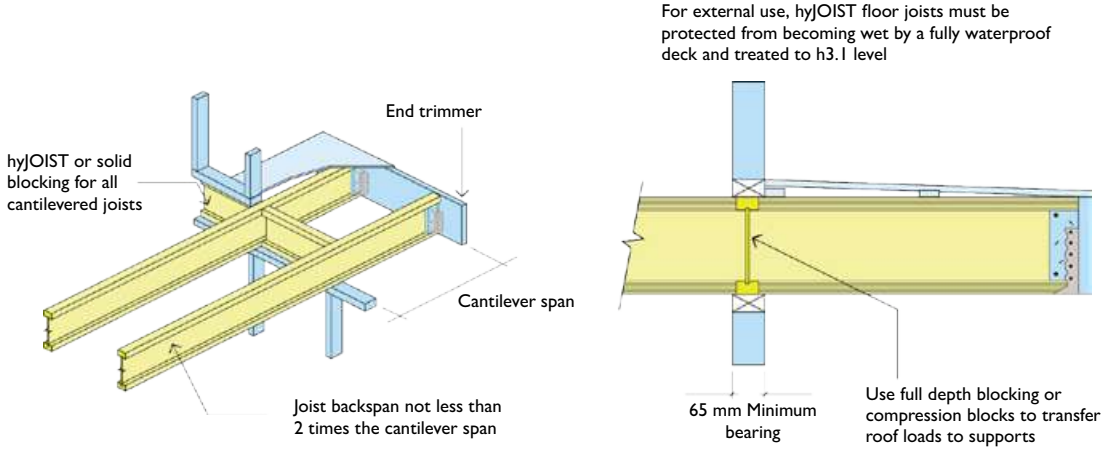
Plywood strips suitable thickness available as accessory product

DETAIL F12: Nested outrigger installation



Double outrigger nailing to match as shown for single outrigger

DETAIL F13: hyJOIST® cantilever for for internal or weather proofed balcony applications



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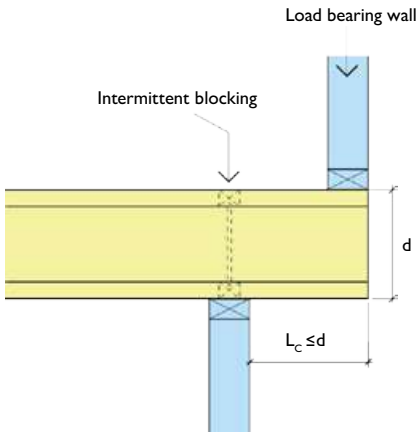
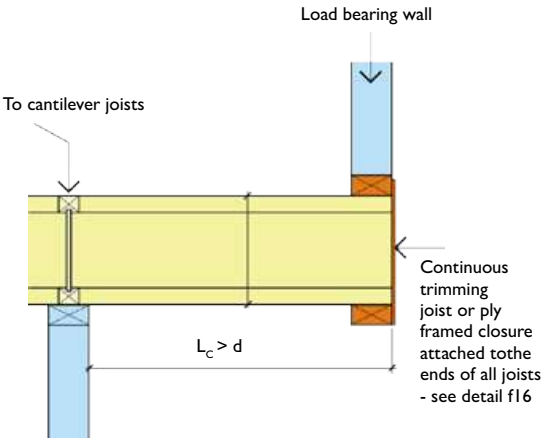
DETAIL F14: Short cantilever supporting load bearing wall



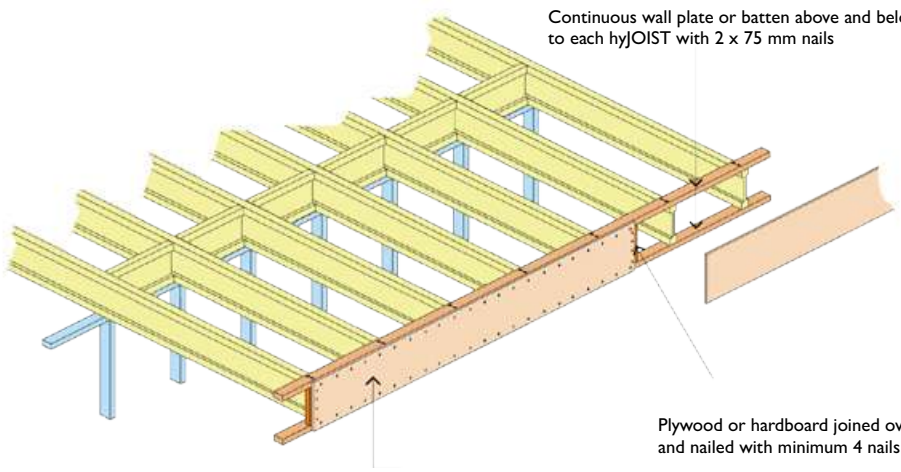
Where specified
Install type 1 reinforcement in accordance with detail F21
Install type 2 reinforcement in accordance with detail f22

DETAIL F15: Cantilever supporting load bearing wall

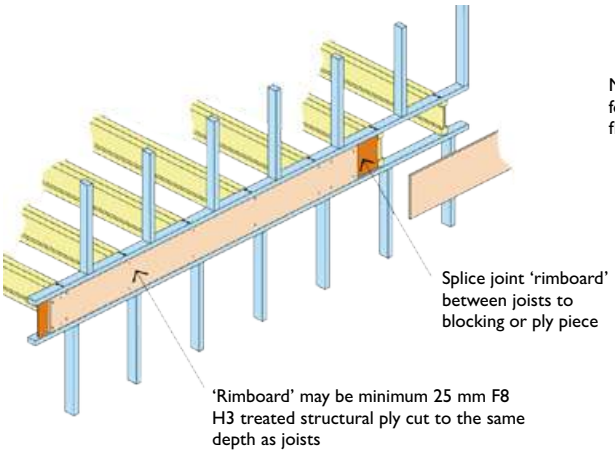


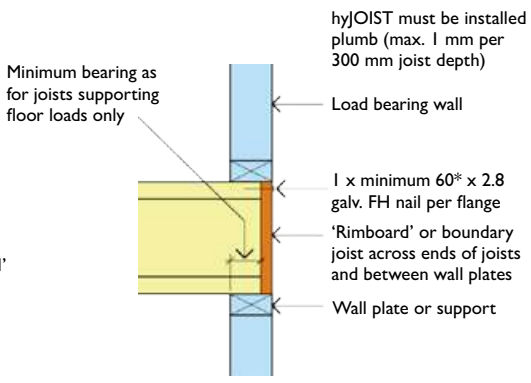
Where specified
Install type 1 reinforcement in accordance with detail F21
Install type 2 reinforcement in accordance with detail f22

DETAIL F16: Cantilevers supporting load bearing walls — installation of end trimmer



DETAIL F17: End restraint – using 'rimboard' or boundary joist





*Nails should be of sufficient length to penetrate the flanges of joist at least 30 mm

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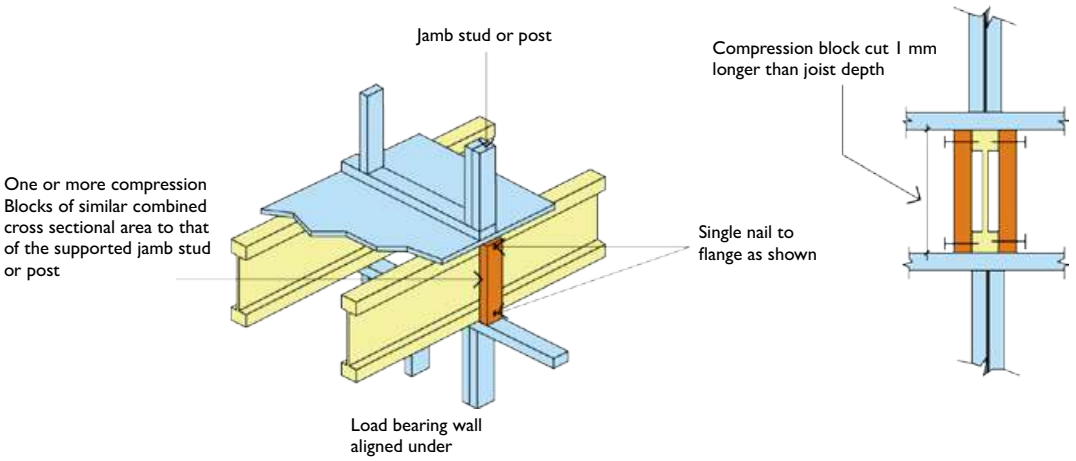
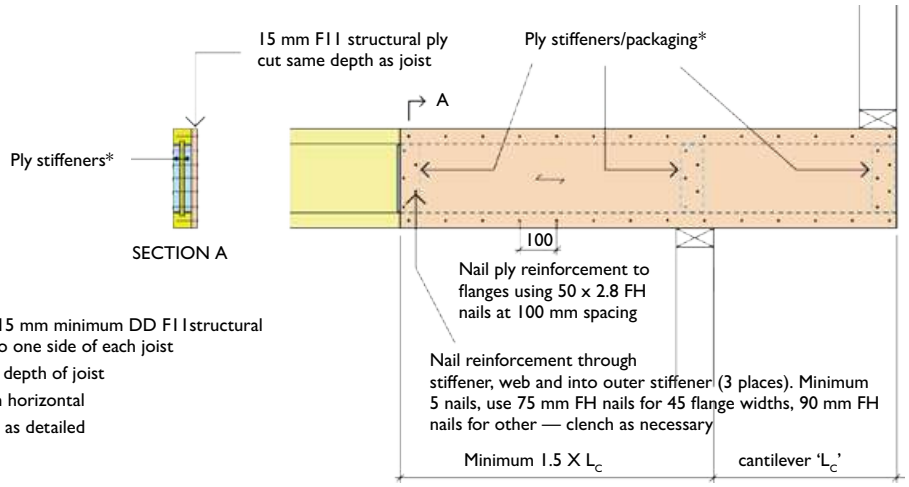
DETAIL F18: Installation of compression blocks



DETAIL F21: Cantilever supporting load bearing walls — Type 1 reinforcement

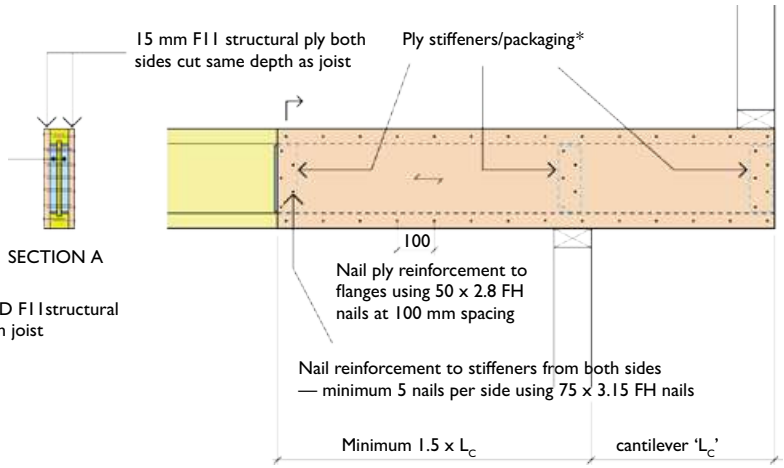


Type 1 — 15 mm minimum DD F11structural ply nailed to one side of each joist

- Ply to full depth of joist
- Face grain horizontal
- Nail fixed as detailed

* Plywood strips of suitable thickness available as accessory product

DETAIL F22: Cantilever supporting load bearing walls — Type 2 reinforcement



Type 1 — 15 mm minimum DD F11structural ply nailed to both sides of each joist

- Ply to full depth of joist
- Face grain horizontal
- Nail fixed as detailed

* Plywood strips of suitable thickness available as accessory product

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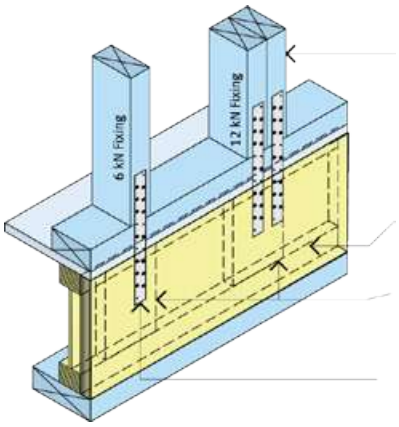
DETAIL TD1: Tie-down for external bracing wall using Rimboard



6 kN and 12 kN fixing details using rimboard

Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

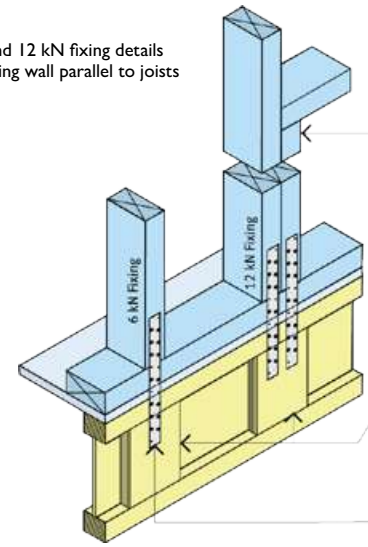
25 mm F8 plywood rimboard

hyJOIST web stiffener each side of joist – fix as per detail F6

Sheet brace strap 300mm x 25mm x 0.9mm fixed with 6/30 x 3.15 nails to each end

DETAIL TD2: Tie-down for external bracing walls

6 kN and 12 kN fixing details
— bracing wall parallel to joists



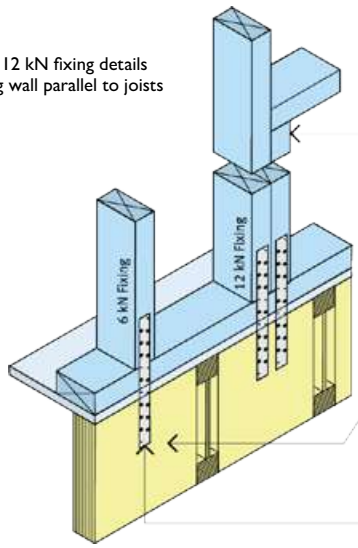
Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

hyJOIST® web stiffener each side of joist — fix as per detail F6

Sheet brace strap
300Mm x 25mm x 0.9Mm fixed with 6/30x3.15 nails to each end

DETAIL TD3: Tie-down for external bracing walls

6 kN and 12 kN fixing details
— bracing wall parallel to joists



Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

hyJOIST® or timber nog between joists

Sheet brace strap
300Mm x 25mm x 0.9Mm fixed with 6/30x3.15 nails to each end

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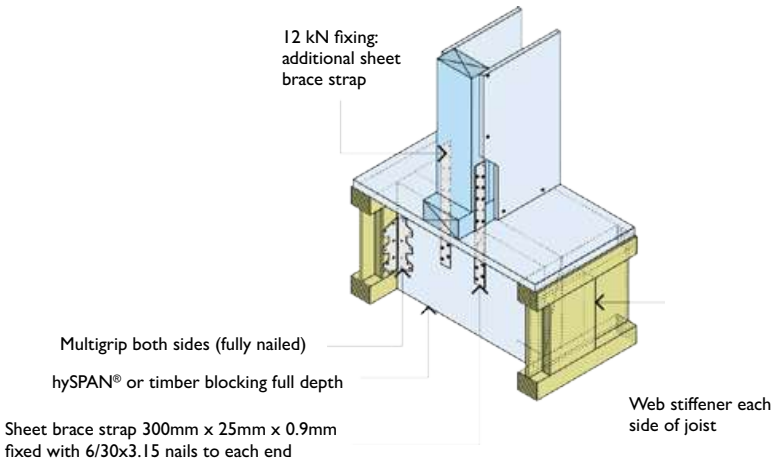
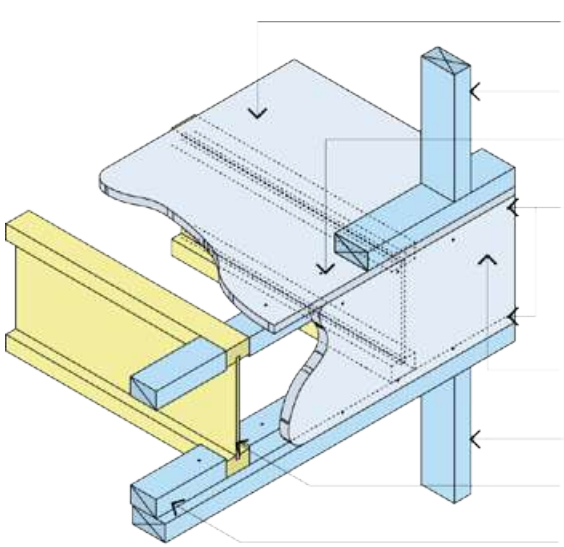
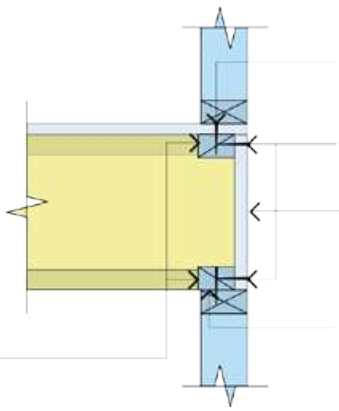
DETAIL TD4: Tie-down for internal bracing walls



DETAIL TD5: Bracing transfer through diaphragm floors





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4.0 hyJOIST® RAFTERS

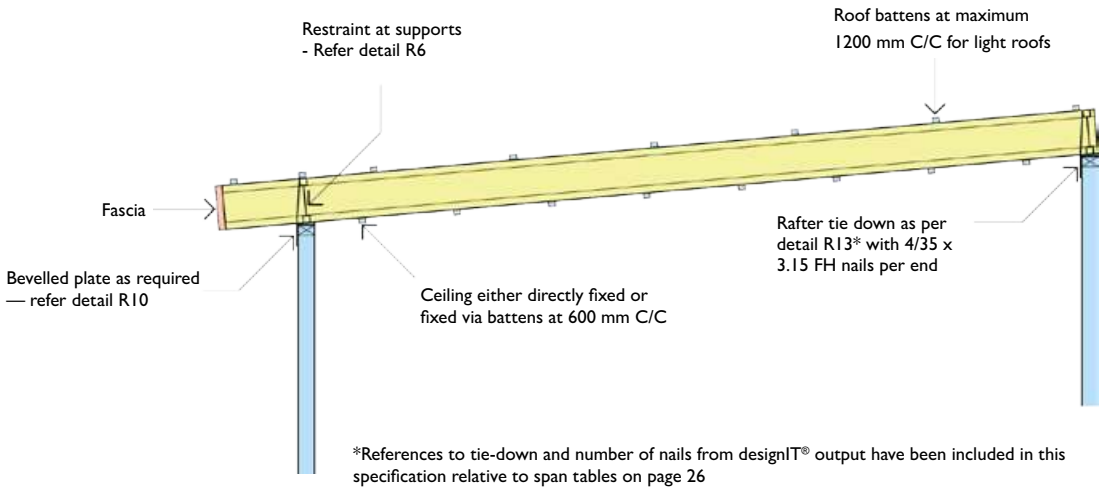
hyJOIST® may also become part of a very effective and economical roof system, particularly where low pitch roofs with ceiling directly attached to the underside are being designed. hyJOIST rafters allow the flexibility of having provision for the installation of ducting and electrical services through the web, whilst offering ample room to include insulation.

hyJOIST may also be used for pitched roofs up to 35 degrees where special attention is paid to connection and tie-down. It is important that the connection of rafters includes for the effects of wind loading as well as dead, live and snow loads where applicable.

Rafter tie-down using looped over strap is recommended whilst bracing requirements do not differ with the use of a hyJOIST roof system.

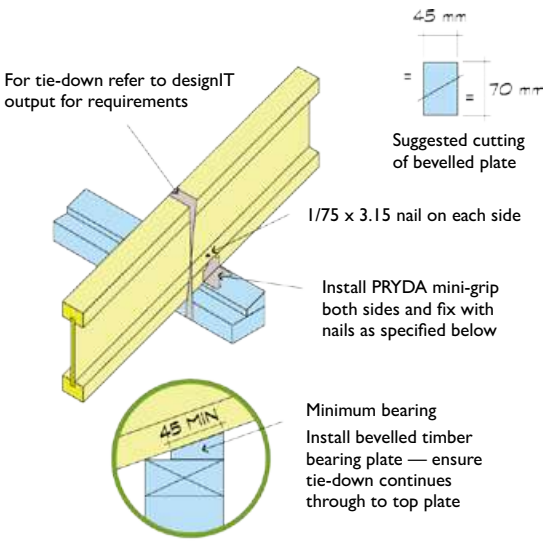
TYPICAL INSTALLATION FOR LOW PITCHED ROOFS

FIGURE 31



*References to tie-down and number of nails from designIT® output have been included in this specification relative to span tables on page 26

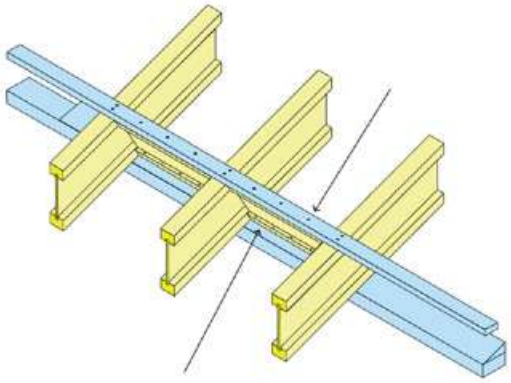
DETAIL R10: Fixing and support using bevelled plate



Roof pitch	Rafter spacing	Installation of mini-grips or similar
≤10°	≤1200	Not required
	≥1200	Fix with 2/35 x 3.15 FH nails per tab
10° to 35°	≤1200	Fix with 4/35 x 3.15 FH nails per tab
	≥1200	Fix with 5/35 x 3.15 FH nails per tab

For roof pitches greater than 35° seek engineering advice

DETAIL R6: Restraint at supports — using blocking



hyJOIST blocking nailed down to supports individual blocking pieces may be spaced up to 1.8m centres or 3 rafter spacings, whichever is greater

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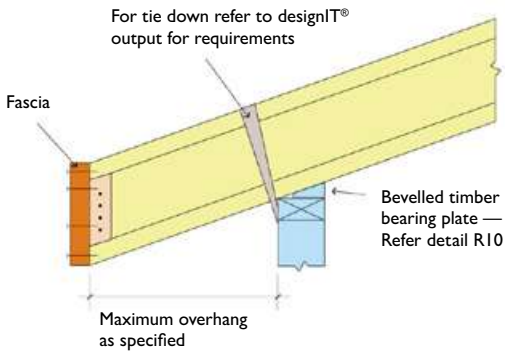
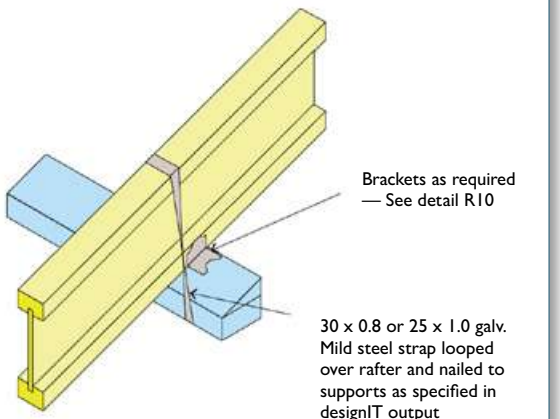
DETAIL R7: Rafter overhang — sloping soffit with bevelled plate supports



DETAIL R13: Rafter tie-down — using looped steel strap



4.1 RAFTER SPAN TABLES

The following span tables have been prepared in accordance with AS 1684.1: 1999 and are based on the following design criteria:

- Rafters are for a house.
- The bottom flange is restrained by ceiling or ceiling battens at maximum 600c/c.
- Roof mass does not exceed 40 kg/m², i.e. light roof and ceiling.
- Wind Zones up to Very High.
- Snow loads up to 0.5 kPa (Snow loads for 1.0 kPa may be designed using modification factors from Section 15 of NZS 3604:1999).
- Permanent load serviceability design limit: span/300 or 20 mm.

TABLE 10:

hyJOIST® section code	Single span							
	Rafter spacing (mm)							
	450		600		900		1200	
	Span (m)	O/h (m)²	Span (m)	O/h (m)²	Span (m)	O/h (m)²	Span (m)	O/h (m)²
HJ200 45	5.5	1.4	5.0	1.4	4.4	1.3	4.0	1.3
HJ240 63	6.8	1.9	6.3	1.8	5.6	1.7	5.1	1.7
HJ240 90	7.3	2.3	6.9	2.1	6.3	2.0	5.8	1.9
HJ300 63	7.7	2.4	7.3	2.2	6.5	2.1	5.7	2.1
HJ300 90	8.3	2.8	7.9	2.6	7.1	2.4	6.7	2.3v
HJ360 63	8.5	2.8	7.8	2.6	6.4	2.6	5.6	2.4
HJ360 90	9.2	3.3	8.6	3.1	8.0	2.8	7.4	2.8
HJ400 90	9.8	3.6	9.2	3.4	8.5	3.1	7.8	3.0

Note:
1. Limited by strength
2. Overhang should not exceed half the length of the backspan

designIT allows for the design and specification of hyJOIST® rafters for other applications including:

- Roof mass from 10 kg/m² to 90 kg/m²
- Low, medium and high wind zones
- Rafters where continuous restraint is not provided to the bottom flange
- Overhangs with horizontal soffits
- Face fixing to ridge beams and details for birdsmouthing over supports
- Alternate fixing details

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5.0 COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC)

This guide provides technical information for the design and installation of hyJOIST® engineered I-Joists as floor joists and rafters in domestic and residential buildings. Further design guidance can also be obtained from the designIT NZ software available from futurebuild. This guide is intended to be used by designers or builders to select appropriate sizes of hyJOIST members and their connections in the framing of houses and similar buildings.

Manufacture

hyJOIST is an engineered I-Joist. The flanges are Laminated Veneer Lumber (LVL) intended for structural use and conforming with the requirements of AS/NZS 4357:2005 Structural Laminated Veneer Lumber. The webs are structural plywood conforming to AS/NZS 2269:2004 Plywood - Structural. hyJOIST is Product Certified by the Engineered Wood Products Association of Australasia (EWPAA) as being manufactured in accordance with AS/NZS 4357 and AS/NZS 2269. The EWPAA is accredited for product certification by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Design

The design methodology used in the preparation of this guide complies with the requirements of the following design standards:

- AS/NZS 1170:2002/3 Structural Design Actions
- AS 1720.1:1997 Timber Structures, Part 1: Design methods.

The design properties and methodologies of hyJOIST used to calculate the span tables in this brochure were determined in agreement with NZS 3603:1993 Timber Structures Standard, an Acceptable Solution to NZBC Clause 1 Structure.

Guidance has been taken from AS 1684.1:1999, Residential timber-framed construction, Part 1: Design criteria, and reviewed to ensure agreement with NZS 3604:1999 Timber Framed Buildings, an Acceptable Solution to NZBC Clause 1 Structure. When selected and installed in accordance with the specifications, details and limitations in this guide, hyJOIST floor joists and rafters will comply with the requirements of the New Zealand Building Code.

Durability

The expected service life of hyJOIST members is in excess of 50 years in dry protected areas, where moisture content is maintained below levels specified in NZS 3602:2003. Designers and building owners must ensure that a building remains weather-tight and hyJOIST remains protected from both external and internal moisture. Exposure to weather during normal construction periods is not a cause for concern. hyJOIST is not recommended for fully weather exposed applications.

Treatment

For weather-protected applications noted in NZS 3602:2003 hyJOIST can be LOSP (solvent) treated to H3 in accordance with AS/NZS 1604.4:2004. This treatment provides the efficacy intended by both H1.2 and H3.1 in NZBC B2/AS1 and NZS 3640:2003

5.1 FOR MORE EFFICIENT FLOOR DESIGN USE

Free designIT® software

Simple to use yet deceptively powerful, designIT® brings efficient and appropriate engineering design solutions within everyone's grasp.
Contact Carter Holt Harvey for your free copy.

designIT®

New designIT uses the same simple system for specifying hySPAN®, hyJOIST® and other selected materials using the data input you're used to. But it now incorporates options for calculating designs with stress graded timber and more complex designs including a range of floor live loads needed for the design of decks, balconies and residential apartment buildings.

designIT® updates

Keeping your designIT up-to-date is easy using the 'Check for Updates' feature contained in the Help Menu. To ensure you always have the latest version regularly select this feature and designIT will automatically check the web. If updates are available simply select 'YES' in the prompt and they will be automatically installed. designIT updated version includes the following additional features:

- New hyJOIST Options Range for more economical floor designs
- Floor joist and bearer calculators, allowing for specification of structural members with point loads, cantilevers and variable spans
- hy90® included as an option for lintels
- hyCHORD® included as an option for floor joists, lintels and rafters
- hyONE for bearers and lintels

5.2 DISCLAIMER

The information contained in this document is current as of December 2013 and is based on data available to CHH Woodproducts at the time of going to print. CHHWoodproducts reserves the right to change the information contained in this literature without prior notice. It is important that you call 0800 808 131 to confirm that you have the most up to date information available or refer to www.chhwoodproducts.co.nz

CHH Woodproducts has used all reasonable endeavors to ensure the accuracy and reliability of the information contained in this document. This information does not replace professional advice and we recommend that professional advice should be obtained specific to your circumstances. To the extent permitted by law, CHH Woodproducts will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

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the futurebuild® range

CarterHoltHarvey
Woodproducts New Zealand

Private Bag 92-106
Victoria Street West
Auckland 1142
New Zealand

Freephone: 0800 808 131
Freefax: 0800 808 132

www.chhwoodproducts.co.nz
www.chhsoftware.com

December 2013

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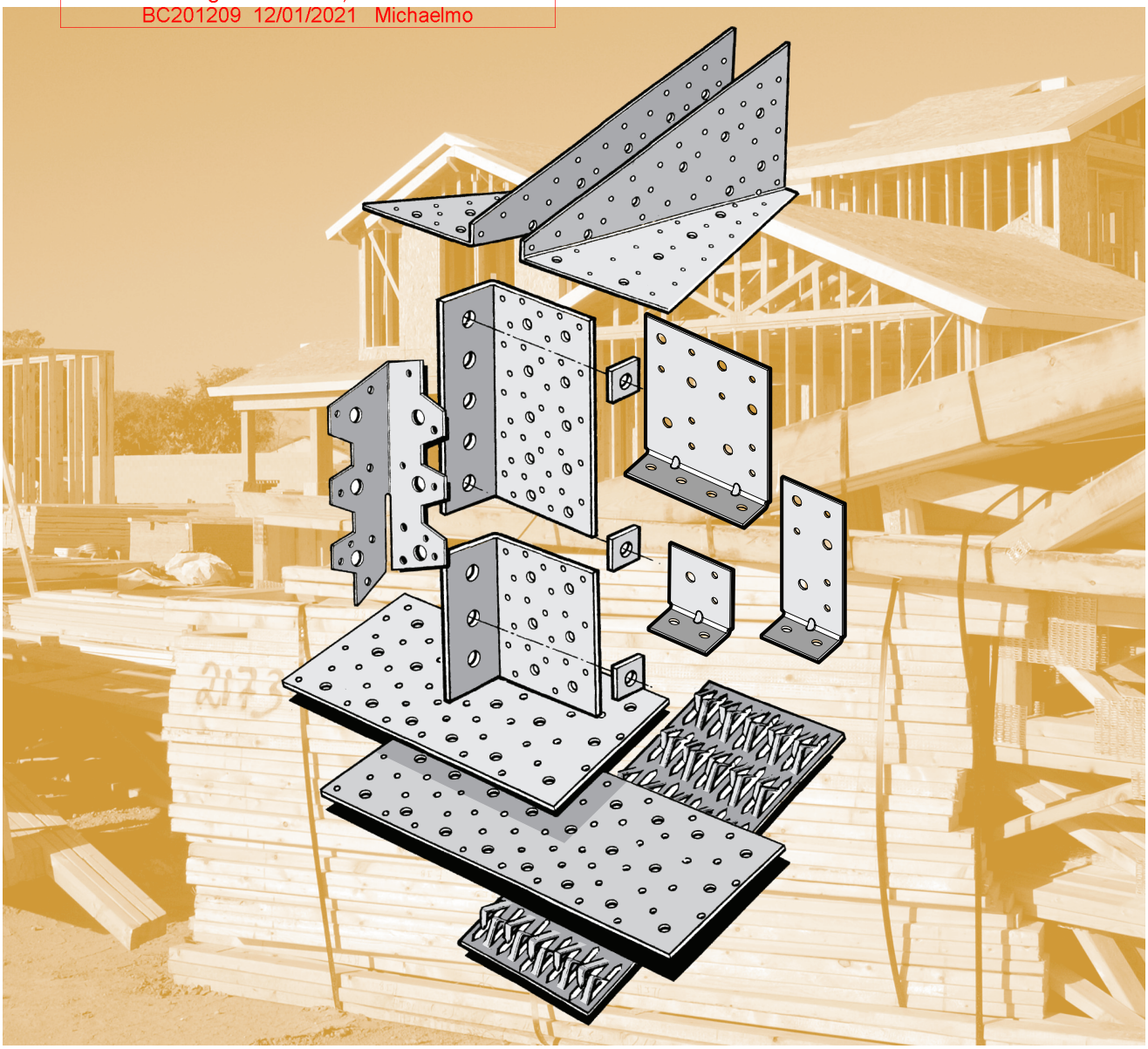
LUMBERLOK®

TIMBER CONNECTORS

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

NOT TO BE USED IN EXTERIOR SITUATIONS Stainless Steel alternatives are available where stated



Timber to Timber - Timber to Concrete - Timber to Steel

MiTek manufactures and markets the range of LUMBERLOK Timber Connectors for the building industry. Each product has been designed and developed to meet the needs of, and changes to building methods, and is tested to conform with the relevant NZ Standards. These include NZS 3603:1993 for timber design and NZS 3604:2011 Timber Framed Buildings.

LUMBERLOK Connectors are available from leading Builders Supply Merchants and Hardware outlets throughout New Zealand.

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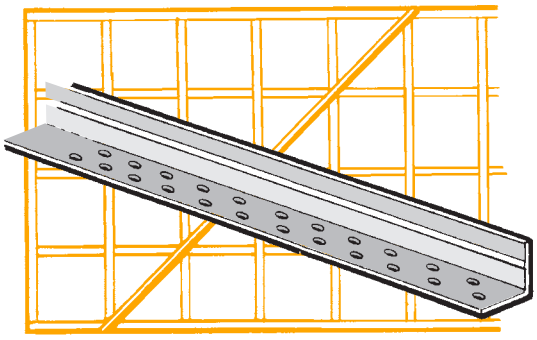


ANGLE BRACE

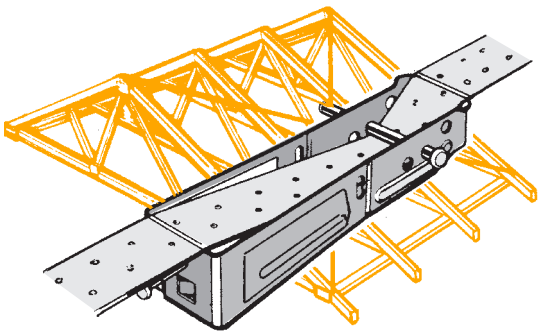
0.85mm G250 Z275 Galvanised Steel

Angle Brace may be used as either compression or tension brace. Nail holes are fully punched for ease of nailing. Fix with 75mm x 3.15mm diameter F.H. nails.

When used as a diagonal wall brace, it should be secured at each end with three nails, and two nails at each stud crossing.

Standard length is 3.6m, other sizes available on request (2.7m - 5.0m). Angle Brace can be used as an anti-sag mechanism for purlins or girts.

Refer to Characteristic Loadings Brochure for design values.



STRIP BRACE

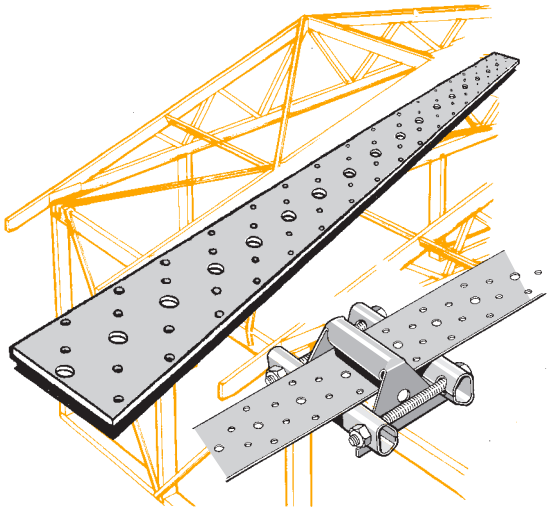
0.55mm x 27mm G550 Z275 Galvanised Steel
0.91mm x 25mm G300 Z275 Galvanised Steel (Export Grade)

Strip Brace is supplied in 10m, 15m and 30m coils for use as bracing or in short lengths as a jointing material.

Strip Brace provides an ideal bracing system for walls, or roof plane. One crossed pair of strips may be used in each location where a diagonal brace is required. Fix using 5 x LUMBERLOK Product Nails 30mm x 3.15mm diameter at each end if strip is folded over timber face. Otherwise use 8 nails each end.

A heavier gauge Export Grade (item suffix EX) is also available in 10m and 30m coils. Tensioners are included with marked boxes of Strip Brace coils or available separately if required.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304. (Stainless Steel tensioners not available)



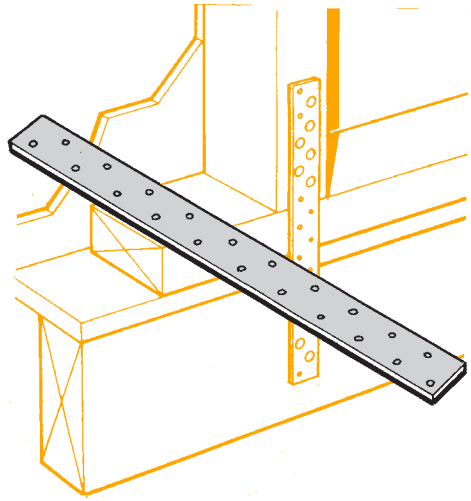
*MULTI-BRACE

0.91mm x 53mm G300 Z275 Galvanised Steel

This product has been developed for commercial building situations as an alternative to steel rod or timber, as a bracing element. Coils are available in lengths of 10m, 15m and 30m, punched to allow easy fixing. Fix using 11 x LUMBERLOK Product Nails 30mm x 3.15mm diameter at each end if Multi-Brace is folded over timber face. Otherwise use 15 nails each end.

Tensioners are available separately if required.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304. (Stainless Steel tensioners not available)



*SHEET BRACE STRAPS

0.91mm x 25mm G300 Z275 Galvanised Steel

Punched strap available in lengths of 200mm, 300mm, 400mm and 600mm, to provide a hold down for use with sheet bracing. As per NZS 3604:2011, a 6kN capacity can be obtained by one strap (6 nails per strap end) or 12kN per two straps (6 nails per strap end). Fixed with LUMBERLOK Product Nails 30mm x 3.15mm diameter.

Refer to brochure for application data.
Available in Stainless Steel 304.

***Detailed product sheet available**

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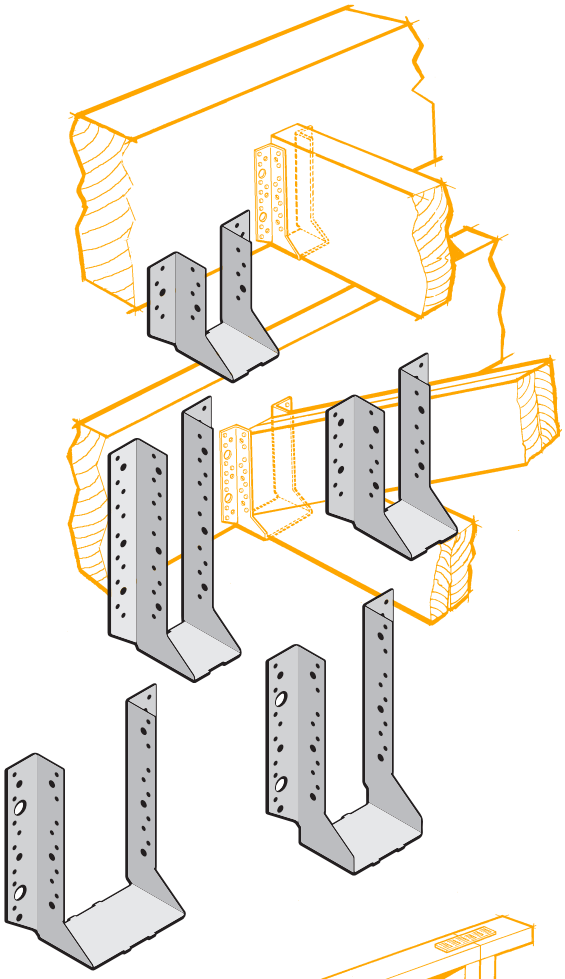


*JOIST HANGERS

0.91mm G300 Z275 Galvanised Steel

Joist Hangers are designed for use where a strong, rigid joint is required between members meeting at 90˚, e.g. truss/joist to beam, or rafter to bearer connection.

i) **Joist Hanger 47 x 90**
Designed for use where gauged timber of 47mm width and up to 150mm deep.

ii) **Joist Hanger 47 x 120**
Multi-use bracket suitable for gauged 47mm thick timber up to 200mm deep.

iii) **Joist Hanger 47 x 190**
Used for gauged 47mm thick timber up to 300mm deep.

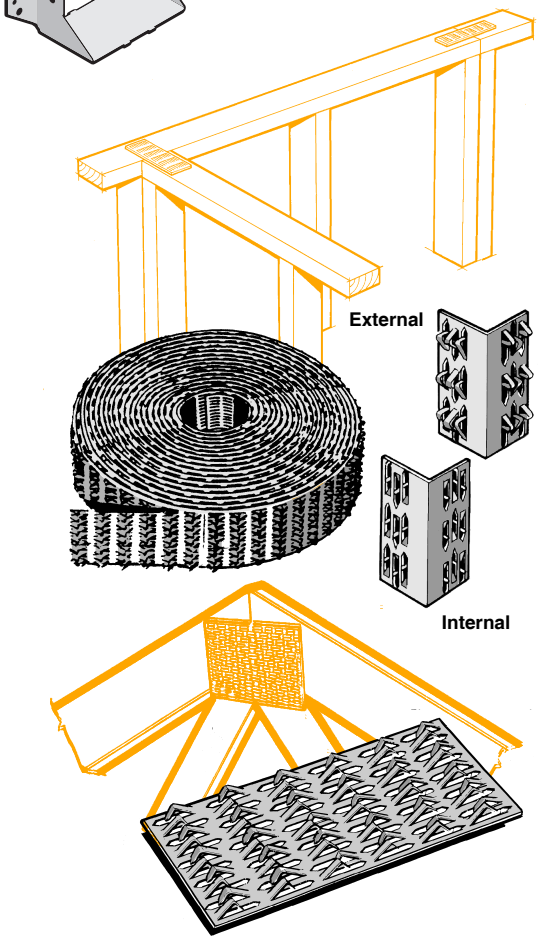
iv) **Joist Hanger 70 x 180**
A special size joist hanger designed for gauged 69mm wide timbers.

v) **Joist Hanger 95 x 165**
For use on gauged 94mm wide timber or double joists/trusses.

Note: Joist Hangers 52mm wide also available for rough sawn timber.

All of the above Joist Hanger connections should be fixed using LUMBERLOK Product Nails 30mm x 3.15mm diameter, or Type 17-12g x 35mm Hex Head Screws.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.



TYLOK PLATES

0.95mm G300 Z275 Galvanised Steel

Tylok Plate is designed for on-site use and can readily be applied by hammer as well as hydraulic press. Tylok Plates are suitable for a wide range of applications such as trusses, formwork, site splicing, etc. Tylok Plates are manufactured from galvanised steel in a range of sizes.

Refer to Characteristic Loadings Brochure for design values.
Plate code example - 6T10 = 6 rows of teeth long x 10 teeth wide.

Code	Width	Length
2T5	34mm	60mm
4T5	34mm	120mm
6T5	34mm	180mm
8T5	34mm	240mm
10T5	34mm	300mm
12T5	34mm	360mm
14T5	34mm	420mm
16T5	34mm	480mm
Coil T5	34mm	15m

Code	Width	Length
2T10	68mm	60mm
4T10	68mm	120mm
6T10	68mm	180mm
8T10	68mm	240mm
10T10	68mm	300mm
12T10	68mm	360mm
14T10	68mm	420mm
16T10	68mm	480mm
Coil T10	68mm	15m

Code	Width	Length
4T15	102mm	120mm
6T15	102mm	180mm
8T15	102mm	240mm
10T15	102mm	300mm
12T15	102mm	360mm
Coil T15	102mm	15m

Code	Width	Length
6T20	136mm	180mm
8T20	136mm	240mm
10T20	136mm	300mm
12T20	136mm	360mm
14T20	136mm	420mm
Coil T20	136mm	15m

Tylok Plate is also available in coil form, in all four widths, as a convenient method of various applications by the builder on-site. By using metal cutters, any length plate can be cut from the 15m coils as required.

TYLOK ANGLES

0.95mm G300 Z275 Galvanised Steel

Available in internal (Int.) or external (Ext.) versions

3A6 35mm x 35mm x 90mm
5A6 35mm x 35mm x 150mm
6A6 35mm x 35mm x 180mm (Internal only)

***Detailed product sheet available**

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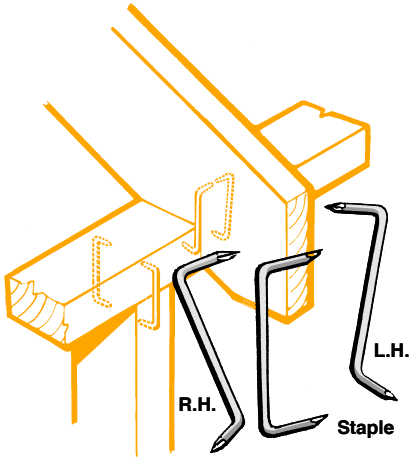
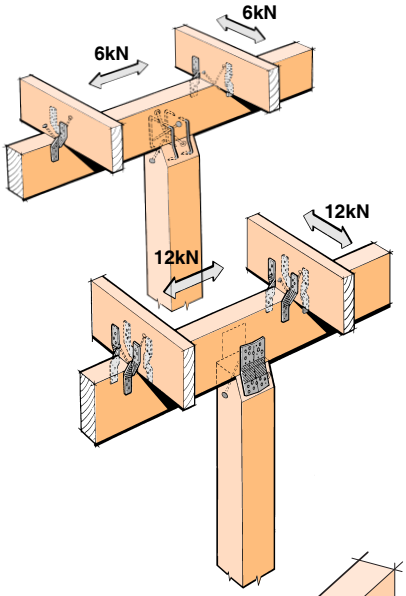
LUMBERLOK®



WIRE DOGS (LH, RH or STAPLE)

Wire Dogs are manufactured as left handed, right handed and staples, from 4.9mm diameter galvanised wire. Each has a 95mm shank, and a 35mm leg. Wire Dogs have been proven by test to be the strongest and most economical timber fastener of its type on the New Zealand market. Typical use in a wind uplift situation, such as truss or rafter to top plate, and top plate to stud connection.

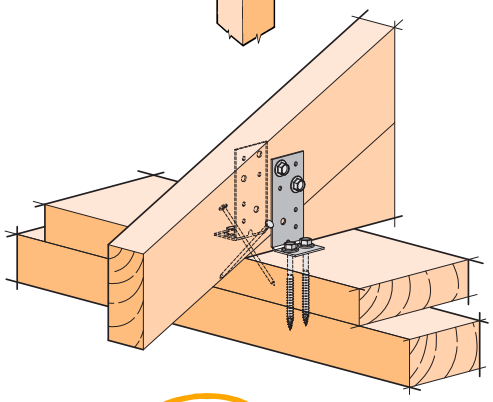
Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.



*12kN & 6kN PILE FIXINGS

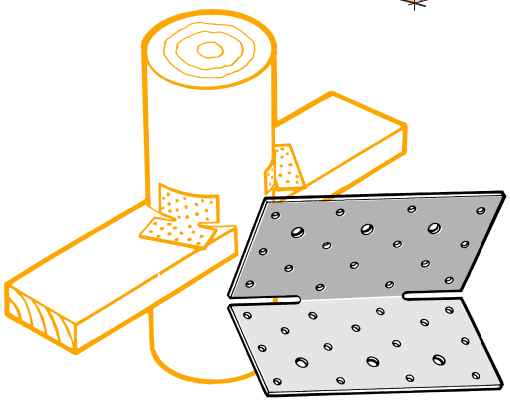
Both these products comply with NZS 3604:2011 as a fixing method for timber piles to bearers to joists. The 12kN product pack is suitable for both Anchor and Brace pile situations whilst the 6kN pack is used with cantilever piles. Each product is manufactured in a hot dip galvanised or stainless steel option to suit the corrosive environment intended to be used in, and all packs are supplied inclusive of all necessary nails.

Refer to brochure for application data.



*9kN & 16kN TRUSS TO TOP PLATE FIXINGS

Used in pairs, the CPC40 cleats achieve 9kN and the CPC80 cleats achieve 16kN. The required pack comes supplied with the appropriate cleats and screws to penetrate through the timber top plate packer and into the top plate. Compliant with NZS 3604:2011, these conveniently top mounted fixings allow additional face fixing if required.



GIRT PLATE

0.91mm G300 Z275 Galvanised Steel

Specifically designed for girt to pole fixing, as per Farm Building Designs. 120mm long Nailon Plate, slit and pre-folded to 90°. Fixed with min. 8 x LUMBERLOK Product Nails 30mm x 3.15mm diameter per flange (16 nails/cleat), or 3 x Type 17-14g x 35mm Hex Head Screws per flange (6 screws/cleat).

Available in Stainless Steel 304.

***Detailed product sheet available**

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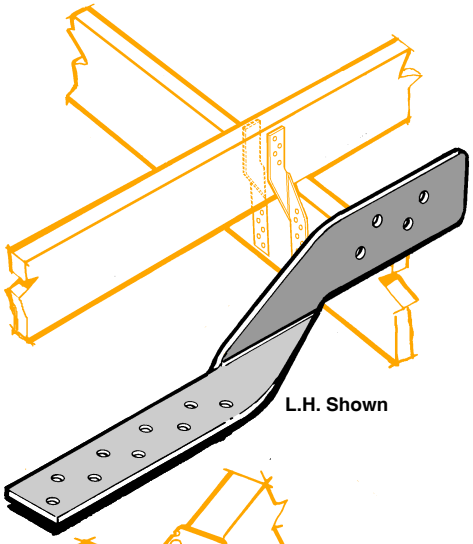
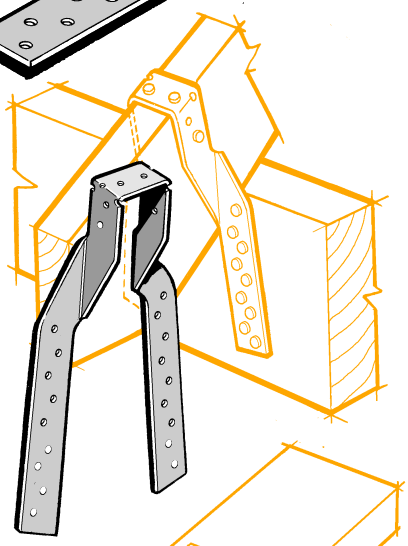


CEILING TIES CT160 & CT200 (LH or RH)

0.95mm NZCC-2D Hot Dip Galvanised Steel (CT160)
0.91mm G300 Z275 Galvanised Steel (CT200)

Overall length 160mm and 200mm – A very useful connector primarily for fixing ceiling joists to rafter or truss members. It also provides an excellent truss or rafter to top plate connection. Fix with LUMBERLOK Product Nails 30mm x 3.15mm diameter.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.

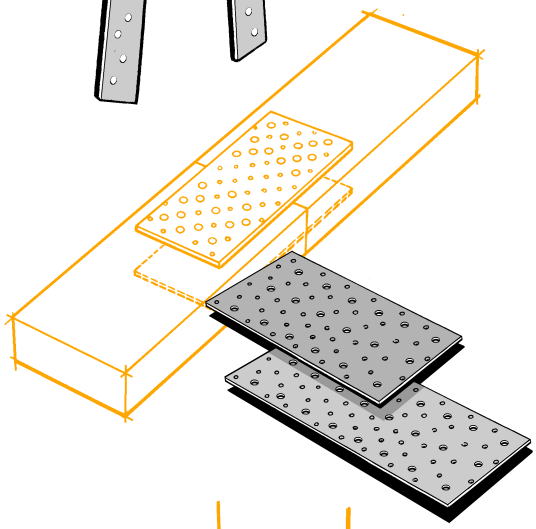


CYCLONE TIES CT400 & CT600

0.91mm G300 Z275 Galvanised Steel

Overall length 400mm and 600mm – Designed specifically for fixing down rafters or purlins in high wind situations. These are produced in straight pre-twisted lengths which are then folded over timber members on-site, accommodating various width purlins or rafters. Fix with LUMBERLOK Product Nails 30mm x 3.15mm diameter.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.



*NAILON PLATES

0.91mm G300 Z275 Galvanised Steel
1.55mm G300 Z275 Galvanised Steel
3.0mm Black Steel NZCC - SD ungalvanised

LUMBERLOK Nailon is produced as a flat steel plate with pre-punched holes to accommodate LUMBERLOK Product Nails 30mm x 3.15mm diameter. Plate sizes vary in thickness, width and length. Standard products are manufactured using Nailon, as well as a range of special products. Use of Nailon Plate fixings is far quicker and more economic than alternative methods.

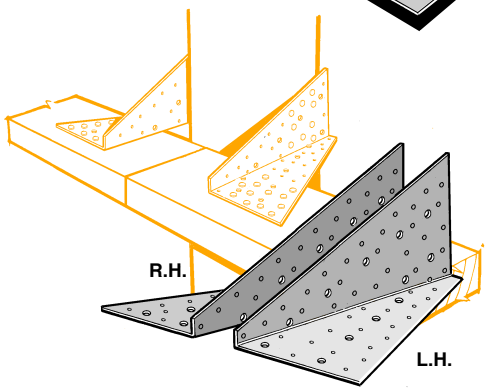
Nailon Plate - Available as a flat plate, cut to required length, in 40mm increments. (min. 80mm length)

Refer to Characteristic Loadings Brochure for design values.

Plate thickness	1.0mm	2.0mm	3.0mm
Width	110mm	113 or 150mm	130 or 240mm

Nailon provides a very strong site joint for truss splicing, rafter connections, etc. 3.0mm can also be welded to form timber to steel or concrete connections.

1.0mm Nailon Plate available in Stainless Steel 304.



DIAGONAL CLEAT N21 (LH or RH)

0.91mm G300 Z275 Galvanised Steel

This diagonally folded Nailon Plate 240mm long, provides a solution for fixing and aligning girts to timber poles. Can also be used for fixing purlins to rafters in high wind uplift situations, or to provide a strong 90˚ butt joint for large timber sizes. Fixed with LUMBERLOK Product Nails 30mm x 3.15mm diameter.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.

***Detailed product sheet available**

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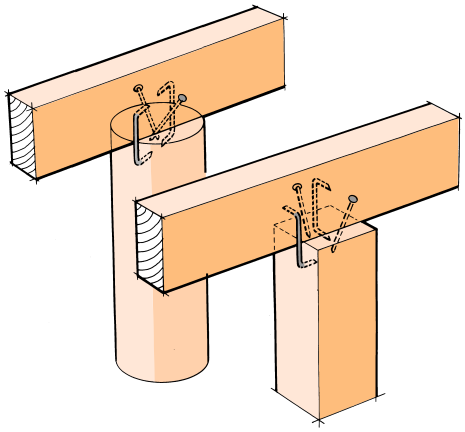
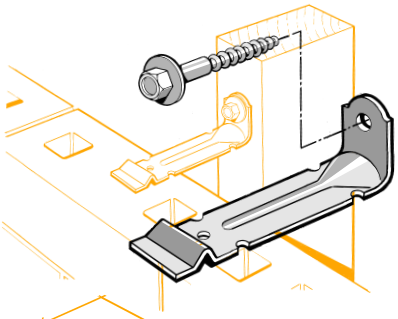


*ORDINARY PILE FIXING

Stainless Steel Wire Dogs and nails to comply with the fixing of ordinary piles to bearers as per NZS 3604:2011.

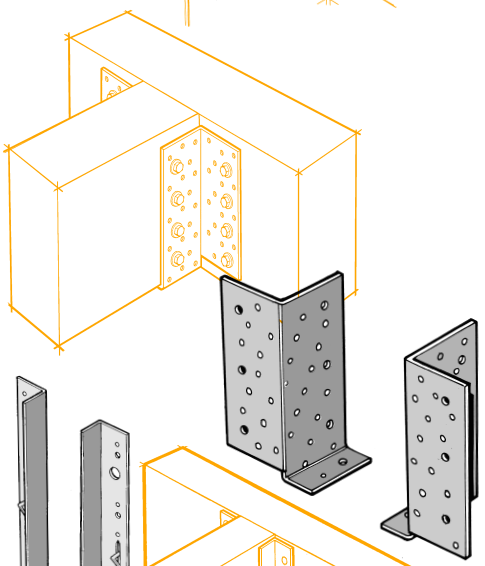


*SCREW TIE

1.2mm NZCC-SD Hot Dip Galvanised Steel

Meets NZS 3604:2011 and AS/NZS 2699.1:2000. This product is used to tie brick veneer to timber framework using a Type 17-12g x 35mm Hex Head Screw. The actual 'Tie' is available in 85mm and 105mm lengths to suit various cavity sizes and brick widths. Suitable for all timber including dry stress graded 90mm x 35mm studs.

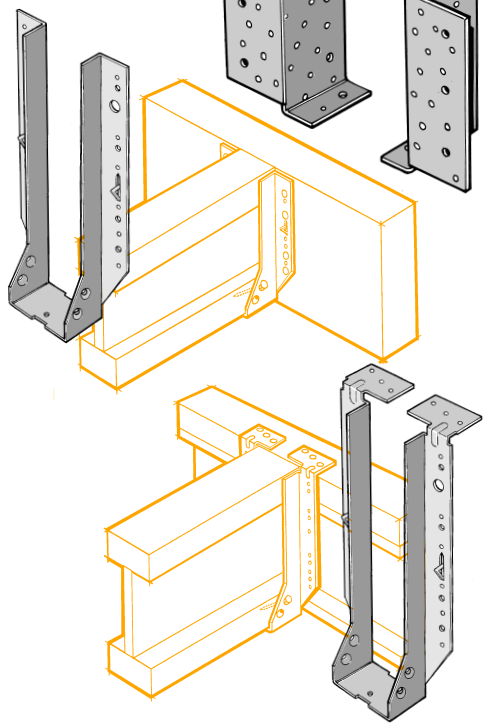
Refer to brochure for application data.
Available in Stainless Steel 316.



*SPLIT HANGERS

1.55mm G300 Z275 Galvanised Steel

Designed to provide a strong 90 degree connection for larger timber widths and/or double joist/trusses to supporting members. Always used as pairs, Split Hangers are available in depths of 140, 180 and 220mm and are fixed with Type 17-14g x 35mm Hex Head Screws, or LUMBERLOK Product Nails 30mm x 3.15mm diameter (dependent on timber member types and load requirements).



*I-BEAM HANGERS

1.15mm G300 Z275 Galvanised Steel

Developed to provide an effective method of fixing timber I-Beams in floor situations, the Face Fix option is suitable for connecting to supporting timber beams, whereas the Top Fix option can be used to fix to supporting steel beams with a timber top plate. Several sizes are available to accommodate a wide range of I-Beams. Fixed with 40mm x 3.75mm diameter nails (supplied). Face Fix option also allows for fixing with Type 17-12g x 35mm Hex Head Screws.

***Detailed product sheet available**

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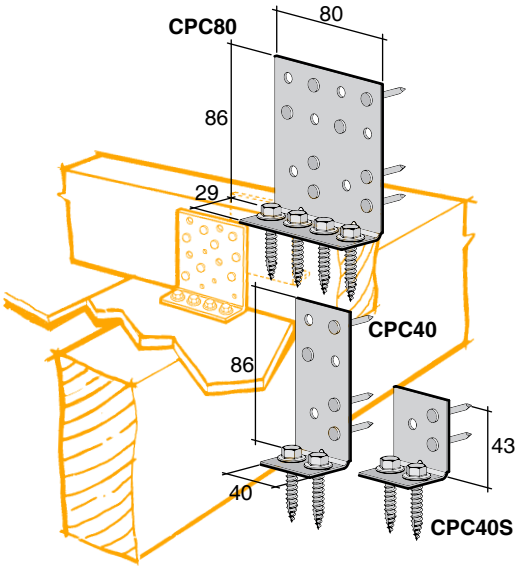


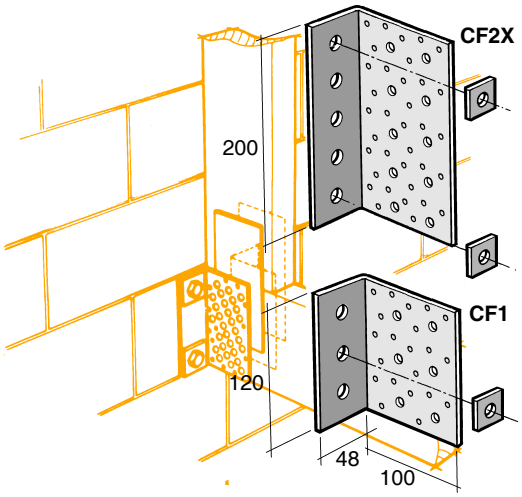
*CONCEALED PURLIN CLEATS CPC40, CPC80, CPC40S

1.55mm G300 Z275 Galvanised Steel

Nominal Rafter Width (mm)	50	100
Cleat	CPC40 or CPC40S	CPC80

CPC cleats provide an excellent purlin/rafter fixing in exposed situations, resisting any wind uplift.
The cleats can also be used for exposed rafter to ridge beam connections. Fixed with Type 17-14g Hex Head Screws and LUMBERLOK Product Nails 30mm x 3.15mm diameter (not supplied with product).

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.

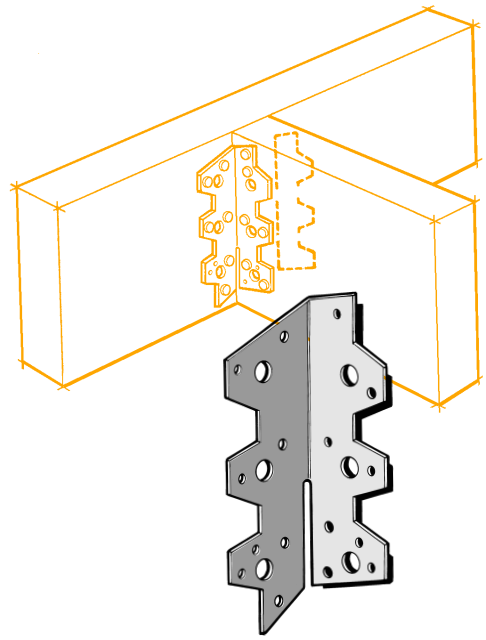


CONCRETE FIXING CLEATS CF1 & CF2X

1.55mm G300 Z275 Galvanised Steel

Both cleats provide a quick and economical method of fixing timber trusses, beams, columns to solid concrete or grouted concrete blockwork.
Both cleats can be used on one or two sides of timber members, depending on the loads required. Fixed with LUMBERLOK Product Nails 30mm x 3.15mm diameter and appropriate M12 bolts (not supplied with product). 40x40x5mm washer supplied.

Refer to Characteristic Loadings Brochure for design values.



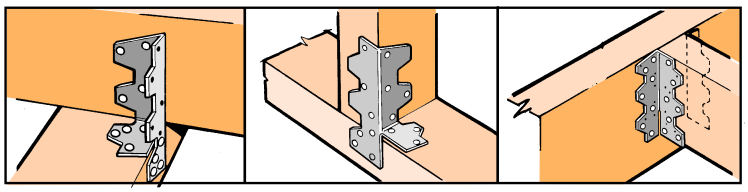
MULTIGRIP

0.91mm G300 Z275 Galvanised Steel

LUMBERLOK Multigrips are a multipurpose product that can be bent into any of five combinations. One product provides for all alternatives with the bending slot enabling easy on-site bending.

Size 125mm high x 38mm flanges. Fix with LUMBERLOK Product Nails 30mm x 3.15mm diameter, or Type 17-14g x 35mm Hex Head Screws. Correct nailing shown below.

Refer to Characteristic Loadings Brochure for design values.
Available in Stainless Steel 304.



***Detailed product sheet available**

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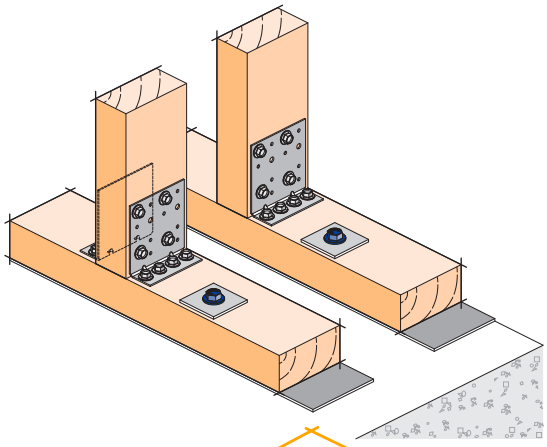
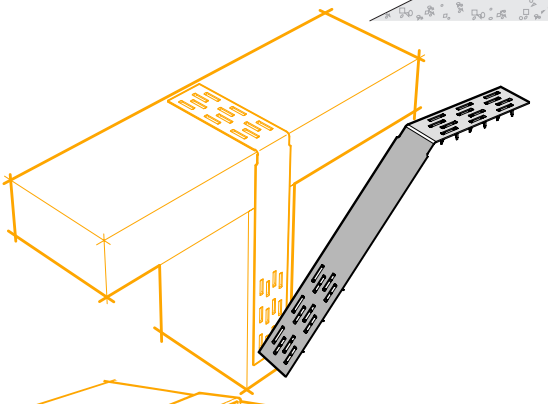


*6kN & 12kN STUD TO BOTTOM PLATE FIXINGS

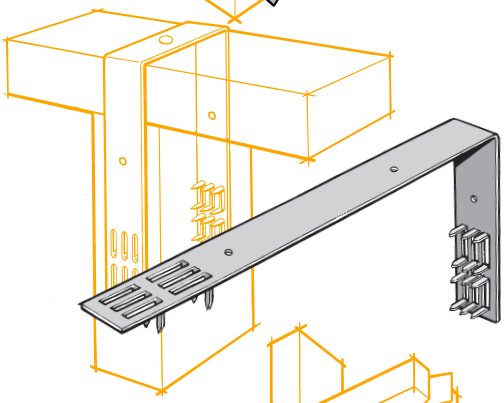
Also referred to as ‘Stud Anchor’ due to being used for stud to top plate fixing, these are a great alternative to the Sheet Brace Straps as they sit within the wall frame. Also an ideal retro fit fixing after lining/cladding is installed. Packs are supplied with two LUMBERLOK CPC80 cleats and the appropriate screws to provide 1 x 12kN or 2 x 6kN fixings.



STUD STRAP

0.95mm G300 Z275 Galvanised Steel

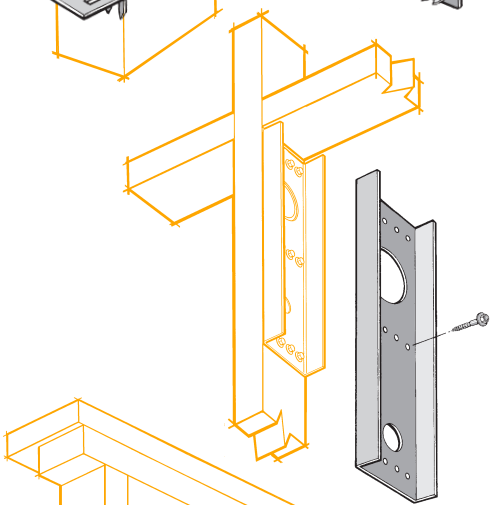
Designed to secure studs to top plate, this pre-bent strap product can be applied to one face only, saving time over alternative fixing methods. In addition, when fixing to the outside of timber stud wall frames, it provides a flat internal surface for plastering. The pre-formed teeth are designed to be applied by blows from a broad face hammer. The 185mm length of strap for fixing to the stud makes this product suitable for double 45mm top plates.



STUD TIE

1.0mm G300 Z275 Galvanised Steel

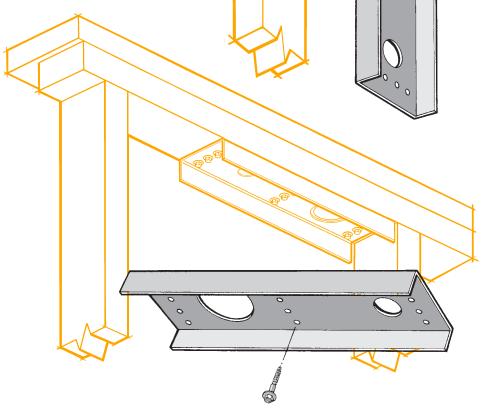
A fast effective way of securing top and bottom plates to studs. The pre-bent Stud Tie is wrapped over the wall plate and has pre-formed teeth which are hammered into both sides of the stud. Available in 300 & 400mm lengths, the longer option is suitable for double 90 x 45mm top plates.



*FRAMING STUD STIFFENER

1.55mm G300 Z275 Galvanised Steel

Replace the strength lost in 90 x 45mm framing studs as a result of holes being drilled through timber framing for plumbing or vacuum systems ducting. This solution is for holes up to 60mm diameter. Fixed to side of stud with 3 rows of 4 x Type 17-14g x 35mm Hex Head Screws (supplied).



*TOP PLATE STIFFENER

1.55mm G300 Z275 Galvanised Steel

Tested to re-strengthen timber top plates where holes have been drilled for the installation of internal vacuum system ducting. This is an alternative solution to NZS 3604:2011 and includes holes up to 60mm diameter. Fixed through the top plate and into the timber packer with 3 rows of 4 x Type 17-14g x 75mm Hex Head Screws (supplied).

***Detailed product sheet available**

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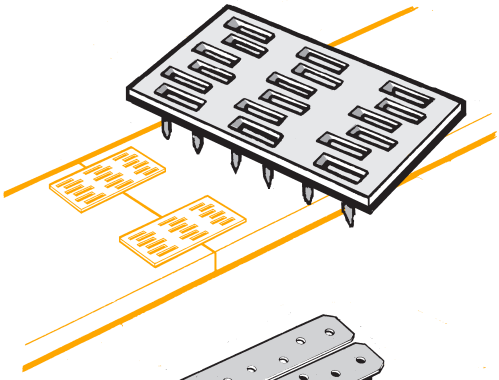


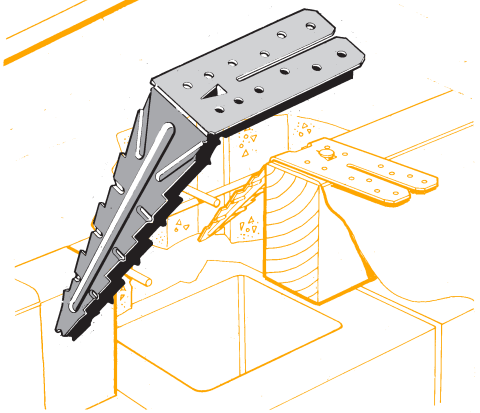
STRAP NAIL

0.95mm G300 Z275 Galvanised Steel

Is specifically designed for on-site use and many general applications where a strong, rigid load-carrying joint is required. Strap Nails eliminate skew nailing, scarf cutting and checking in.

The Strap Nail has many applications in the furniture and packaging industries, plus having many uses for the home handyman. Size 39mm x 76mm.

Refer to Characteristic Loading Brochure for design values.

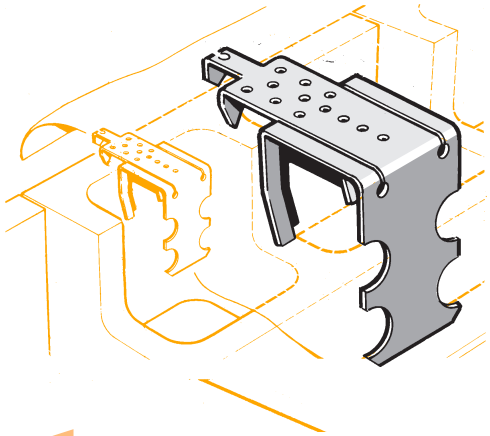


*BOTTOM PLATE FIXING ANCHOR

0.95mm G300 Z450 Galvanised Steel

Ingenious product designed to fix timber wall frames down onto concrete slab floors. Bottom Plate Anchors are temporarily fixed to the perimeter boxing at 900mm centres max. prior to the concrete pour, and folded around the bottom plate when the frames are located. LUMBERLOK Product Nails 30mm x 3.15mm diameter are then applied to secure the frames in position.
Alternative to concrete bolts, or the drilling of bottom plates and lifting of frame over cast-in steel rods.

Refer to brochure for application data.
Available in Stainless Steel 304.

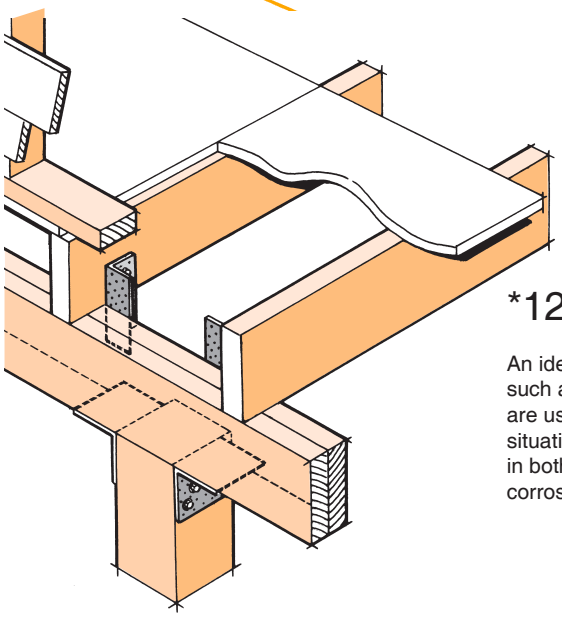


*HEADER BLOCK ANCHOR

1.15mm G250 Z275 Galvanised Steel

This product has been developed to complement the Bottom Plate Anchor, where concrete header blocks are used to form the concrete slab perimeter. The product is clipped onto the block edge at 600mm centres max. and left until the slab is poured and frames ready to stand up.
The tongue is then lifted up off the surface and folded around the bottom plate for nailing using LUMBERLOK Product Nails 30mm x 3.15mm diameter.

Refer to brochure for application data.
Available in Stainless Steel 304.



*12kN RETRO SUBFLOOR FIXING

An ideal fixing to be used when the outside face of the bearer is not accessible, such as with relocatable houses to piles. The specially developed Retro Plates are used for connecting pile to bearers to joists and are easily fixed in constricted situations with Type 17-12g x 35mm Hex Head Screws (supplied). Manufactured in both Hot Dip Galvanised and Stainless Steel options to suit the required corrosive environment.

***Detailed product sheet available**

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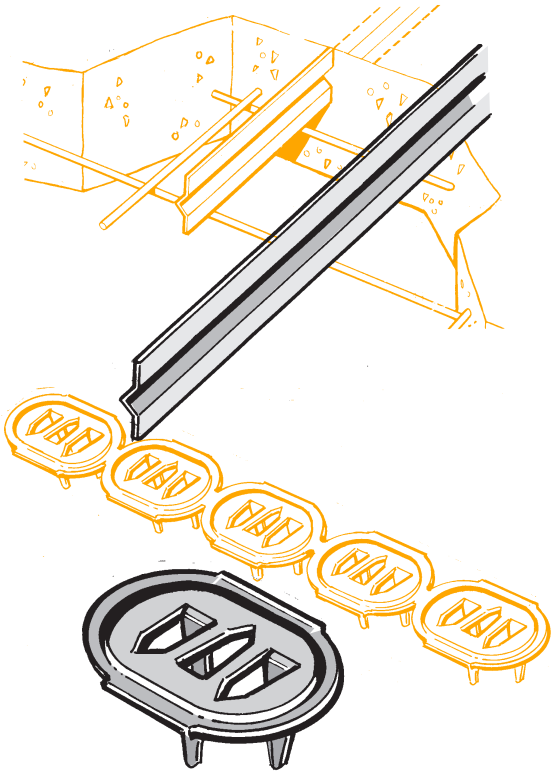


*KRACK MATE

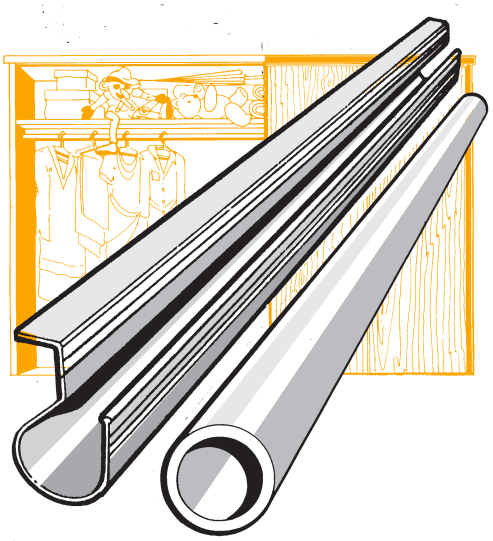
0.85mm G250 Z275 Galvanised Steel

A preformed metal crack inducer for all types of concrete surfaces. Eliminates concrete cutting. 36mm overall width, supplied in 3m lengths. Krack Mate is inserted into wet concrete after screeding stage, flush with surface level.

Refer to brochure for application data.

LITTLE GRIPPER

Available in strips of 5, this hammer on, snap off connector is suitable for economical quick fastening of building paper, shade cloth, plastic sheeting, etc.

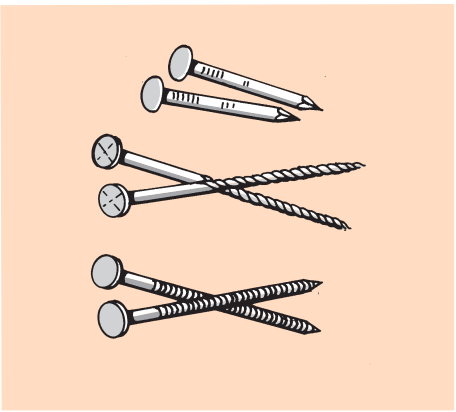


CLOSET RAIL

This attractive product provides an alternative to bar or timber rails in wardrobe situations. Manufactured from extruded aluminium, the closet rail enhances wardrobe appearances and also provides additional support strength to the closet shelf. The product is available in lengths of 1.8m, 2.4m and 3.6m, either standard mill finish or powder-coated white.

CLOSET TUBE

This economical and attractive product is ideal as an alternative to galvanised pipe in wardrobe situations. Closet Tube is available in lengths of 1.8m or 2.4m, and powder-coated finished in white. Strong sockets are also available to support the Closet Tube ends.



PRODUCT NAILS

30mm x 3.15mm diameter F.H.
Available in 25kg, 5kg packs and 500g bags. To be used for most products requiring nailing.
Also available in Stainless Steel 316.

SPIRAL ROLLED NAILS

90mm x 3.55mm diameter F.H., 45mm x 3.55mm diameter F.H.
Available in 1kg packs.

ANNULAR GROOVED NAILS

30mm x 3.15mm diameter F.H., 45mm x 3.3mm diameter F.H.,
90mm x 4.0mm diameter F.H.
Available in Stainless Steel 316.

***Detailed product sheet available**

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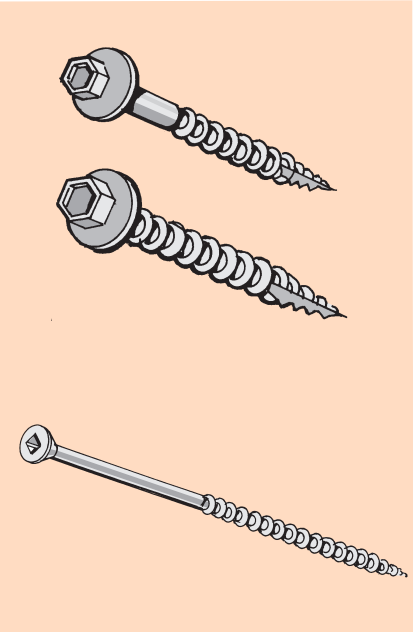

SCREWS

Type 17-12g x 35mm Hex Head Screws Galvanised, Electro Galvanised and Stainless Steel.
Type 17-14g x 35mm Hex Head Screws Electro Galvanised and Stainless Steel.
Type 17-14g x 75mm Hex Head Screws Electro Galvanised and Stainless Steel.
Available in bags of 100.

BLUE SCREW

Specifically developed for use as a purlin and batten fixing. Complies with NZS 3604:2011. This unique 80mm x 10g screw is blue in colour making it easily identifiable.
Available in boxes of 250.

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LUMBERLOK®

MiTek New Zealand Limited

AUCKLAND
PO Box 58-014, Botany 2163
Phone: 09-274 7109
Fax: 09-274 7100

CHRISTCHURCH
PO Box 8387, Riccarton 8440
Phone: 03-348 8691
Fax: 03-348 0314

www.miteknz.co.nz

MITEK® LUMBERLOK® BOWMAC®

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Thermakraft™

Product Data Sheet

SUPERCOURSE 500

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Synthetic Damp Proof Course

Supercourse 500 is a general damp-proof course (DPC) used to prevent moisture transfer between building materials. It is also used as a concealed flashing for masonry veneer cladding.

Manufactured using a single layer of black polyethylene, Supercourse 500 is tough, high-impact and tear resistant. It is a suitable moisture impermeable alternative to bituminous DPC.

Smarter products. Better buildings.
thermakraft.co.nz

BRANZ Appraised
Appraisal No.329 [2016]

Supercourse 500

Synthetic Damp Proof Course

Supercourse 500 comes in eleven roll sizes:

Product Code	Roll Size	Rolls Per Carton
SPC05030	50mm x 30m	42
SPC07530	75mm x 30m	24
SPC09030	90mm x 30m	24
SPC10030	100mm x 30m	18
SPC15030	150mm x 30m	12
SPC20030	200mm x 30m	6
SPC25030	250mm x 30m	6
SPC30030	300mm x 30m	6
SPC40030	400mm x 30m	
SPC50030	500mm x 30m	
SPC100030	1000mm x 30m	

Scope of Use

- Supercourse 500 intended for use as a damp-proof course separating timber and wood-based products and metal from concrete, masonry elements or clay bricks.
- Can also be used to separate timber jack studs or bearers from concrete or timber piles.
- Supercourse 500 can be used as a concealed flashing in masonry veneer walls.

General

- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.
- Available in 11 product width sizes.

Limitations

- Maximum weather or UV exposure is 30 days.
- Supercourse 500 is NOT a window flashing tape and NOT a thermal break product.

Compliance

When Supercourse 500 is used and installed as a damp-proof course and/or concealed flashing behind masonry veneer walls, the product will meet or contribute to meeting the following provisions of the NZBC:

- Clause B2 Durability: Performance B2.3.1 (a), not less than 50 years and B2.3.2.
- Clause E2 External Moisture: Performance E2.3.2 and E2.3.3. When used as a flashing as part of a masonry veneer cladding system, Supercourse 500 will contribute to meeting the requirement of E2.3.2. When used as a damp-proof course, Supercourse 500 will meet the requirements of E2.3.3.
- Clause F2 Hazardous Building Materials: Performance F2.3.1. Supercourse 500 meets this requirement and will not present a health hazard to people.

More details can be found in Supercourse 500 BRANZ Appraisal 329 (2016)

Durability

Supercourse 500 is expected to have a serviceable life in excess of 50 years when it is:

- Installed in accordance with Thermakraft's literature and BRANZ Appraisal.
- Not over exposed to the weather or UV (not more than 30 days).
- Never exposed to chemicals or solvents that will degrade or affect polyethylene material.

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

Thermakraft Limited / 0800 806 595

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BRANZ Appraised
Appraisal No.329 (2016)

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

Issue 3, November 2019

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Thermakraft™

Installation Guide

ALUBAND

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Bituminous window flashing tape.

Aluband is designed specifically as a premium window flashing tape. Made with a heavy bituminous adhesive the product provides high strength bond and excellent abrasion resistance.

Product usage

Aluband Window Flashing Tape is installed into and around frame joinery opening over the wall membrane and exposed frame to cover both the face and edge of the opening framing as a secondary weather resistant barrier. It can also be installed at joinery heads to seal flashing upstands to the wall membrane.

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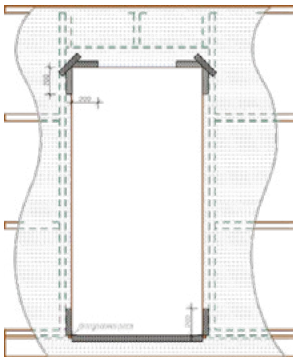
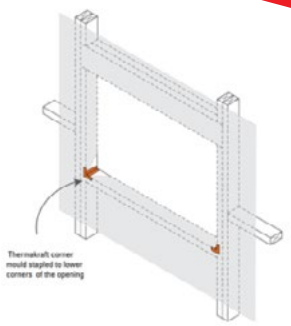
thermakraft.com.au

Installation Guide

Application Method

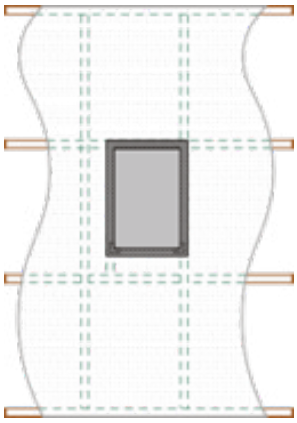
- Cut the wall underlay/air barrier at a 45° angle away from each corner. Fold flaps tightly into the window or door opening and fix with staples on the back faces of the framing.
- Fix the Thermakraft Corner Moulded Piece to the bottom corners by way of staples or clouts to the two jambs. Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminates, solvents, oils or waxes. Note the following: 150mm wide tape is used for 100mm wide window or door framing, and the 200mm wide tape is used for 140mm to 150mm wide reveals. (With steel framed houses use Double Sided Tape to attach the Thermakraft Aluband Corner Moulded Piece to metal framing).
- Measure 200mm up both jambs, add 400mm to the length of the window sill and cut to suit that measurement.
- First remove the release film from the tape; align the back edge of the tape with the inside edge of the sill.
- Using the Thermakraft Tool, firmly press the tape onto the wall underlay to ensure good adhesion and ensure the tape is fitted tightly into the jamb to sill corners.
- At the sill/jamb corners cut the tape from the external edge of the frame outwards. Fold flaps back onto the wall underlay/air barrier and press tape firmly for good adhesion.
- Proceed to fit the Window Flashing Tape to the top corners of the frame (200mm across lintel x 200mm down jamb).
- For window or door lintel to jamb junction, apply a butterfly using the 75mm wide x 100mm long Aluband. Fix at a 45° angle to the jamb with an overlap at the corner of 3mm.
- Door frames are to be treated similarly to window openings. The sill may be either a timber or a concrete floor.
- Window Flashing Tape is used to seal the up stand of the window head flashing to the building membrane. (Refer to the cladding manufacturer's details).
- Aluband must NOT be left exposed to the weather or UV for more than 42 days.

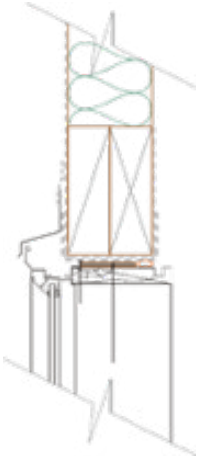




Window and door frames

- Staple orange corner piece to the bottom corner sill. Place tape 200mm up the jambs and across the full width of the sill opening. Align tape with the back of the frame opening.
- At the top corner place tape 200mm down the jamb and 200mm across the lintel. Place a strip of 75mm tape across the top corner.





Application Tips

- Always use the Thermakraft Aluband Window Flashing Tool to apply firm pressure onto the tape during installation. This will ensure proper adhesion of the tape to the building underlay or other substrates.
- Install the Aluband Window Flashing above 5°C.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Important Information

To assist the adhesion of Aluband window flashing tape, Thermakraft suggests the following two options this is particularly relevant in the following conditions:

- In temperatures below 5°C.
- When adhering to difficult to bond substrates such as rough/uneven surfaces.
- When the tape has been lifted or moved after initial application.

Installation Guide

Application of Heat:

- Press the window sill tape into position in the usual manner.
- Apply a gentle heat, using a heat gun on low heat to the top of the window sill tape.
- Once the adhesive starts to soften use the Thermakraft tool or a roller to firmly press the tape into the wall underlay ensuring good adhesion.
- Take care not to damage the foil face lining.

Difficult to Bond Substrates Surface Preparation:

- Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminates, solvents, oils or waxes.
- Application of Scotch® Super 77™ Spray Adhesive: When installing Aluband Flashing Tapes on difficult to bond substrates, Scotch® Super 77™ Spray Adhesive may be used. Ensure that the substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch apply the flashing tape in the normal manner.

Adhesives and Sealants:

- After the installation of Aluband window flashing tape, ensure that the edges do NOT come into contact with solvent based sealants or adhesives. Solvents in these products can adversely affect the adhesion or dissolve the bituminous adhesive and cause it to run.
- If the application of solvent based adhesives or sealants are necessary, cover the edges with Thermakraft joining tape or a true aluminium foil tape to form a barrier. With a true aluminium foil tape, the installer must test the bonding strength.
- The installer must check the compatibility of the Aluband window flashing tape with the sealant or adhesive product to ensure the components are fully compatible.

Handling and Storage

Aluband window flashing tape must be handled with care to prevent damage such as tearing, excessive puncture and roll deformation.

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

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

Issue 2, November 2019

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BC201209

Thermakraft™

Thermakraft
ONE WRAP SYSTEM
10 Products - One system
One warranty

Installation Guide

WATERGATE PLUS

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

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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

Watergate Plus is part of the Thermakraft One Wrap System. Its unique construction allows for easier installation while maintaining best in class performance qualities.

Smarter products. Better buildings.
thermakraft.co.nz

CodeMark BRANZ-CM-1002

BRANZ Appraised
Appraisal No.695 [2017]

Installation Guide

Application Method

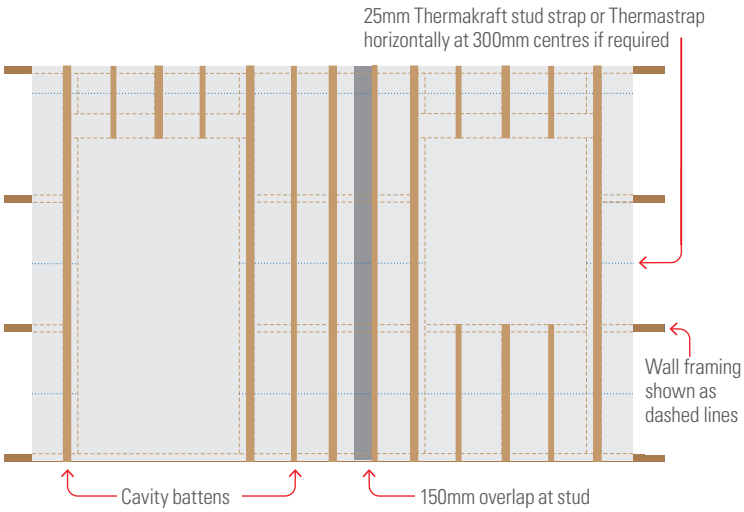
- Fix Watergate Plus underlay with printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Watergate Plus underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.
- Watergate Plus underlays are available in widths of 2740mm and 1370mm. The 2740mm width product is generally wide enough to come from below the bottom plate to the top plate.
- When fixing Watergate Plus underlay to Steel framing the same procedures applies, use adhesive spray or tape or flat head screws to fasten to the framing or thermal break, the exterior cladding fastenings will act as the permanent fixings.
- Cover all windows and door openings with Watergate Plus underlay.
- It is recommended that the Watergate Plus underlay is not cut and prepared for window installation until the arrival of the windows. minimum of 150mm lap is required at joins, all vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of the membrane.
- When windows and doors are ready for installation, the Watergate Plus underlay covering the openings should cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system. **Note:** In accordance with NZBC Acceptable Solution E2/AS1, wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm Thermakraft stud strap run horizontal at 300 centres is an acceptable means of prevention.
- Once installed, Watergate Plus must not be left exposed to the weather or UV for a maximum of 60 days. Watergate Plus underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZS 3604.
- Make good any forced tears with Thermakraft window flashing tapes. Any large areas which require repair may be covered with a second layer of underlay, a lap of 150mm is required.
- Watergate Plus underlay must be installed by a licensed building practitioner.

Fix securely to the frame with fasteners such as 6-8mm staples

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

Application Tips

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



Handling and Storage

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

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

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

Issue 1, November 2019

CONSENT ISSUED BC201209 - Page 398 of 689

Cl/SfB
MAY 2016

Thermakraft™

WATERGATE PLUS 295

SYNTHETIC WALL UNDERLAY

The ultimate wrap, all walls, all systems

Watergate Plus 295 is a fire retardant, absorbent, breathable wall underlay. It is a white composite Non-woven polypropylene, specifically designed as a wall underlay behind exterior wall cladding. Watergate Plus 295 also offers a high degree of water resistance, with a high level of water vapour permeability.

ADVANTAGES

- Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding direct fixed to framing.
- Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding installed over an 18mm minimum drained cavity.
- Is suitable for use in all Wind Zones of NZS 3604 up to, and including, "Very High", when used as standalone flexible underlay, and Extra High when used as a flexible underlay over a rigid wall underlay.
- Will provide temporary weather protection during construction. (Max 60 Days)
- Can be used as a non-rigid backing material for Stucco Plaster*
- May be used as a slip layer over rigid backing for Stucco*
- Is fire retardant*
- Unaffected by LOSP treated timber.
- Is suitable as an air barrier in unlined walls

ENVIRONMENTALLY FRIENDLY PRODUCT

FIRE RETARDANT

WALL
This is a Thermakraft wall product

* Refer technical specifications

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

BRANZ Appraised
Appraisal No.695 [2010]

For additional details and latest specifications www.thermakraft.co.nz or scan QR code.

Thermakraft Watergate 295 - Technical Specification

Fire Retardant | Breathable | Absorbent | Non Woven | Wall Underlay

Thermakraft Watergate Plus 295 can be used as a wall underlay on timber and steel framed buildings within the following scope:

- The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area; and,
- With absorbent wall claddings directly fixed to timber and steel framing; and,
- With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity;
- With masonry veneer in accordance with NZS 3604, NZBC Acceptable Solution E2/AS1 for timber framed buildings, or specific engineering design for steel framed buildings; and,
- Situated in NZS3604 Building Wind Zones up to, and including 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- Can be used as a non-rigid backing material for Stucco Plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 9.3.5.1. The Underlay must be supported with 75mm galvanized mesh, or Thermakraft Stud Strap Hand Held or wire at 150mm centres run across cavity battens to limit deflection to a maximum of 5mm.
- May also be used as a slip layer over rigid backing for Stucco Plaster in accordance with the requirements of NZBC E2/AS1 Paragraph 9.3.3(b).
- Refer BRANZ Appraisal No 695 (2010) for full details.
- May be used with LOSP treated timber.
- Is suitable as an air barrier in unlined wall spaces.
- Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- Is suitable for direct fixing behind metal cladding.

Flammability Index

Thermakraft Watergate Plus 295 Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Limitations

- Must not be used as a roof underlay.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, Providing

- It is not damaged
- Installed in accordance with instructions
- Is not left exposed for more than 60 days
- Installed by or under guidance of Licensed Building Practitioners
- Is compatible with cladding system used.

Table 1: NZBC E2/AS1 Alternative Solution to Table NZS2295 AS wall underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 100gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 20mm	Pass
Air Resistance	≥ 0.1 MN.s/m^3	295 can be used as an air barrier

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M^2
1370	18.5	25
1370	37.0	50
1370	73.0	100
2740	18.5	50
2740	36.5	100

For additional details and latest specifications www.thermakraft.co.nz

BRANZ Appraised
Appraisal No.695 [201]

Thermakraft Industries Ltd 11 Turin Place, East Tamaki, Auckland, New Zealand
P.O.Box 58-112, Botany, Auckland 2163 **Phone** 0800 806 595 or +64 9 273 3727
Fax +64 9 273 3726 **Email** info@thermakraft.co.nz **www.thermakraft.co.nz**

INTELLIGENT MEMBRANES FOR THE BUILDING INDUSTRY

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.

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Thermakraft™

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Product Data Sheet

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as “Building Paper” Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

Thermakraft 215 comes in two roll sizes:

1250mm wide	20m long	25m^2 coverage*
1250mm wide	40m long	50m^2 coverage*

* **Note:** m2 is the roll size for actual coverage, allow for laps and joins.

Smarter products. Better buildings.
thermakraft.co.nz

Thermakraft 215

Self-supporting bituminous wall and roof underlay

Scope of Use (Roof Application)

- Suitable with masonry tile, metal tile and profiled metal roof cladding.
- Direct fix or cavity fix.
- Can be used on roofs up to and including NZS 3604 'Extra High' wind zones.
- Refer to installation guide regarding underlay support requirements.
- Will provide temporary weather protection during construction (maximum 7 days), same day coverage recommended.

Scope of Use (Wall Application)

- Suitable for use with both timber and steel framing, either direct fix or in conjunction with an 18mm minimum drained cavity.
- Can be used with absorbent wall claddings (e.g. timber, brick or fibre cement) or non-absorbent wall claddings (e.g. metal or plastic).
- Can be used with masonry veneer in accordance with NZS 3604.
- Suitable for buildings situated in NZS3604 Building Wind Zones up to and including 'Very High'.
- Thermakraft 215 can be used as an air barrier to reduce wind entry and is highly water resistant.
- Will provide temporary weather protection during construction (maximum 28 days).

General

Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.

Limitations

- In roofing applications must NOT be exposed to the weather or UV for more than 7 days.
- In wall applications must NOT be exposed to the weather or UV for more than 28 days.
- Must NOT be used under translucent sheeting.
- Is not fire retardant.
- Not suitable for School Property, please refer to Ministry of Education; Weather-Tightness & Durability requirements for School Property.

Compliance

Thermakraft 215 meets the requirements of NZBC Acceptable Solutions E2/AS1, Table 23 and NZS 2295:2006 for both wall & roof underlay.

Durability

Meets the Performance Requirements of NZBC Clause B2, Durability B2.3.1 (a) 50 years and B2.3.1 (b) 15 years, E2 External Moisture providing:

- It is installed in accordance to Thermakraft Installation Guide.
- Run length is no greater than 10 meters.
- Is NOT left exposed to the weather or UV for more than 7 days on roof.
- Is NOT left exposed to the weather or UV for more than 28 days on walls.
- Is installed by or under guidance of Licensed Building Practitioners.
- Is installed in accordance with the MRM Code of Practice.
- Is compatible with the cladding system used.*

* **Note:** roof cladding system compatibility testing must be done first before installation.

Property Performance

NZBC E2/AS1 Wall Underlay Requirements					
NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	**Absorbency**	**Vapour Resistance**	**pH of Extract**	**Shrinkage**	**Water Resistance**
Property Performance Requirement	≥ 150gsm	≤ 7 MN.s/g	≥ 5.5 and ≤ 8	≤ 0.5%	100mm for 24 hrs
Property Performance	Pass	Pass	Pass	Pass	Pass

NZS2295:2006 Classification			
NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	**Flammability Index**	**Wind Zone**	**NZS2295:2006 Index**
Property Performance Requirement		R2	R2
Property Performance	Non-Fire Retardant	Up to Extra High	Self - Support

Thermakraft 215

Self-supporting bituminous wall and roof underlay

Control of Condensation

In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation method to prevent moisture build-up in the roof cavities.

Factors which adversely affect the condensation risk in roofing systems include:

- Humid, and/or cold climatic regions.
- Warm/Skillion roof construction.
- Low roof cavity air volume and restricted air movement.
- Omitting Vapour Control Layers.
- Occupancy activities which have high moisture loading on conditioned spaces.
- Ceiling penetrations and entry of warm air into roof cavities.
- Low pitched roof.
- Bulk insulation.
- Building structures ability to naturally dry construction moisture.

Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer to MRM Code of Practice for details.

For passive ventilation of the roof space, it is recommended that all roof underlays are terminated at the ridge, and if not it should be slit or slotted to allow for passive ventilation. (For further information refer to the NZ MRM Roofing Code of Practice).

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

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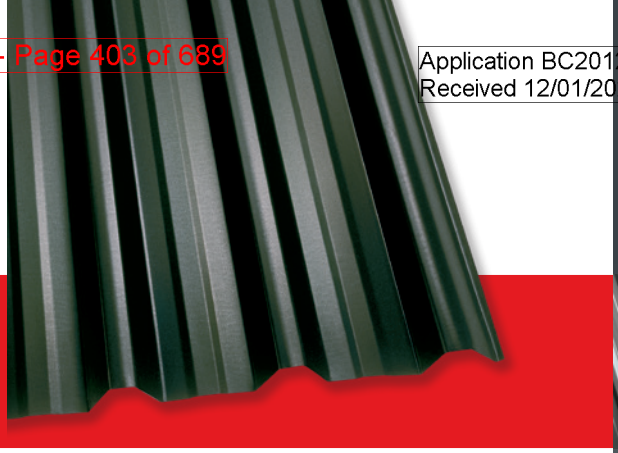
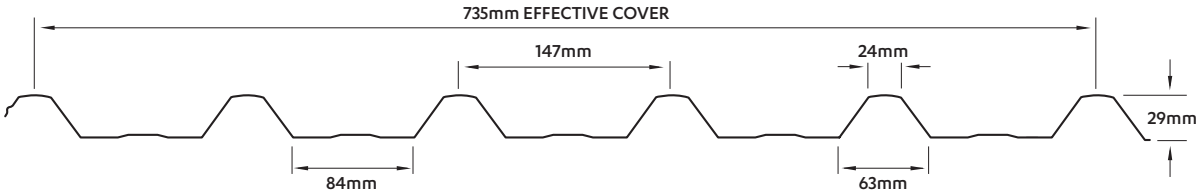


PRODUCT TECHNICAL STATEMENT

TRIMLINE

Profiled Metal Roofing and Cladding

NOMINAL DIMENSIONS



DESCRIPTION

Trimline is a premium low rib, six-ribbed trapezoidal profile, offering great looks and exceptional performance.

APPLICATIONS

- **Residential Roofing & Cladding**
- **Industrial/Commercial Roofing & Cladding**
- **Curving**

FEATURES

Trimline has an extra rib compared to most other products in its class, giving it unequalled good looks and greater rigidity.

OPTIONS

Trimline in .55 G300 material can be crimp curved to minimum radii of 400mm. Depending on grade and purlin spacings, it can be sprung curved down to convex radii of 28 metres. Clear sheeting is available in G.R.P. (fibreglass).

MATERIALS

Available in metallic coated and pre-painted steel in .40mm and .55mm B.M.T. (base metal thickness) aluminium plain and prepainted in .70mm and .90mm, and other non-ferrous metals.

FASTENERS

Typically: Steelfix 12g x 55mm, Timberfix 12g x 65mm, Class 4 minimum of material compatible with that being fastened and durability no less than the sheet material. Category 5 or non-ferrous fasteners are recommended for severe or very severe marine environments

DURABILITY

All material selections must be compatible with prevailing environmental conditions and adjacent materials, see *Roofing Solutions Product Guide* or *Specifiers Guide* for details. Areas not exposed to rain washing will require programmed maintenance.

WARRANTY PLUS

Steel & Tube **Warranty*Plus*** is the most comprehensive warranty available in the industry. **Warranty*Plus*** covers an extended range of performance criteria, is supported back-to-back by our suppliers, includes site-specific maintenance requirements and is transferable to subsequent owners.

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PERFORMANCE DATA

MASS (KG/M²)

.40mm B.M.T.	4.07	.55mm B.M.T.	5.52

MAXIMUM SPAN

Maximum spans for normal and heavy traffic in millimetres based on Point Load limits, Distributed Loads in kPa calculated in accordance with AS/NZS 1170:2003 at maximum spans, using 4 fasteners per sheet per support. Loads for alternative fastener frequencies available on request.

	Material Thickness	Internal Span			End Span		
		Span	Strength Load	Serviceability Load	Span	Strength Load	Serviceability Load
Controlled Traffic*	.40mm	1700	4.45	3.03	1450	4.95	3.31
	.55mm	2300	5.35	2.12	1700	6.21	3.96
Heavy Traffic**	.40mm	1100	7.07	6.00	800	8.01	5.70
	.55mm	1800	8.19	4.27	1400	7.43	5.65

** Supports 1.1kN to PAN at mid-span. ** Supports 1.1kN to RIB at mid-span.*

To minimise the possibility of roof traffic damage, Steel & Tube recommends Heavy Traffic maximum spans be used.

FASTENERS PER SHEET PER PURLIN

Material Thickness	Purlin Spacing	Wind Zone				
		Low 32 m/s	Medium 37 m/s	High 44 m/s	Very High 50 m/s	Extra High 55 m/s
.40mm	900	2	2	3	3	3
.55mm		2	2	2	2	3
.40mm	1200	2	3	3	4	5
.55mm		2	2	2	3	3

Fastener requirements for Wind Zones according to NZS3604:2011 (calculated on periphery area pressures), using standard fasteners without load spreading washers (typically fastened through every rib to top and bottom purlin).

For SED conditions and applications designed to AS/NZS 1170refer to Steel & Tube: 0800 333 247.

MINIMUM PITCH

In accordance with Acceptable Solution E2, the minimum pitch for **Trimline** for roofing dwellings is 3°.Roof runs in excess of 35 metres should be checked for water runoff capacity.

FOOT TRAFFIC

Foot traffic up the roof must take place in the pan of the profile, or over purlin lines. Traffic across the roof must take place along purlin lines.

SPECIFICATIONS

Recommended specifications are available in the branded sections of MasterSpec *BASIC* or MasterSpec *STANDARD*, or from your local Steel & Tube branch or visit our website.

DESIGN DETAILS

Design details covering many applications are available on our website in CAD and PDF under each product section. Visit www.steelandtube.co.nz.

IMPORTANT PUBLICATIONS

For your installation to perform to its potential, it is essential that it is designed, installed and maintained in accordance with good trade practice. Please refer to:

- Steel & Tube: Roofing Solutions Product Guide
- New Zealand Steel: Installation Guide
- New Zealand Steel: Builders and Specifiers Guide
- BRANZ: Good Profiled Metal Roofing Practice
- MRM: New Zealand Metal Roofing and Wall Cladding Code of Practice
- E2/AS1

INSTALLERS

A list of local installers for your area and contract type is available from your local Steel & Tube branch or visit www.steelandtube.co.nz.

Note:

Trademarks apply to the following products presented in this publication: Trimline, MasterSpec BASIC and MasterSpec STANDARD.

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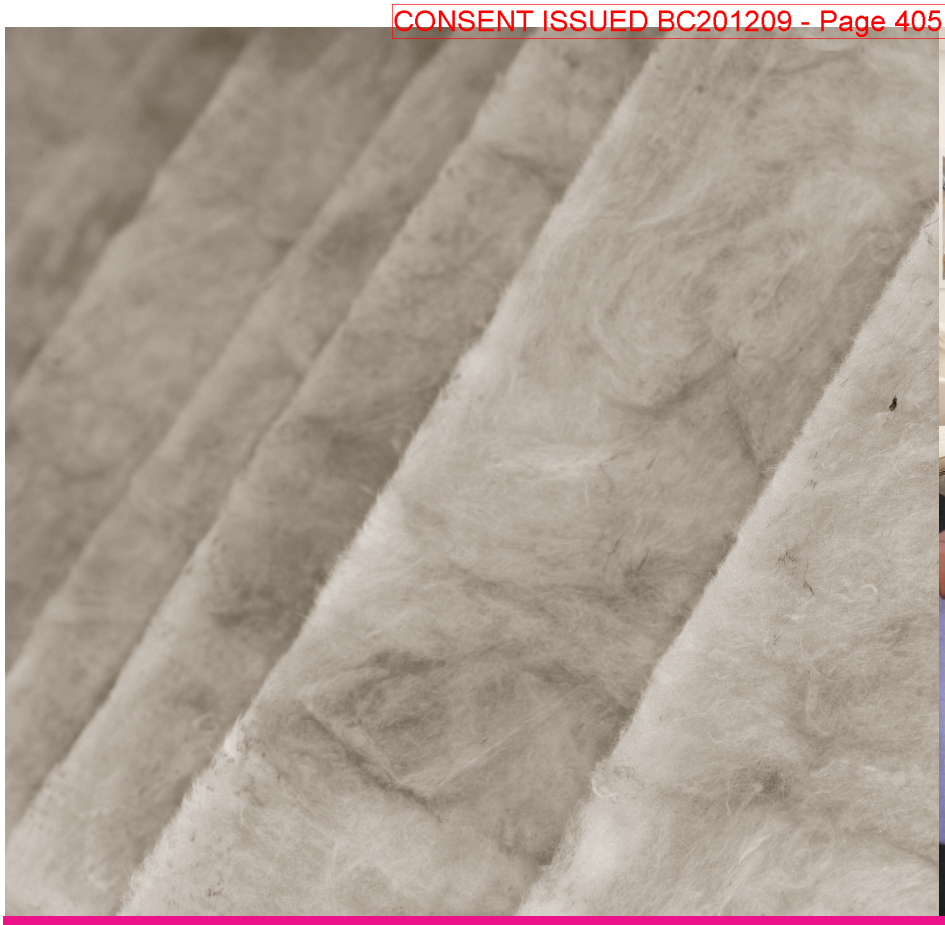

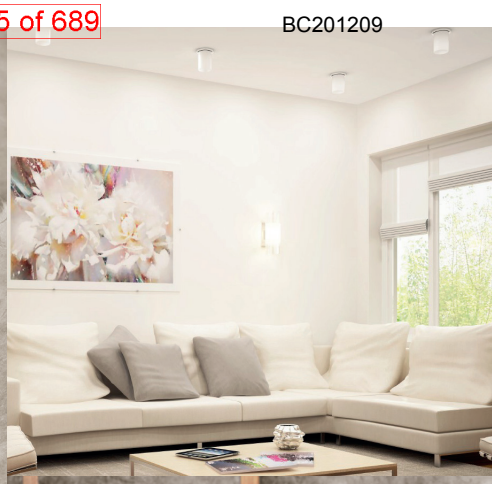

PRODUCT DATA SHEET

Acoustic | PINK® BATTS® SILENCER® INSULATION WALL & MIDFLOOR

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209, 12/01/2021 Michaelmo

Application

Pink® Batts® Silencer® insulation is a lightweight flexible glass wool insulation product designed to:

- Provide acoustic insulation in internal walls and midfloors
- Fit easily into standard constructions, or be easily cut to fit in non-standard constructions
- Meet the requirements of the New Zealand Building Code (NZBC) for different designs and environments

NOTE: Pink® Batts® Silencer® wall insulation is designed for use in internal walls, only where both acoustic and thermal properties are desired. In an external wall, we recommend the use of the Pink® Batts® Ultra® wall range.

Features and Benefits

- Absorbs sound – reduces noise transmission between rooms for a quieter more relaxing home
- Internationally certified for Indoor Air Quality – gives assurance that products meet strict chemical emissions limits
- Non-combustible – will not easily burn in the event of a fire
- Made from over 80% recycled glass - making sustainable use of waste
- Made in New Zealand - designed for New Zealand building conditions and reduces emissions associated with the importing of overseas manufactured product

Acoustic | PINK® BATTS® SILENCER® INSULATION WALL & MIDFLOOR

Acoustic Properties

Pink® Batts® insulation will assist with noise control; however, penetrations in walls will transmit sound readily. Superior noise control can be achieved by using Pink® Batts® insulation products in conjunction with good acoustic design.

	Application	STC[1]	IIC[2]	NRC[3]	Nominal Thickness	Estimated R-value[4]
Pink® Batts® Silencer® 100mm	90mm internal walls	43	N/A	1.04	100mm	R2.4
Pink® Batts® Silencer® 75mm	70mm internal wall	39	N/A	0.91	75mm	R1.9
Pink® Batts® Silencer® Midfloor	In-between floors /multiple storeys	N/A	32	1.10	150mm	R3.6

1 Testing with 10mm GIB® standard plasterboard on either side
2 Construction 200 x 50mm Joist @ 450mm, 20mm particle board, 10mm GIB® standard plasterboard, battens @ 400mm
3 Once the product is enclosed in a wall cavity NRC is irrelevant. NRC measures reverberation and absorption eg: Suitable measure for recording studio, theatre etc
4 This R-value is an estimated R-value only and is not tested to AS/NZS 4859.1 like our Pink® Batts® thermal insulation products.Estimated R-values are calculated at nominal thickness

Steps to a Quieter Home

Building or renovating - follow these simple steps to ensure your home has optimal noise control

1. Ensure your layout allows for different noise zones
   - Group similar rooms together
     - Quiet rooms: e.g. bedrooms and studies
     - Living Rooms: e.g. lounge, dining, home cinema, rumpus
     - Functional rooms: e.g. kitchens, laundries, bathrooms, toilets
   - If noise is likely to disturb sleeping occupants, position bedrooms as far away from living areas as possible
   - Ensure bedroom and living areas are positioned away from external noise sources such as busy roads
   - Use foyers, corridors or hallways to buffer noise
2. Specify and install Pink® Batts® Silencer® in internal walls between rooms. Use GIB® Soundseal® and GIB® Noiseline® for additional noise control
3. Design your home to ensure penetrations and gaps in walls are minimised i.e: power outlets are not back to back.

Acoustic | PINK® BATTS® SILENCER® INSULATION WALL & MIDFLOOR

Acoustic Solutions

Between room solutions - Fill internal walls with Pink® Batts® Silencer® wall insulation

Used in conjunction with GIB® Noise Control Systems, Pink® Batts® Silencer® insulation can provide noise control for all the different zones in your home. Depending on your desired level of noise control, choose from the systems below.

Sound Control	Construction	STC
Minimum	Standard internal wall framing, no Pink® Batts® Silencer® insulation, 10mm GIB® Standard plasterboard both sides.	Provides an STC 36 - speech can be heard.
Improved Option	Standard internal wall framing, Pink® Batts® Silencer® insulation, 100mm,10mm GIB® Standard plasterboard both sides.	Provides an STC 43 - loud speech is just audible.
Superior Option	Standard internal wall framing, Pink® Batts® Silencer® insulation, 100mm, 2 layers 10mm GIB® Noiseline® both sides, GIB® SoundSeal® around the perimeter.	Provides an STC 48* - loud speech is heard as a light murmur only.

* The correct use of Pink® Batts® Silencer® insulation and GIB® Noise control systems will reduce noise significantly but will not eliminate it. For more detailed information about construction options refer to GIB® Noise Control Systems Manual 2006.

Between Floor Solution - Pink® Batts® Silencer® Midfloor

Pink® Batts® Silencer® Midfloor is specifically designed to reduce noise transmission between floors. If you plan on having a hard surface such as tiles or laminate flooring on your upper level, use Pink® Batts® Silencer® Midfloor in conjunction with a GIB® Noise Control System. A well designed system will reduce the level of impact sound that travels through the floor joists and into the room below. Carpets and soft floor coverings will also help reduce the sound.

External noise solution - Pink® Batts® Ultra® insulation - the ultimate in thermal and acoustic insulation for your external walls

The Pink® Batts® Ultra® range will not only provide you with great thermal insulation, it can also help reduce the noise from the outside. However, penetrations in walls will transmit sound readily. Superior noise control can be achieved by using Pink® Batts® Ultra® insulation products in conjunction with good acoustic design.

Tips to reduce noise entering your home

- Use Pink® Batts® Ultra® wall and ceiling products
- Minimise penetrations in walls ie: Doors, windows, plumbing etc.
- Use double glazing

Environment

Pink® Batts® insulation is a sustainable and energy efficient product.

- Manufactured using over 80% recycled glass, making sustainable use of waste
- Manufactured in Auckland, minimising shipping distances compared to imported products

Green Star NZ Credits

Green Star is a comprehensive environmental rating system for buildings; materials with certain attributes can receive points that contribute to the overall score of a rated home.

New Zealand Green Building Council (NZGBC) does not test or certify products; they rely on the work done by third party certification bodies and eco labels like Environmental Choice. Further information is available at **nzgbc.org.nz.**

All BRANZ appraised products are eligible for Environmental Choice, all Pink® Batts® insulation products are manufactured in the same environmentally considerate way.

Health and Safety

Product Safety

Pink® Batts® insulation is a non-hazardous, safe product.

- IARC (International Agency for Research on Cancer) classifies glass wool formulation used to manufacture Pink® Batts® products as Group 3: 'Not classifiable as to its carcinogenicity to humans'. This is the same classification as caffeine, tea, hair colouring, chlorinated drinking water, saccharin
- Pink® Batts® insulation is bio-soluble. In the unlikely event any fibres are inhaled into the lungs they will dissolve in the body fluids and be cleared from the body

Indoor Air Quality

- Pink® Batts® insulation is certified under the GREENGUARD Certification Program. Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments

General Health

- Pink® Batts® insulation will assist in meeting the World Health Organisation recommendation for houses to be maintained at a minimum temperature of 18ºC to provide a healthy and comfortable home
- A Wellington School of Medicine study found insulated houses resulted in families with fewer sick days and the economic benefit was double the initial cost of the insulation[5]

[5] Howden-Chapman, P. et al. "Effect of insulating existing houses on health inequality: cluster randomised study in the community" British Medical Journal, 2007, p334:460

Technical Data

Properties	Result		Test/Method/Standard	Test Results
Combustibility	Non-Combustible	✓	AS/NZS 1530.1:1994	Group Number 1S
Early Fire Hazards		✓	AS/NZS 1530.3:1993 - Ignitability (Range 0-20) - Spread of Flame Index (Range 0-10) - Heat Evolved Index (Range 0-10) - Smoke Developed Index (Range 0-10)	 = 0 = 0 = 0 = 0-1
Corrosion	Non-Corrosive	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Moisture Absorption	Non-Hygroscopic	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Vermin Resistance	No Food Source	✓	AS/NZS 4859.1:2002-Glass wool exempt	

* Stated thicknesses are values at which stated R-values are achieved and are likely to be minimum values. See table on Page 5

Acoustic | PINK® BATTS® SILENCER® INSULATION WALL & MIDFLOOR

New Zealand Building Code (NZBC) and Limitations

Pink® Batts® insulation when used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

NZBC Clause B2: Durability
Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

NZBC Clause E3: Internal Moisture
Contributes to meeting these requirements

NZBC Clause F2: Hazardous Building Materials
Meets this requirement and will not present a health hazard to people

NZBC Clause H1: Energy Efficiency
Contributes to meeting this requirement

Limitations

To meet the provisions of the NZBC as outlined in this datasheet, Pink® Batts® wall insulation MUST be:

- Installed and maintained in a dry protected environment
- Installed in a building where the provisions of NZBC E2 and E3 are met
- Installed to the requirements of NZS 4246:2016: Energy Efficiency-Installing bulk thermal Insulation in Residential Buildings
- Pink® Batts® wall insulation should NOT be crushed or folded

Product Specifications

WALL - Acoustic Insulation	PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER BALE (m^2)	APPROX. COVERAGE PER BALE* (m^2)
Pink® Batts® Silencer® 100mm^	7317001	1140 x 560	100	12.8	14.9
Pink® Batts® Silencer® 75mm^	7317003	1140 x 560	75	16.6	19.5
FLOOR - Acoustic Insulation					
Pink® Batts® Silencer® Midfloor^	7310051	1140 x 432	150	4.9	5.2

* Coverage relates to standard structures (ie with framing allowance) therefore actual coverage may vary.
^ Product does not have Lifetime Warranty or BRANZ appraised accreditation.

Accreditations/Appraisals/Certifications

Tasman Insulation New Zealand Ltd Certified QMS
Telarc. Registered
Quality ISO 9001

GREENGUARD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS UL.COM/GG

TASMAN INSULATION NEW ZEALAND

DISTRIBUTED BY
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9-15 Holloway Place, Penrose, Auckland, New Zealand

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PRODUCT DATA SHEET

Wall

PINK® BATTS® WALL INSULATION

Application

Pink® Batts® wall insulation is a lightweight flexible glass wool insulation product designed to:

- Thermally insulate timber and steel framed walls
- Fit easily into standard wall constructions, or be easily cut to fit in non-standard constructions
- Meet the requirements of the New Zealand Building Code (NZBC) for different designs and environments

Features and Benefits

- High R-values – R-values up to R4.0 to assist in keeping homes above 18°C as per the World Health Organization's recommendation for a healthy and comfortable home
- Easy to install – lightweight, flexible and simple design makes the installation fast and easy
- Internationally certified for Indoor Air Quality – gives assurance that products meet strict chemical emissions limits
- Non-combustible – will not easily burn in the event of a fire
- Made from over 80% recycled glass making sustainable use of waste
- Made in New Zealand - designed for New Zealand building conditions and reduces emissions associated with the importing of overseas manufactured product

Environment

Pink® Batts® insulation is a sustainable and energy efficient product.

- Manufactured using over 80% recycled glass, making sustainable use of waste
- Energy used during the manufacture of Pink® Batts® products is offset by the energy saved by a home fully insulated with Pink® Batts® products within 3-15 months[1]
- Manufactured in Auckland, minimising shipping distances compared to imported products

Green Star NZ Credits

Green Star is a comprehensive environmental rating system for buildings; materials with certain attributes can receive points that contribute to the overall score of a rated home.

New Zealand Green Building Council (NZGBC) does not test or certify products; they rely on the work done by third party certification bodies and eco labels like Environmental Choice. Further information is available at **nzgbc.org.nz.**

Environmental Choice

All Pink® Batts® Wall insulation products have Environmental Choice New Zealand Accreditation (refer to the Product Specifications)

Licence No 2504017.
Thermal Building Insulants

Independently assessed for:

- **Waste Minimisation:** Recycled content, and recycling of process waste
- **Energy Management:** Effective energy management policies and procedures
- **Manufacturing Process:** Not manufactured using blowing agents with a Global Warming Potential (GWP) or Ozone Depleting Potential (ODP)
- **Product Characteristics:** Durability and performance

While only BRANZ appraised products are eligible for Environmental Choice, all Pink® Batts® thermal insulation products are manufactured in the same environmentally considerate way.

[1] (Beca Carter Hollings & Ferner Ltd, Energy Economics of Fibreglass Insulation, 2005)

Health and Safety

Product Safety

Pink® Batts® insulation is a non-hazardous, safe product.

- IARC (International Agency for Research on Cancer) classifies glass wool formulation used to manufacture Pink® Batts® products as Group 3: 'Not classifiable as to its carcinogenicity to humans'. This is the same classification as caffeine, tea, hair colouring, chlorinated drinking water, saccharin
- Pink® Batts® insulation is bio-soluble. In the unlikely event any fibres are inhaled into the lungs they will dissolve in the body fluids and be cleared from the body

Indoor Air Quality

- Pink® Batts® insulation is certified under the GREENGUARD Certification Program. Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments

General Health

- Pink® Batts® insulation will assist in meeting the World Health Organization recommendation for houses to be maintained at a minimum temperature of 18ºC to provide a healthy and comfortable home
- A Wellington School of Medicine study found insulated houses resulted in families with fewer sick days and the economic benefit was double the initial cost of the insulation[2]

[2] Howden-Chapman, P. et al. "Effect of insulating existing houses on health inequality: cluster randomised study in the community" British Medical Journal, 2007, p334:460

Technical Data

Properties	Result		Test/Method/Standard	Test Results
Combustibility	Non-Combustible	✓	AS/NZS 1530.1:1994	Group Number 1S
Early Fire Hazards		✓	AS/NZS 1530.3:1993 - Ignitability (Range 0-20) - Spread of Flame Index (Range 0-10) - Heat Evolved Index (Range 0-10) - Smoke Developed Index (Range 0-10)	 = 0 = 0 = 0 = 0-1
R-value	Various*	✓	AS/NZS 4859.1:2002	
Corrosion	Non-Corrosive	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Moisture Absorption	Non-Hygroscopic	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Vermin Resistance	No Food Source	✓	AS/NZS 4859.1:2002-Glass wool exempt	

*Stated thicknesses are values at which stated R-values are achieved and are likely to be minimum levels. See table on page 5.

New Zealand Building Code (NZBC) and Limitations

Pink® Batts® wall insulation when used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

NZBC Clause B2: Durability

Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

NZBC Clause E3: Internal Moisture

Contributes to meeting these requirements

NZBC Clause F2: Hazardous Building Materials

Meets this requirement and will not present a health hazard to people

NZBC Clause H1: Energy Efficiency

Contributes to meeting this requirement

Limitations

To meet the provisions of the NZBC as outlined in this datasheet, Pink® Batts® wall insulation MUST be:

- Installed and maintained in a dry protected environment
- Installed in a building where the provisions of NZBC E2 and E3 are met
- Installed to the requirements of NZS 4246:2016: Energy Efficiency-Installing bulk thermal Insulation in Residential Buildings
- Pink® Batts® wall insulation should NOT be crushed or folded

Acoustic Properties

Pink® Batts® insulation will assist with noise control, however penetrations in walls will transmit sound readily.
Superior noise control can be achieved by using Pink® Batts® insulation products in conjunction with good acoustic design.

Wall | PINK® BATTS® WALL INSULATION

Product Specifications

WALL - Thermal Insulation	PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER BALE (m^2)	APPROX. COVERAGE PER BALE* (m^2)	ENVIRONMENTAL CHOICE
Masonry						
R1.0 Pink® Batts® Masonry R1.0	7160110	1220 x 580	40	21.2	-	✓
R1.2 Pink® Batts® Masonry R1.2	7160134	1220 x 580	50	17.0	-	
70mm Wall Range						
R2.2 Pink® Batts® Classic R2.2 70mm Wall	7160248	1140 x 560	70	6.4	7.5	
90mm Wall Range						
R1.8 Pink® Batts® Classic R1.8 Wall	7127118	1140 x 560	90	16.6	19.6	✓
R2.2 Pink® Batts® Classic R2.2 Wall	7127122	1140 x 560	90	13.4	15.8	✓
R2.2 Pink® Batts® Steel R2.2 Wall	7160214	1220 x 610	90	15.6	15.6	✓
R2.2 Pink® Batts® R2.2 Narrow Wall	7160243	1140 x 360	90	9.0	11.2	✓
R2.4 Pink® Batts® Classic R2.4 Wall	7127124	1140 x 560	90	10.2	12.1	✓
R2.6 Pink® Batts® Ultra® R2.6 Wall	7127126	1140 x 560	90	9.6	11.3	✓
R2.6 Pink® Batts® Ultra® Steel R2.6 Wall	7160215	1220 x 610	90	9.7	9.7	✓
R2.6 Pink® Batts® Ultra® R2.6 Narrow Wall	7160244	1140 x 360	90	7.4	9.2	✓
R2.8 Pink® Batts® Ultra® R2.8 Wall	7127128	1140 x 560	90	6.4	7.5	✓
R2.8 Pink® Batts® Ultra® R2.8 Narrow Wall	7160247	1140 x 360	90	4.5	5.6	✓
140mm Wall Range						
R3.2 Pink® Batts® Ultra® R3.2 140mm Wall	7127132	1140 x 560	140	9.6	11.3	✓
R3.2 Pink® Batts® Ultra® R3.2 140mm Narrow Wall	7160245	1140 x 360	140	7.0	8.6	✓
R3.6 Pink® Batts® Ultra® R3.6 140mm Wall	7127136	1140 x 560	140	7.0	8.3	✓
R4.0 Pink® Batts® Ultra® R4.0 140mm Wall	7127140	1140 x 560	140	5.1	6.0	✓
R4.0 Pink® Batts® Ultra® R4.0 140mm Narrow Wall	7160246	1140 x 360	140	4.1	5.0	✓
ROOF and WALL - Thermal Insulation						
R2.4 Pink® Batts® HandyPack R2.4^	7200158	7000 x 580	90	4.06	-	

* Coverage relates to standard structures (ie with framing allowance) therefore actual coverage may vary.
\# For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz/lifetime-warranty.
^ Product does not have the Pink® Batts® Lifetime Warranty or BRANZ Appraised Accreditation.

Accreditations/Appraisals/Certifications

BRANZ Appraised
Appraisal No. 238 [2012]
Appraisal No. 632 [2012]
Appraisal No. 767 [2012]

Licence No 2504017.
Thermal Building Insulants

Tasman Insulation New Zealand Ltd
Certified QMS
Telarc. Registered
Quality ISO 9001

GREENGUARD

pink batts Lifetime WARRANTY #

TASMAN INSULATION NEW ZEALAND

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New Zealand

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PRODUCT DATA SHEET

Roof

PINK® BATTS® CEILING INSULATION

Application

Pink® Batts® ceiling insulation is a lightweight flexible glass wool insulation product designed to:

- Thermally insulate ceilings in new homes, be retrofitted into existing homes without insulation, or over existing insulation for better performance
- Fit easily into standard ceiling constructions, or be easily cut to fit in non-standard constructions
- Meet the requirements of the New Zealand Building Code (NZBC) for different designs and environments

Features and Benefits

- High R-values – R-values up to R7.0 to assist in keeping homes above 18°C as per the World Health Organisation's recommendation for a healthy and comfortable home
- Easy to install – lightweight, flexible and simple design makes the installation fast and easy
- Internationally certified for Indoor Air Quality – gives assurance that products meet strict chemical emissions limits
- Non-combustible – will not easily burn in the event of a fire
- Made from over 80% recycled glass-making sustainable use of waste
- Designed for New Zealand building conditions

Environment

Pink® Batts® insulation is a sustainable and energy efficient product.

- Manufactured using over 80% recycled glass, making sustainable use of waste
- Energy used during the manufacture of Pink® Batts® products is offset by the energy saved by a home fully insulated with Pink® Batts® products within 3-15 months[1]
- Manufactured in New Zealand and Australia, reducing shipping distances
- Recycleable packaging

Green Star NZ Credits

Green Star is a comprehensive environmental rating system for buildings; materials with certain attributes can receive points that contribute to the overall score of a rated home.

New Zealand Green Building Council (NZGBC) does not test or certify products; they rely on the work done by third party certification bodies and eco labels like Environmental Choice. Further information is available at **nzgbc.org.nz.**

Environmental Choice

All Pink® Batts® ceiling insulation products have Environmental Choice New Zealand Accreditation (refer to Product Specifications on page 5 for accredited products)

Independently assessed for:

- **Waste Minimisation:** Recycled content, and recycling of process waste
- **Energy Management:** Effective energy management policies and procedures
- **Manufacturing Process:** Not manufactured using blowing agents with a Global Warming Potential (GWP) or Ozone Depleting Potential (ODP)
- **Product Characteristics:** Durability and performance

Licence No 2504017.
Thermal Building Insulants

While only BRANZ appraised products are eligible for Environmental Choice, all Pink® Batts® thermal insulation products are manufactured in the same environmentally considerate way.

Note that Pink® Batts® R3.6 and Pink® Batts® R3.2 ceiling insulation is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made product only.

[1] (Beca Carter Hollings & Ferner Ltd, Energy Economics of Fibreglass Insulation, 2005)

Health and Safety

Product Safety

Pink® Batts® insulation is a non-hazardous, safe product.

- IARC (International Agency for Research on Cancer) classifies the glass wool formulation used to manufacture Pink® Batts® products as Group 3: 'Not classifiable as to its carcinogenicity to humans'. This is the same classification as caffeine, tea, hair colouring, chlorinated drinking water and saccharin
- Pink® Batts® insulation is bio-soluble. In the unlikely event any fibres are inhaled into the lungs they will dissolve in the body fluids and be cleared from the body

Indoor Air Quality

- Pink® Batts® insulation is certified under the GREENGUARD Certification Program. Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments

General Health

- Pink® Batts® insulation will assist in meeting the World Health Organisation recommendation for houses to be maintained at a minimum temperature of 18ºC to provide a healthy and comfortable home
- A Wellington School of Medicine study found insulated houses resulted in families with fewer sick days and the economic benefit was double the initial cost of the insulation[2]

[2] Howden-Chapman, P. et al. "Effect of insulating existing houses on health inequality: cluster randomised study in the community" British Medical Journal, 2007, p334:460

Technical Data

Properties	Result		Test/Method/Standard	Test Results
Combustibility	Non-Combustible	✓	AS/NZS 1530.1:1994	Group Number 1S
Early Fire Hazards		✓	AS/NZS 1530.3:1993 - Ignitability (Range 0-20) - Spread of Flame Index (Range 0-10) - Heat Evolved Index (Range 0-10) - Smoke Developed Index (Range 0-10)	 = 0 = 0 = 0 = 0-1
R-value	Various*	✓	AS/NZS 4859.1:2002	
Corrosion	Non-Corrosive	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Moisture Absorption	Non-Hygroscopic	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Vermin Resistance	No Food Source	✓	AS/NZS 4859.1:2002-Glass wool exempt	

* Stated thicknesses are values at which stated R-values are achieved and are likely to be minimum values. See table on Page 5.

Acoustic Properties

Pink® Batts® insulation will assist with noise control, however penetrations in ceilings and walls will transmit sound readily. Superior noise control can be achieved by using Pink® Batts® insulation products in conjunction with good acoustic design.

New Zealand Building Code (NZBC) and Limitations

Pink® Batts® ceiling insulation when used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

NZBC Clause B2: Durability

Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

NZBC Clause E3: Internal Moisture

Contributes to meeting these requirements

NZBC Clause F2: Hazardous Building Materials

Meets this requirement and will not present a health hazard to people

NZBC Clause H1: Energy Efficiency

Contributes to meeting this requirement

Limitations

To meet the provisions of the NZBC as outlined in this datasheet, Pink® Batts® ceiling insulation MUST be:

- Installed and maintained in a dry protected environment
- Installed in a building where the provisions of NZBC E2 and E3 are met
- Installed to the requirements of NZS 4246:2016: Energy Efficiency-Installing bulk thermal Insulation in Residential Buildings

Pink® Batts® ceiling insulation should NOT be crushed, folded or compressed.

Roof | PINK® BATTS® CEILING INSULATION

Product Specifications

ROOF - Thermal Insulation		PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER BALE (m^2)	APPROX. COVERAGE PER BALE* (m^2)	ENVIRONMENTAL CHOICE
R1.8	Pink® Batts® Classic R1.8 Ceiling	7110118	1220 x 432	95	13.7	14.4	✓
R2.2	Pink® Batts® Classic R2.2 Ceiling	7110122	1220 x 432	115	12.6	13.3	✓
R2.6	Pink® Batts® Classic R2.6 Ceiling	7110126	1220 x 432	140	10.5	11.1	✓
R3.2	Pink® Batts® Classic R3.2 Ceiling‡	7110132	1220 x 432	170	8.4	8.8	✓‡
R3.2	Pink® Batts® Skillion Roof R3.2	7110232	1220 x 432	115 max	3.7	3.9	✓
R3.6	Pink® Batts® Classic R3.6 Ceiling‡	7110136	1220 x 432	180	7.4	7.7	✓‡
R3.6	Pink® Batts® Skillion Roof R3.6	7110236	1220 x 432	165 max	6.3	6.6	✓
R4.0	Pink® Batts® Ultra® R4.0 Ceiling	7110140	1220 x 432	195	6.3	6.6	✓
R5.0	Pink® Batts® Ultra® R5.0 Ceiling	7110150	1220 x 432	220	4.2	4.4	✓
R6.0	Pink® Batts® Ultra® R6.0 Ceiling	7110160	1220 x 432	235	3.7	3.9	✓
R6.3	Pink® Batts® Ultra® R6.3 Ceiling	7110163	1220 x 432	250	3.2	3.3	✓
R7.0	Pink® Batts® Ultra® R7.0 Ceiling	7110170	1220 x 432	260	2.6	2.8	✓
ROOF - Thermal Retrofit Insulation							
R2.9	Pink® Batts® R2.9 Retrofit Ceiling	7110129	1220 x 432	150	9.5	10.0	✓
R3.3	Pink® Batts® R3.3 Retrofit Ceiling	7110133	1220 x 432	175	8.4	8.8	✓
ROOF and WALL - Thermal Insulation							
R2.4	Pink® Batts® HandyPack R2.4^	7200158	7000 x 580	90	4.06	-	

* Coverage relates to standard structures (ie with framing allowance) therefore actual coverage may vary.
‡ This product is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made product only.
# For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz/lifetime-warranty.
^ Product does not have the Pink® Batts® Lifetime Warranty or BRANZ Appraised Accreditation.

Accreditations/Appraisals/Certifications

BRANZ Appraised
Appraisal No. 238 [2012]
Appraisal No. 632 [2012]
Appraisal No. 767 [2012]

Licence No 2504017.
Thermal Building Insulants

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pink® batts®
Always.

PRODUCT DATA SHEET

Roof

PINK® BATTS® SKILLION ROOF INSULATION

Application

When standard insulation is too thick, use Pink® Batts® Skillion Roof insulation to maintain required clearances from roofing materials while providing the level of comfort and savings that comes with higher R-values.

Pink® Batts® Skillion Roof is designed to be used in skillion roof constructions while still achieving the minimum 25mm clearance between the roof underlay and insulation in:

- New buildings and retrofits of existing ceilings
- Modern 'lean to' style extensions on existing homes
- Low profile roof design and restricted roof cavities

Cathedral style roofs and raked ceilings are generally skillion roof constructions where the ceiling line and roof line are in parallel.

Features and Benefits

- Specifically designed for Skillion Roofs – provides New Zealand Building Code (NZBC) levels of thermal insulation while providing minimum ventilation clearances
- Easy to install – Lightweight, flexible and simple design makes the installation fast and easy
- Internationally certified for Indoor Air Quality – Gives assurance that products meet strict chemical emissions limits
- Non-combustible – will not easily burn in the event of a fire
- Made from over 80% recycled glass – making sustainable use of waste
- Made in New Zealand - designed for New Zealand building conditions and reduces emissions associated with the importing of overseas manufactured product

Critical Design Considerations

Historically there have been moisture related problems with skillion roofs. The following design factors should be considered to ensure your roof's performance and durability.

Internal moisture and condensation

- To prevent internal moisture entering the roof space, use vapour resistant lining in wet areas such as kitchens and bathrooms (e.g. gloss/oil based paint systems)
- Reduce airflow into the roof cavity through ceiling linings that are resistant to airflow (e.g. for a tongue and groove ceiling) by using a breather type air barrier
- Reduce penetrations through ceilings e.g. use sealed recessed downlights
- Special situations: Ski lodges, indoor pools/spas, cold stores may require an additional fully sealed vapour barrier (e.g. Sisalation® Heavy Duty 450)

Ventilation

- A minimum 25mm clearance between the top of the insulation and the building underlay is required to provide a minimum amount of ventilation and reduce moisture build up in the roof cavity . However in areas of high humidity and/or large temperature differences, additional ventilation may be required to compensate for higher levels of condensation and water vapour
- Ensure the insulation product you specify or install is guaranteed not to over recover or loft above the rafter depth; often nominal thickness measurements are not the maximum loft that segments will achieve

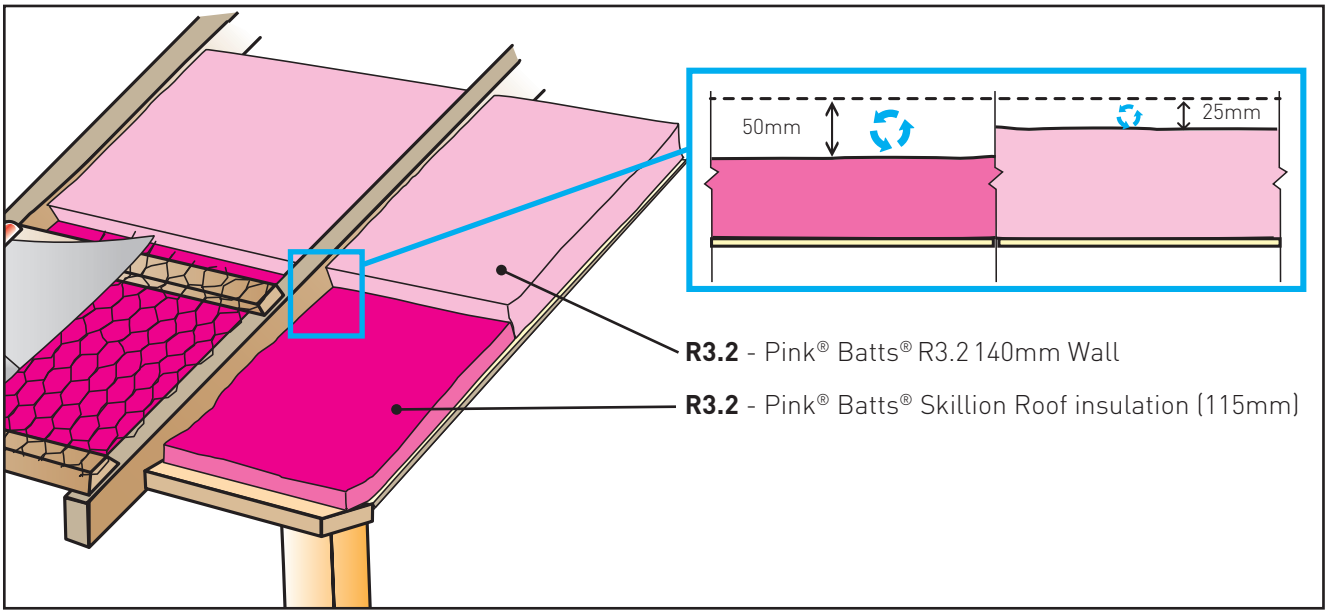
Trapped moisture

- To avoid trapping excessive levels of construction moisture into the roof cavity ensure timber, concrete and other building materials are dry before enclosing building

For more detailed information please refer to BRANZ Bulletin 525

How to reduce moisture related problems in skillion roofs

By providing additional ventilation, Pink® Batts® Skillion roof insulation achieves 100% more ventilation clearance, while still maintaining the same R-value as R3.2 140mm Wall (or R3.6 180mm) insulation products.



Environment

Pink® Batts® insulation is a sustainable and energy efficient product.

- Manufactured using over 80% recycled glass, making sustainable use of waste
- Energy used during the manufacture of Pink® Batts® products is offset by the energy saved by a home fully insulated with Pink® Batts® products within 3-15 months[1]
- Locally manufactured in New Zealand minimising shipping distances
- Recyclable packaging

Green Star NZ Credits

Green Star is a comprehensive environmental rating system for buildings; materials with certain attributes can receive points that contribute to the overall score of a rated home.

New Zealand Green Building Council (NZGBC) does not test or certify products; they rely on the work done by third party certification bodies and eco labels like Environmental Choice. Further information is available at **nzgbc.org.nz.**

Environmental Choice

All Pink® Batts® ceiling insulation products have Environmental Choice New Zealand Accreditation (refer to Product Specifications on page 5 for accredited products)

Licence No 2504017.
Thermal Building Insulants

Independently assessed for:

- **Waste Minimisation:** Recycled content, and recycling of process waste
- **Energy Management:** Effective energy management policies and procedures
- **Manufacturing Process:** Not manufactured using blowing agents with a Global Warming Potential (GWP) or Ozone Depleting Potential (ODP)
- **Product Characteristics:** Durability and performance

While only BRANZ appraised products are eligible for Environmental Choice, all Pink® Batts® insulation products are manufactured in the same environmentally considerate way.

[1] (Beca Carter Hollings & Ferner Ltd, Energy Economics of Fibreglass Insulation, 2005)

Health and Safety

Product Safety

Pink® Batts® insulation is a non-hazardous, safe product.

- IARC (International Agency for Research on Cancer) classifies the glass wool formulation used to manufacture Pink® Batts® products as Group 3: 'Not classifiable as to its carcinogenicity to humans'. This is the same classification as caffeine, tea, hair colouring, chlorinated drinking water and saccharin
- Pink® Batts® insulation is bio-soluble. In the unlikely event any fibres are inhaled into the lungs they will dissolve in the body fluids and be cleared from the body

Indoor Air Quality

- Pink® Batts® insulation is certified under the GREENGUARD Certification Program. Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments

General Health

- Pink® Batts® insulation will assist in meeting the World Health Organisation recommendation for houses to be maintained at a minimum temperature of 18ºC to provide a healthy and comfortable home
- A Wellington School of Medicine study found insulated houses resulted in families with fewer sick days and the economic benefit was double the initial cost of the insulation[2]

[2] Howden-Chapman, P. et al. "Effect of insulating existing houses on health inequality: cluster randomised study in the community" British Medical Journal, 2007, p334:460

Technical Data

Properties	Result		Test/Method/Standard	Test Results
Combustibility	Non-Combustible	✓	AS/NZS 1530.1:1994	Group Number 1S
Early Fire Hazards		✓	AS/NZS 1530.3:1993 - Ignitability (Range 0-20) - Spread of Flame Index (Range 0-10) - Heat Evolved Index (Range 0-10) - Smoke Developed Index (Range 0-10)	 = 0 = 0 = 0 = 0-1
R-value	Various*	✓	AS/NZS 4859.1:2002	
Corrosion	Non-Corrosive	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Moisture Absorption	Non-Hygroscopic	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Vermin Resistance	No Food Source	✓	AS/NZS 4859.1:2002-Glass wool exempt	

* Refer to product specifications

Acoustic Properties

Pink® Batts® insulation will assist with noise control, however penetrations in ceilings and walls will transmit sound readily. Superior noise control can be achieved by using Pink® Batts® insulation products in conjunction with good acoustic design.

New Zealand Building Code (NZBC) and Limitations

Pink® Batts® ceiling insulation when used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

NZBC Clause B2: Durability

Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

NZBC Clause E3: Internal Moisture

Contributes to meeting these requirements

NZBC Clause F2: Hazardous Building Materials

Meets this requirement and will not present a health hazard to people

NZBC Clause H1: Energy Efficiency

Contributes to meeting this requirement

Limitations

To meet the provisions of the NZBC as outlined in this datasheet, Pink® Batts® ceiling insulation MUST be:

- Installed and maintained in a dry protected environment
- Installed in a building where the provisions of NZBC E2 and E3 are met
- Installed to the requirements of NZS 4246:2016: Energy Efficiency-Installing bulk thermal Insulation in Residential Buildings

Pink® Batts® ceiling insulation should **NOT** be crushed or folded

Product Specifications

ROOF - Thermal Insulation	PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)*	NOMINAL TOTAL AREA PER BALE (m^2)	APPROX. TOTAL AREA PER BALE (m^2)**	ENVIRONMENTAL CHOICE
R3.2 Pink® Batts® Skillion Roof R3.2	7110232	1220 x 432	115 max	3.7	3.9	✓
R3.6 Pink® Batts® Skillion Roof R3.6	7110236	1220 x 432	165 max	6.3	6.6	✓

* Stated thicknesses are maximum values.
**Coverage relates to standard structure and actual coverage may vary.

Accreditations/Appraisals/Certifications

BRANZ Appraised
Appraisal No.767 (2012)

Licence No 2504017.
Thermal (resistive type) building insulants.

Tasman Insulation New Zealand Ltd
Certified QMS
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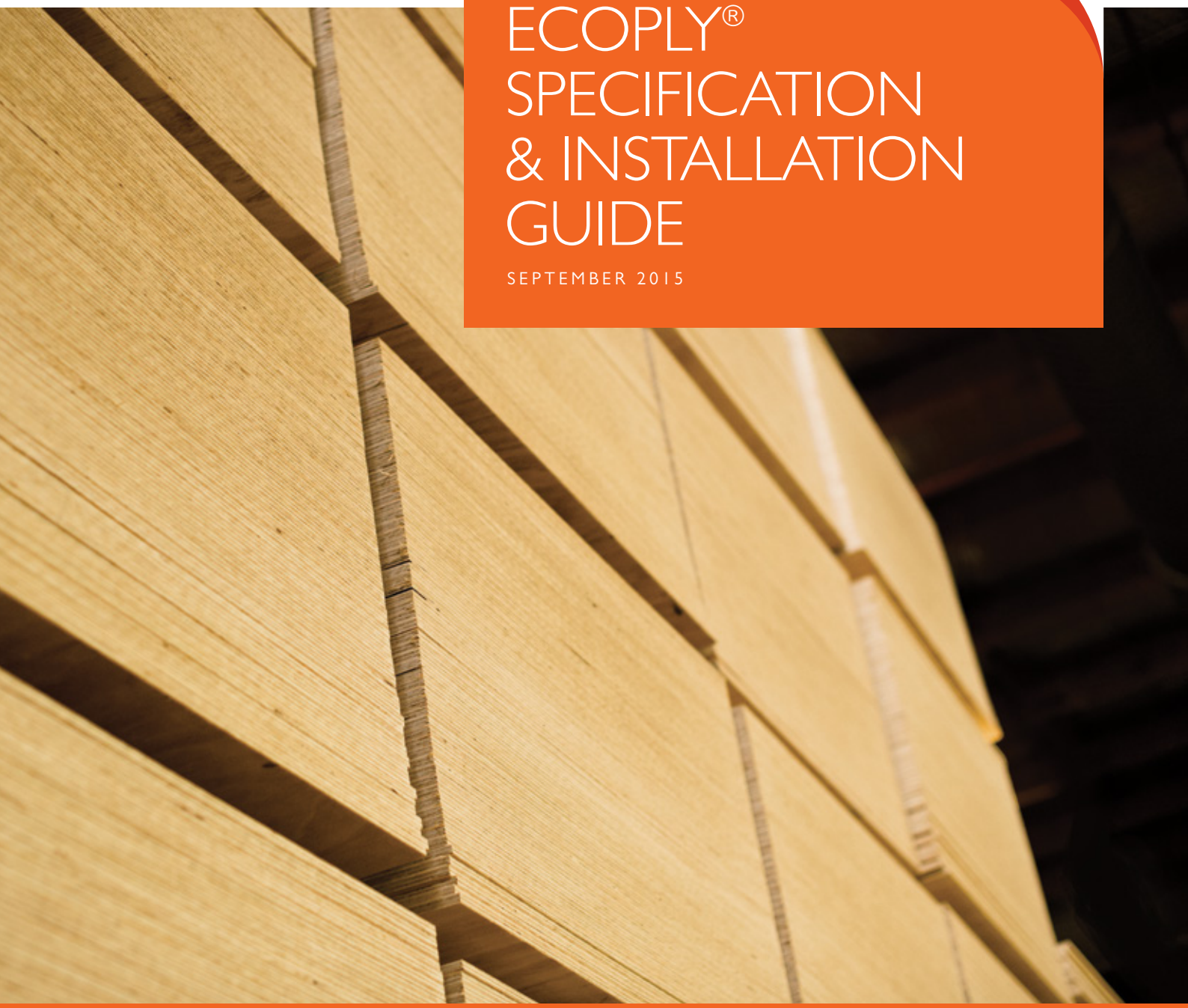
Proven. Durable. Strong

ECOPLY® STRUCTURAL FLOORING
ECOPLY® STRUCTURAL ROOFING
ECOPLY® STRUCTURAL Square EDGE
ECOPLY® STRUCTURAL BARRIER

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2015



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Information contained within is specific to Ecoply® structural plywood products and must not be used with any other plywood products, no matter how similar they may appear.

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ECOPLY® SPECIFICATION & INSTALLATION GUIDE

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1.0 ECOPLY® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey Woodproducts, the Ecoply® portfolio represents a range of structurally rated plywood products.

Ecoply is manufactured under a third party audited quality control programme to monitor compliance with AS/NZS 2269 Plywood Structural. All Ecoply products carry Engineered Wood Products Association of Australasia (EWPAA) Joint Accreditation System - Australia and New Zealand (JAS-ANZ) certification.

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification & Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide. Both of these documents can be downloaded from www.chhwoodproducts.co.nz.

Ecoply products must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage. This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply products. However, to the maximum extent permitted by law, Carter Holt Harvey Woodproducts assumes no legal liability to you in relation to this information.

1.1 TECHNICAL INFORMATION AND CAD DETAILS

When specifying or installing any Ecoply® plywood products visit www.chhwoodproducts.co.nz or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

The information contained in this document is current as at September 2015. It is your responsibility to ensure you have the most up to date information available.

The information contained in this publication relates specifically to Ecoply structural plywood products manufactured by Carter Holt Harvey Woodproducts and must not be used with any other plywood manufacturer's product no matter how similar they may appear.

Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply structural plywood products is not appropriate, and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the NZBC.

1.2 PRODUCT DESCRIPTION AND RANGE

Ecoply structural plywood panels are manufactured from radiata pine wood veneers. The veneers are placed at right angles to each other for maximum strength and stability then bonded together with synthetic phenolic (PF) resin to form a strong and permanent Type A bond.

The strength of Ecoply plywood is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are defined in AS/NZS 2269 and summarised in Tables 2A & 2B
- Stress grade - utilises the symbol F and a suffix, for example;
  - F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. F8 is the standard stress grade for Ecoply products
  - Ecoply 19 mm Longspan Flooring and 15 mm Ecoply Roofing are F11[1] stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11[1] upon request
- Thickness - ranging from 7 mm to 25 mm. (Thicknesses above 25 mm subject to availability)
- Length - being 2400 mm and 2700 mm with a standard nominal width of 1200 mm
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

Note: Technical notes referenced in this guide can be downloaded from www.chhwoodproducts.co.nz or contact Carter Holt Harvey Woodproducts on 0800 326 759.

Table 1: Ecoply® Product Range

Nominal Thickness (mm)		7		9		12		15		17		19		21		25	
Sheet length (x 1200 mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply Structural Square Edge	BD			●		●	●	●		●							
	CD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	DD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ecoply Flooring (pt)	CD							●	●	●	●	● LS	● LS	●	●		●
Ecoply Roofing (pt)	DD							●	●	●	●						

- ● Available untreated only
- ● Available either untreated or H3.2 CCA
- ● Available either untreated or H3.1 LOSP

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200 mm cover

LS Ecoply 19 mm F11/F8 Longspan Flooring

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades
- Ecoply 15 mm/17 mm Roofing and Ecoply 19 mm Longspan Flooring are supplied as standard in F11 stress grade[1]
- Other Ecoply products are also available in F11[1] upon request

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

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1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply structural plywood is available with some typical applications for each surface grade.

The surface grade specifications are defined in AS/NZS 2269. Table 2B details surface appearance grades for specialty Ecoply plywood and typical applications.

Table 2A: Ecoply® Structural Square Edge Products

Face Grade B	Face Grade C	Face Grade D
Appearance grade with a solid sanded surface. Suitable for a higher quality finish.	Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish.	Non appearance grade allowing open imperfections up to 75 mm across the face veneer. Splits and knots allowable
Possible Uses:	**Possible Uses:**	**Possible Uses:**
• Furniture/Joinery/Signs • Interior Linings • Sheathing • Engineering components where a superior visual finish is required	• Structural gussets • Stressed skin panels • Bins, boxes, crates • Hoardings • Membrane substrate	• Non visual bracing • Strength critical pallets • Structural components • Portal frame gussets

Table 2B: Speciality Ecoply® Products

Flooring CD	Roofing DD
Solid sanded C grade surface with tongue and groove profile on long edges. Features void free second layer under the face veneer for increased protection against high point loads	Unfilled D grade surface with tongue and groove profile on long edges
Possible Uses:	**Possible Uses:**
• Substrate for flooring overlays such as linoleum, tiles and rigid coverings • Substrate for membrane roofing and decking where visible appearance is critical	• Substrate for asphalt shingles • Substrate for roof systems where a smooth substrate is not required

Notes: A higher visual grade may be substituted if required. e.g. Ecoply CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern and colour may vary. If sheet appearance is critical select panels individually.

1.4 PRESERVATIVE TREATMENT

Ecoply structural plywood is available untreated or treated in accordance with AS/NZS 1604.3. If treated, Ecoply structural plywood is treated with either H3.2 CCA (Copper Chrome Arsenate) or H3.1 LOSP (Azole) clear treatment. H3.1 LOSP is the standard preservative treatment for BD Structural Square Edge products and by special request for other Ecoply plywood products.

H3.2 CCA and H3.1 LOSP treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

Ecoply plywood is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Holdfast® Metalex® Concentrated Timber Preservative Clear (Holdfast® Metalex® Clear) is recommended. Failure to do so will affect the long term durability of the panel.

The characteristics of the treatments are shown in Table 3.

Table 3: Preservative Treatment

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
Preservative carrier	N/A	Water	Light organic oil (white spirits)
Colour	Natural	Green	Clear (i.e. natural)
Fungicide	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
Insecticide	Heat treated dry wood	Arsenate	Permethrin
Other chemicals	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
Mouldicide	N/A	Copper (limited efficacy)	IPBC
Notes	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions. Solvent smell disappears over time
Availability	Readily available	Standard treatment except for Ecoply BD	Treated to order for CD, DD, flooring and roofing products. Standard treatment for Ecoply BD
Applications (Refer NZ3602)	Interior dry protected	Exterior/Interior damp (service performance subject to detailing & coatings)	

H3.2 CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 CCA applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with H3.2 CCA and subsequent drying is likely to increase the face checking of the panel.

For more information on face checking refer to section 1.8 General Design Considerations - Aesthetics.

H3.1 LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating H3.1 LOSP treated plywood, traces of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains to the sheet surface.

The H3.1 LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated. Untreated plywood is recommended for internal applications where NZS 3602 allows the use of untreated plywood

Mechanical fasteners are recommended to fix H3.1 LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and H3.1 LOSP tolerant adhesives should be applied according to the adhesive manufacturer's instructions. See section 2.3 Adhesives.

1.5 SECTION PROPERTIES

Table 4A: Section Properties of Ecoply® Structural Plywood

		Section properties per mm width						
		Parallel to the face grain			Perpendicular to the face grain			
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Mass** (kg/m²)	**Parallel Moment of Inertia** (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)	**Perpendicular Moment of Inertia** I (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)
7	7-24-3	4.0	30.0	8.3	5.2	2.0	1.7	2.3
9	9-30-3	5.0	58.6	13.0	6.4	4.0	2.7	2.9
12	12-24-5	6.6	115.0	19.2	9.3	33.4	9.3	5.4
15	15-30-5	8.3	225.0	29.9	11.6	65.2	14.5	6.8
17	17-24-7	9.2	285.0	33.9	12.2	122.0	20.4	9.4
17	17-24-6	9.2	273.0	32.5	12.3	134.0	22.3	9.5
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
21	21-30-7	11.6	556.0	52.9	15.2	239.0	31.9	11.8
25	25-30-9	13.5	897.0	72.9	17.8	381.0	41.0	13.9

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F8 Grade

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1046.5	480.0	15.6	303.9	231.7	9.2
15	15-30-5	2047.5	747.5	19.5	593.3	362.5	11.4
17	17-24-7	2593.5	847.5	20.5	1110.2	510.0	15.9
17	17-24-6	2484.3	812.5	20.7	1219.4	557.5	16.0
19	19-30-7	4104.1	1172.5	23.0	1428.7	595.0	18.0
21	21-30-7	5059.6	1322.5	25.5	2174.9	797.5	19.8
25	25-30-9	8162.7	1822.5	29.9	3467.1	1025.0	23.4

Table 4C: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F11[1] Grade (Including Longspan Flooring)

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1207.5	595.2	16.7	303.9	231.7	9.2
15	15-30-5	2362.5	926.9	20.9	593.3	362.5	11.4
17	17-24-7	2992.5	1050.9	22.0	1110.2	510.0	15.9
17	17-24-6	2866.5	1007.5	22.1	1219.4	557.5	16.0
19	19-30-7	4735.5	1453.9	24.7	1428.7	595.0	18.0
21	21-30-7	5838.0	1639.9	27.4	2174.9	797.5	19.8
25	25-30-9	9418.5	2259.9	32.0	3467.1	1025.0	23.4

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

2 Actual thickness of Ecoply sheets manufactured to thickness tolerances stated in AS/NZS 2269

3 Identification code: panel thickness – outermost veneer thickness x 10 – number of plies

4 I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603

Notes:

- Use Tables 4A & B values for all F8 stress grade Ecoply products
- Use Tables 4A & C values for all F11 stress grade Ecoply (including 19 mm Ecoply Longspan Flooring)
- The section properties in Tables 4A, B & C have been calculated in accordance with AS/NZS 2269
- For section properties for other thicknesses and Shadowclad® products contact CHH Woodproducts on 0800 326 759

Structural properties of Ecoply® plywood

The majority of Ecoply plywood is F8 grade (exceptions are identified in section 1.2: Product Description & Range) and the characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Tables 4B and 4C.

Table 5: Structural Properties of Ecoply® Plywood

	Characteristic Strength MPa	
Stress Grade	**F8**	**F11**
Bending (f_{pb})	25.0	31.0
Tension (f_{pt})	15.0	18.0
Panel shear (f_{ps})	4.2	4.5
Rolling shear (f_{pr})	1.7	1.8
Compression in plane of sheet (f_{pc})	20.0	22.0
Compression normal to the plane of the sheet (f_{pp})	9.7	12.0
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (G)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' and ø factors to determine resistances for limit states design.

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor ø and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Table 5A: Strength Reduction Factors

Structural Timber Material	**Application of Structural Member**		
	Category 1	**Category 2**	**Category 3**
	Structural members for houses for which failure would be unlikely to affect an area[1] greater than 25 m²; OR secondary members in structures other than houses	Primary structural members in structures other than houses; OR elements in houses for which failure would be likely to affect an area[1] greater than 25 m²	Primary structural members in structures intended to fulfil essential services or post disaster function
	Value of Strength Reduction Factor Ø		
Structural Plywood – AS/NZS 2269.0	0.95	0.85	0.75

[1] In this context area should be taken as plan area.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY
- Face grade, back grade: e.g. CD
- Intended application: e.g. STRUCTURAL
- Panel construction code: e.g. 19-30-7 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Glue bond: eg. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): eg. AS/NZS 1604.3:2012
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated)
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Untreated example:

ECOPLY CD FLOORING STRUCTURAL
19-30-7 A BOND E0 AS/NZS 2269.0:2012
PAT 01/12/15 12:23:45 F11/F8
911

Treated example:

ECOPLY CD STRUCTURAL
25-30-9 A BOND E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 046 01 H3 E CCA
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8
911

Note: Performance based products like Grooved Lining and Shadowclad may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269

1.7 CODE COMPLIANCE

Ecoply plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Woodproducts is licensed by the EWPAA to stamp plywood with the EWPAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in the NZBC Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building
- NZS 3603 Timber Structures
- NZS 3604 Timber Framed Buildings
- AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood
- E2/AS1 External Moisture

WARNING: Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PS1-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

Structure B1

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VM1 Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade. Some specialty products are available F11 or with specifically designed properties for specialised applications.

1.8 GENERAL DESIGN CONSIDERATIONS

Durability (Clause B2) and exterior moisture (Clause E2)

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5 mg/litre for E_0).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E_0 emission level).

Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is 4.5 x 10-6 mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH Woodproducts on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214 Methods of determining the total thermal resistance of parts of buildings. e.g. Plywood has a Conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Aesthetics

Ecoply plywood products can be selected for decorative or weather protection functions as well as structural performance. Acceptable Solution E2/AS1- External Moisture allows plywood manufactured to AS/NZS 2269, (minimum CD appearance grade, minimum 12 mm thickness and treated as required by NZS 3602) to be used for exterior cladding. For exterior cladding applications CHH Woodproducts strongly recommends Shadowclad® exterior cladding rather than smooth faced plywood such as Ecoply.

Shadowclad® features a textured (bandsawn) face which reduces the visibility of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. For more information on plywood used as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction.

Face checks on plywood exposed to weather

Face checks are lengthwise separations of wood fibres in the face veneer of the plywood. They result from the normal swelling and shrinking of wood as it gains and loses moisture. It is important to realise that these checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way. If you are the specifier, it is important to discuss these issues with your client and consider the length of exterior exposure, climate conditions and protection offered by the surface coating before finalising product choice.

Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZBC.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3.2 CCA treated Ecoply should be used.

For plywood as a rigid air barrier (including rigid air barrier acting as bracing) refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from www.chhwoodproducts.co.nz.

Fire, spread of flame and smoke development

The following data on early fire hazard properties of uncoated Ecoply plywood are the result of tests carried out by Australian Wool Testing Authority AWTA to test structural plywood manufactured to AS/NZS 2269 in accordance with ISO 5660, reaction to fire tests (heat release, smoke production and mass loss rate). Part 1: Heat Release rate (cone calorimeter method).

Table 6 summarises the test configurations and associated material groups.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. For advice on specific coating systems and their suitability for use with Ecoply products, always refer to the coating manufacturer.

Table 6: Early Fire Hazard Properties of Ecoply® Plywood

Material	Species	Origin	Thickness	Treatment	Material groups
Plywood	Radiata Pine	New Zealand	7mm	CCA Treated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	CCA Treated	Group 3

1.9 SUSTAINABILITY

Ecoply is manufactured from radiata pine. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees.

New Zealand plantations are managed in compliance with the New Zealand Forest Accord.

Ecoply is manufactured in New Zealand at CHH Woodproducts Tokoroa plywood mill.

Ecoply is available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Material Safety Data Sheets (MSDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which can be downloaded from www.chhwoodproducts.co.nz.

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

1.11 STORAGE & HANDLING

Ecoply panels must be stored and handled with care to maintain good condition before use and after installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets)
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage
- The sheets must be stacked flat, NOT on edge
- Store in well-ventilated areas away from sources of heat, flame or spark
- To avoid staining, fading and surface checking, the sheets must not be exposed to the weather while awaiting installation
- Store in well-ventilated areas away from sources of heat, flames or sparks

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.

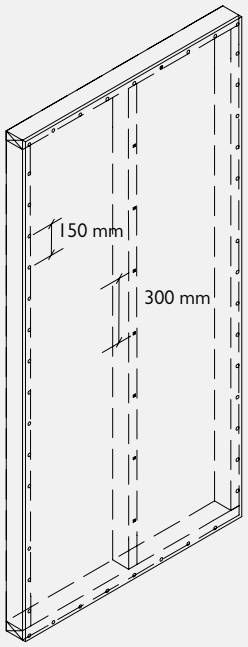
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

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

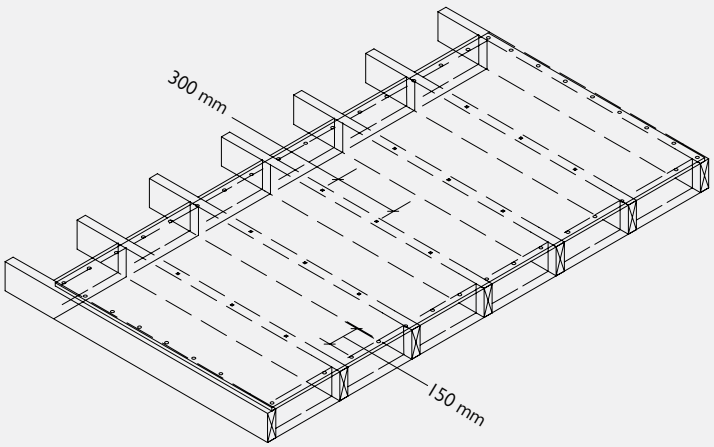
2.2 SHEET FASTENERS AND FIXING

- 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

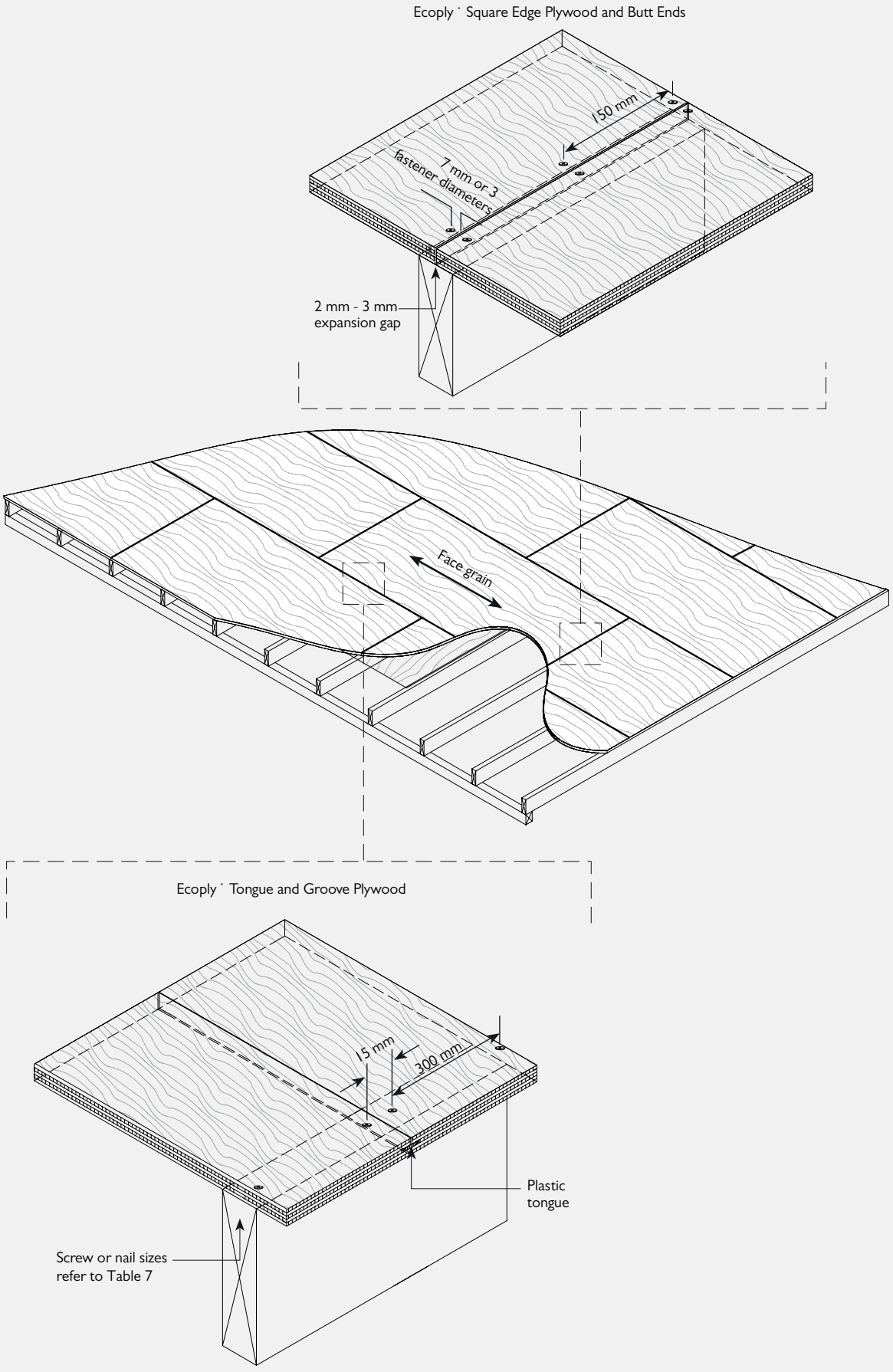


Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

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 framing[2]	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 framing[2]	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 framing[3]	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 framing[3]	10-24-35[4]	1200	10-16-404	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 advise 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 glueline 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.

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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.

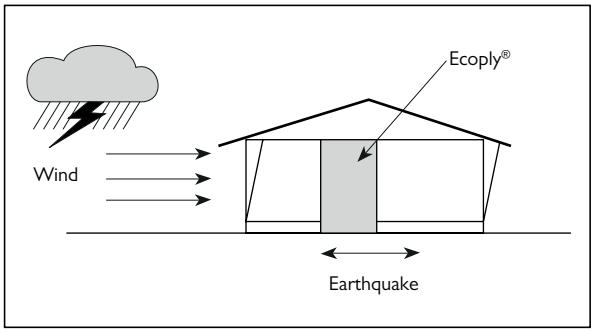
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

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.

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Table 8: Ecoply® Suitability for Bracing Applicatons 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:

(a) 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 ÷ element height in metres, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
(b) Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
(c) 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
EP1	0.4 m	Ecoply one side	80	95
	0.6 m		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	BUs/m Wind	BUs/m Earthquake
EP1_0.4	0.4 m	Ecoply one side	80	95
EP1_0.6	0.6 m	Ecoply one side	95	105
EP1_1.2	1.2 m	Ecoply one side	120	135

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

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

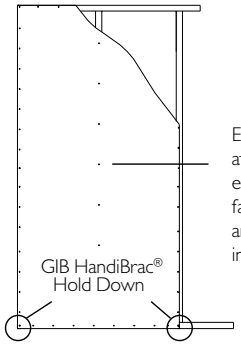
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

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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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	BUs/m Wind	BUs/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
EPG_1.2	1.2 m		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. 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

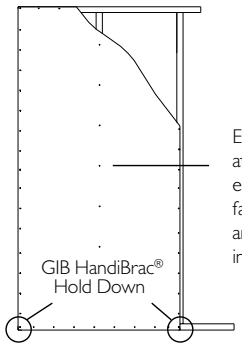
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

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® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

SEPTEMBER 2015

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.

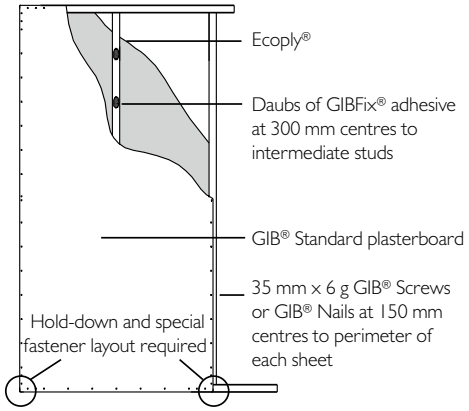


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

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 zones1 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 zone1 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 eexposure 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.

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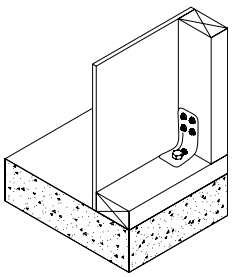
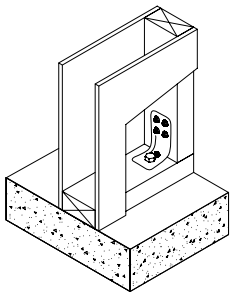
3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

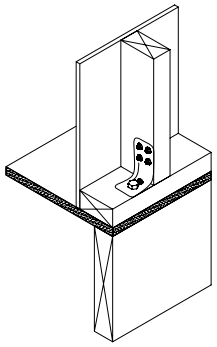
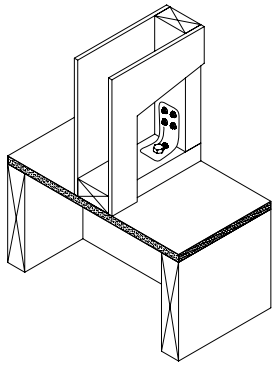
Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

- 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:

(a) Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
(b) 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:

(a) The length of diaphragm shall not exceed twice its width measured between supporting walls
(b) The ceiling lining must consist of plywood over the entire area of the diaphragm
(c) Complete sheets with a minimum size of 1800 x 900 must be used
(d) Framing size and spacing must comply with NZS 3604
(e) 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
(f) Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
(g) Fixings are no closer than 10 mm from sheet edges
(h) 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
(i) Sheets must be layed in a staggered pattern
(j) The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

4.0 ROOFS AND DECKS

The section below covers the use of Ecoply plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. The information below should be considered as supplementary to system specifications from roofing and decking suppliers.

Further guidance on installation and detailing factors can be found in the EWPAA Technical Note; Plywood Roofing and Flooring: Installation and Detailing Factors. This can be downloaded from www.ewp.asn.au

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or E.P.D.M to protect the surface from weathering.

Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.

4.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membranes coatings will telegraph any substrate imperfections
- Use Ecoply Flooring or Structural Square Edge (CD Grade)
- Where Ecoply Flooring is used consider the use of a small daub of glue or nail in the Tongue & Groove of each sheet if potential movement of the plastic tongue joint is not acceptable
- For trafficable decks use a minimum 17 mm thickness, refer to Table 15A and 15C for specification
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations
- Use kiln dried timber framing such as Laserframe® or appropriate LVL framing from the Futurebuild® range
- Consult the membrane manufacturer regarding use of bond breaker tapes over joints to allow elongation with natural plywood movement
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier). It is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system

Plywood substrates, face checking and flexible membrane systems

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of CHH Woodproducts. For more information see section 1.8: General Design Considerations - Face Checking on Plywood Exposed to Weather.

Face checks, while typically not present after manufacture, do not affect structural performance of the sheet and are acceptable under AS/ NZS 2269. They are not a manufacturing fault.

Designers and membrane suppliers must carefully consider the suitability of plywood as a substrate for the membrane system in question if the potential of telegraphing of face checks onto the membrane surface is not acceptable.

The risk of telegraphing can be reduced by protecting the plywood surface from weather and moisture during the construction process.

Where the potential of face checking in the plywood substrate is not acceptable designers should consult the membrane supplier for a more suitable membrane or an alternative substrate.

Allowing for moisture expansion of plywood under roof and floor coverings

Membrane suppliers have held different views on the requirements for plywood substrates. The fixing instructions within this guide are the starting point but designers must detail joints that allow for expansion in accordance with practices recommended by the chosen membrane supplier.

CHH Woodproducts' view, and the recommendation of a number of suppliers here and in North America is that expansion and contraction at sheet edges should be allowed for by loosely butting tongue and grooved edges so that the tongues can absorb movement and providing a small gap (2 to 3 mm) between square sawn edges. Use a bond breaking tape over these joints to spread elongation in the membrane over a longer distance than the narrow gap in the joint itself. This tape can double as a rain seal over the sheet edges during construction.

Other membrane suppliers believe that sheets should be tightly butted and glued and screwed hard up to each other. This practice constrains movement at the small joint between sheets, but over a wider area requires significant allowance for movement around the perimeter of a roof segment. Junctions between the roof slopes and walls need careful detailing to allow for the potential movement. Movement control joints should be provided at regular intervals following the recommendation of the membrane manufacturer, especially if this method is adopted.

4.2 ROOF TILE SYSTEMS

Most fibreglass, asphalt or wooden shingle and tile systems will tolerate DD grade surface characteristics.

- Use unsanded Ecoply Roofing (DD grade), or sanded Ecoply of the required thickness in Table 15A
- The unsanded surface provides extra grip on steeper roofs for roofers
- Fix tiles according to the tile manufacturer's specification
- Under asphalt shingles use felt underlay over the Ecoply

4.3 ROOFING & DECKING – PRODUCT SELECTION GUIDE

Table 14: Roofing and Decking Product Selection Guide

	Structural Square Edge (CD Grade)	Flooring (CD Grade)	Roofing (DD Grade)
Product Description	CD face grade sheets are available in a range of thicknesses and size	Solid sanded C grade surface with tongue and groove profile on long edges	Unfilled D grade surface with tongue and groove profile on long edges
Recommended Applications	Substrate for flexible coverings requiring a smooth substrate and where avoidance of visible surface indentations is critical. Use as a substrate for flexible roof and deck membranes and thin roofing tiles		Substrate for coverings with the ability to span holes in the D face grade (up to 75 mm in diameter) such as asphaltic roof tiles and torch welded polyester reinforce membranes. Do not use under flexible membrane coverings or where avoidance of visible surface indentation is critical
Face Grades	Front: C solid sanded Back: D unsanded		Front & Back: D unsanded
	Refer to Table 1 for range and treatment options		
Product Features	Blocking required to support all edges	Second void free layer under surface veneer for increased protection against punching through the first veneer under high point loads & increased moisture resistance. Blocking not required to support tongue and groove edges (unless otherwise specified)	15 and 17 mm thickness specifically designed for use under shingles and tiles that have a courser finish. Unsanded surface for extra strength and grip for installers on steep roofs Blocking not required to support[2] tongue and groove edges (unless otherwise specified)
Thicknesses Available	12, 15, 17, 19, 21, 25 mm	15, 17, 19, 21, 25 mm	15, 17 mm
Sheet Sizes Available	2400/2700 x 1200m		
Stress Grades Available	F8 (F11[1] available upon request)	F8 (F11[1] available upon request) 19 mm Longspan supplied F11[1] as standard	F11[1]
Treatment	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
Span Capabilities	Refer to frame spacings in Tables 15A to 15C		

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain.

2 Where roofing products use tongue and groove CHH Woodproducts recommends fastening the tongue to rafters/joists at a minimum of one point

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4.4 FRAME SPACINGS FOR ECOPLY® ROOFS AND DECKS

Table 15A: Roofing - Sheathing, Non Trafficable, Above 2 Degree Pitch

Application	Roof Pitch	Stress Grade	Maximum Wind Zone	Maximum frame centres (mm) for Ecoply® with face grain across framing				
				Ecoply nominal thickness (mm)				
				15	17	19	21	25
Sheathing, non trafficable roof for all roof pitches above 2 degrees Suitable for roof mass up to 30 kg/m² (additional to Ecoply weight or 40 kg/m² including Ecoply)	>2°	F8	Extra High	600	600	800	800	900
		F11	High	900	900			
			Very High	800	900			
			Extra High	800	800			
	>20°	F11	Very High	900	900			
			Extra High	800	800			

Suggested applications include substrates for Asphalt Shingle and Membrane type roofs. The above suggested maximum framing spans are based on the following deflection criteria:

- Under a short term 1kN point load, deflection is less than Span/130
- Under a long term self weight load, deflection is less than Span/400
- Under a short term wind gust load, deflection is less than Span/150

Table 15B: Sub-Sheathing

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing					
	Ecoply nominal thickness (mm)					
	12	15	17	19	21	25
Under steel or self supporting cladding for support of building paper or lateral diaphragm action. Sag not critical.	800	1200				

Table 15C: Decking

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing			
	Ecoply nominal thickness (mm)			
	17	19	21	25
1. Trafficable roof decking Limited by dynamic response of roof as floor	540	600	600	750
2. Roof decking to Clause 8.5.5.1 c) of E2/AS1	400	400	400	400

- The current requirement in E2/AS1 is extremely conservative when compared with calculations determined for other applications using VM1 Clause 6 and calibrating the spans against codes of practice from North America and Australia. CHH Woodproducts recommends designers consider the alternative solution in row 1 of Table 15C for membrane decking in consultation with the membrane manufacturer.

  Unless otherwise stated spans apply equally to square edge or tongue and groove panels. Check Table 1 for availability of grades and lengths to match span multiples in Table 16
- Use the next lower recommended frame spacing or thicker Ecoply® where appearance is critical
- To suit trusses at 900 centres, 2700 long sheets are available. See Table 16

Table 16: Frame Set Outs to Match 2400mm and 2700mm Sheet Modules

Length (mm)	Typical Frame Spacing to Suit Sheet Length			
2400	400	480	600	800
2700	450	540	675	900

Limitation for the use of Table 16.

CHH Woodproducts does not have access to information about designs for specific sites. Table 16 is a guide to estimate the initial selection of a span for design. Each site should be evaluated by qualified persons to ensure all loading parameters and site conditions have been considered, and appropriate changes should be made by the building designer.

4.5 ROOFING – DESIGN CONSIDERATIONS

Durability

In general, H3.2 CCA treatment of Ecoply plywood with waterborne preservatives is recommended for roofing.

Roofing materials

Various roofing materials used over Ecoply plywood have different durability expectations, normally in excess of the 15 years required by the NZBC Clause B2. Durability of the roofing is subject to the specifications, installation and maintenance requirements of the roofing manufacturer. The durability of the Ecoply can only be assured as long as the overlying roofing and detailing excludes moisture. With good building practice and maintenance, roofing materials can be repaired or replaced at regular intervals to achieve life from the Ecoply in excess of the original roofing. The durability of Ecoply structural plywood will continue to satisfy the relevant requirements of the NZBC for 50 years, if installed in accordance with the instructions and limitations within this guide and the roof system is adequately maintained.

High humidity, condensation and solar driven moisture

Where the moisture content of wood may exceed 18% for prolonged periods, Ecoply must be H3.2 CCA treated, to resist decay hazard. This includes Ecoply used under roof coverings that may be subject to condensation, or where rain moisture soaked in the roof covering can be driven into the Ecoply by the sun. Appropriate building detailing and ventilation is recommended which can reduce the need for treatment.

Roof ventilation

Good ventilation and the avoidance of moisture are important design considerations when using H3.2 CCA treated Ecoply panels. Poorly ventilated spaces can develop very high temperature and moisture levels. The most likely source of moisture is the condensation of vapour from warm interior air on the underside of cold roofing. Good ventilation can limit the build up of excess moisture vapour in warmer climates but in regions where winter nights are consistently colder, H3.2 CCA treated Ecoply should be used. Moisture induced decay is only one risk that needs to be managed. If incorrectly detailed, roof spaces can be very tight and the dark colour of many roofing materials means that excessive heat can build up causing distortion in plywood or even framing members. Use the suggested details or alternatives to suit. Designers must consider roofing type, seasonal conditions, wind effects and the intended use of the building.

As a minimum, CHH Woodproducts recommends a vent area of 1/300th of the ceiling plan area (approx 3350 mm^2 per square metre of ceiling) equally distributed at the eaves and ridge to allow free flow under the Ecoply, up the roof slope, and out.

Roofing material suppliers should detail vent systems suited to their specific membrane or tile roofing. Proprietary ridge capping profiles or vents are available from roofing suppliers.

Detail gaps of 25 mm in the plywood at ridges, and at walls where a roof slopes up to an upper storey. For flat roofs, natural ventilation flows may be impeded. Use proprietary roof vents. Consider forced ventilation as appropriate.

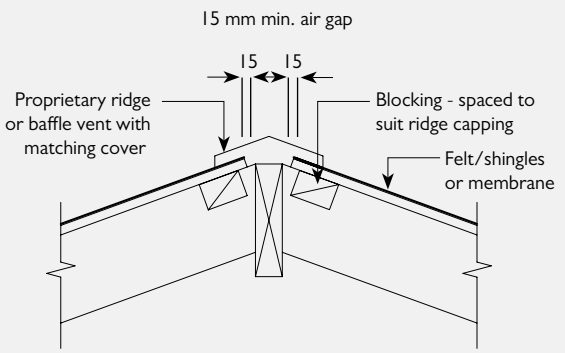
Bubbling

Plywood bubbling occurs when moisture trapped in knot holes in inner veneers expands as the temperature rises. This moisture will dissipate through the face veneer and will not affect the structural integrity of the plywood panel. As membrane coverings can prevent moisture dissipation, Ecoply Flooring and Structural Square Edge CD is recommended if the visual appearance of bubbling is not acceptable, or a high visual finish is required.

Soil

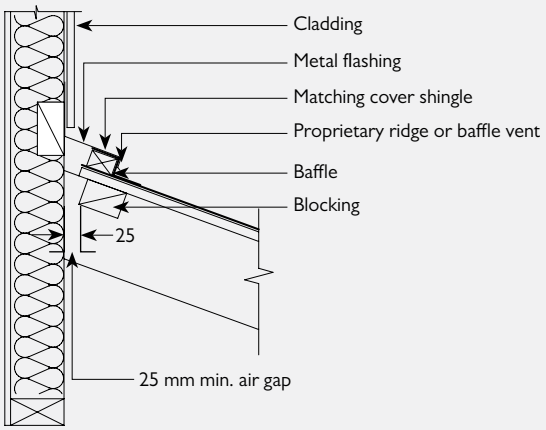
Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

EC003: Ridge detail with ridgeboard



(use also with Hip Rafter if extra ventilation required)

EC004: Roof to wall junction vent



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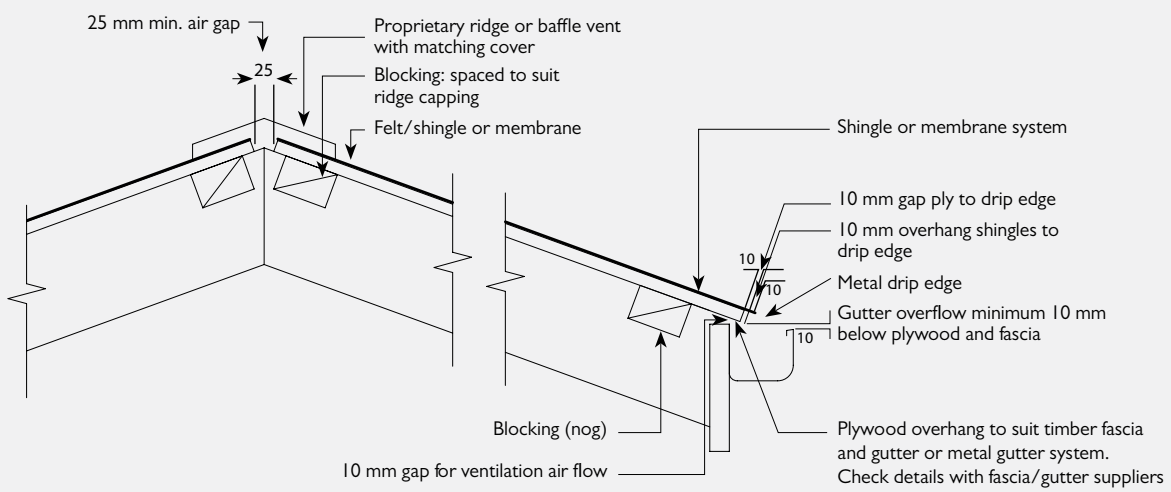
EC005: Truss ridge detail



Rain wetting and construction time

Untreated Ecoply will withstand a reasonable amount of rain wetting and exposure during construction for up to three months. In extreme weather conditions of high temperature and/or high rainfall this period may be less. Appearance issues such as discolouration and face checking of the sheet surface can be expected if Ecoply is exposed. For roofs uncovered for longer periods use H3 treated Ecoply to lower the risk of decay. Return Ecoply to below 18% moisture content before installing moisture sensitive materials, coverings, coatings or adhesives. Where a high visual finish is desired (such as membrane roofing and decking) protect Ecoply from exterior moisture during construction. For detailed information see section 4.1 Flexible Membrane Systems.

Gutter details

Where Ecoply structural plywood sub-sheathing supports roofing at gutters, a metal drip edge must be provided with appropriate gaps to shed water. Gutters should have a front edge overflow or ends lower than the back to shed water overflow away from framing and sub-sheathing Ecoply.

H3.2 CCA treatment is recommended for Ecoply sheets that protrude into gutters, with regular maintenance to avoid leaf mould (soil) development. Untreated Ecoply must not be exposed to gutter splash or moisture.

Fastener spacing for wind suction

Wind pressure applies withdrawal loads to nails holding plywood to purlins and trusses. For the frame spacing in Table 15A designers may use the following guidelines for wind zones expressed in NZS 3604.

Note: Full penetration of fasteners into the supporting member is assumed.

The main body of the roof

For wind zones up to and including high, use 60 x 2.8 mm nails spaced at 150 mm centres on all cross framing. For very high and extra high wind zones, use 75 x 3.15 mm nails spaced at 150 mm centres on all cross framing.

Roof edges

All Ecoply structural plywood used at local pressure suction zones at the roof edges, gutters, eaves and gable ends must be supported on framing, and fixed at 75 mm centres with minimum 60 x 2.8 mm nails for regions up to, and including high wind zones (use 75 x 3.15 mm nails for very high and extra high wind zones). Local pressure zones are interpreted from AS/NZS 1170 as being within 20% of the building length, width or the average of the gutter and ridge height.

Designers and builders should review site conditions to ensure adequate fixing is applied. Buildings in exposed sites and lee zones should be specifically designed using the loading standard (AS/NZS 1170) and the timber structures standard NZS 3603. In some wind conditions, the tiles themselves may be sucked from the plywood. Use a consulting engineer to assess site conditions, calculate wind pressures for the specific site, and determine the fastening and span requirements, and to check that the truss system can resist the loads being applied through the plywood.

Fixing of roofing

Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate. Some shingle systems may not be suitable for use in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

4.6 ROOFING – INSTALLATION

Framing

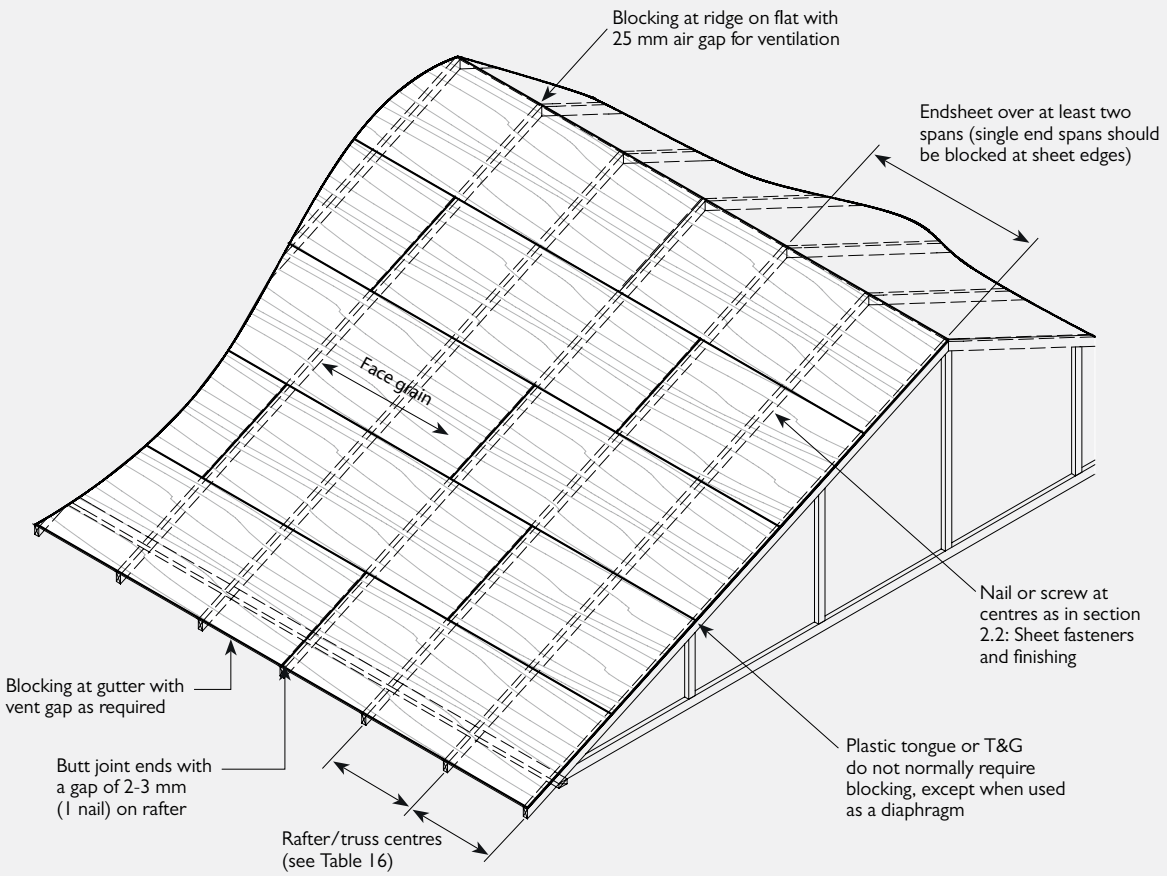
Frames should be at spacings to suit plywood thicknesses in Table 15A, page 25. Additional requirements for roof framing are:

- Ensure top edges of framing are properly aligned
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections

Blocking (nogs, dwangs)

- Block all edges of Ecoply Structural Square Edge plywood
- Block all edges at the ridge and gutter lines to prevent sag at capping or gutters
- Block for high face loads or under areas accessed for maintenance
- Blocking within the body of the roof is not required under tongue and grooved edges when using Ecoply Flooring & Roofing, unless required for framing stability or the plywood is being used as a diaphragm to resist horizontal wind or earthquake loads. In this case fixings transfer shear across the joints and details should be specified on drawings
- Use blocking on the flat to provide gaps where air flow is needed for ventilation
- Specific roofing suppliers may require blocking to suit their system

EC006: Sheet and framing layout



Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- Lay the sheets in a staggered pattern
- Allow sufficient clearance inside confining structure such as concrete or brick walls adjacent to the roof. Use extra allowances with large areas
- Allow clearance for ventilation as required

Fixing of sheets

Ecoply may be fixed to different types of framing with nails, screws or a combination of fasteners and construction adhesives.

Fasteners should be corrosion resistant to a level appropriate to the end use life expectancy (15 or 50 years) and expected exposure to moisture. Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must 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.

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roof covering.

- Always refer to the roofing system supplier for system requirements
- For roofing, check the additional requirements according to wind exposure
- For very exposed sites, cyclonic conditions or roofs above 10 metres in height, carry out specific structural design to the relevant standards
- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping
- For minimum fastener spacing for wind suction, refer section 4.5 Roofing - Design Considerations - Fastener spacing for wind suction

Fixing to timber frames

- Ring shank nails or annular grooved nails or screws are recommended for additional holding power
- Use flathead nails. Do not use jolt or bullet head nails
- Stainless steel nails must be annular grooved
- Ensure fastener is compatible with the roofing cover (consult roofing system supplier)
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50 mm long staple with 12 mm crown and legs 1.8 mm diameter. Space staples 20% closer than nails. Refer to the manufacturer's information for corrosion resistance and durability

Fixing to steel frames

- Fix directly to roll formed steel (up to 2 mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may shear. Keep Ecoply dry or use larger screws or;
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length
- H3.2 CCA treated plywood must not be fixed to steel framing

5.0 FLOORING

The following section covers the use of Ecoply Flooring plywood used as a flooring substrate with flexible and rigid overlays. Ecoply Flooring is suitable as a substrate for overlays such as carpet, tiles and some membrane products (refer to flooring manufacturer).

5.1 FLOORING – RANGE

- Ecoply Flooring features a void free second layer under the surface veneer for increased protection against moisture bubbles and punch through of the first veneer under high point loads than normal Ecoply Structural Square Edge plywood
- The tongue and groove on long sheet edges does not require support blocking under the joint (unless otherwise specified)
- Supplied in F8 stress grade (F11 available upon request)
- Ecoply 19 mm Longspan Flooring supplied as standard in F11/F8 stress grade
- Supplied standard with a sanded C grade surface with D grade back
- Sanded B grade surface is available in 19 mm thickness (untreated only) for clear finish applications. Designers must expect the surface to dent or mark more easily than hardwood flooring systems as Ecoply is manufactured from relatively soft radiata pine.
- Available untreated or H3.2 CCA treated, (H3.1 LOSP treated available upon request)
- LOSP treated plywood is not recommended for internal applications
- Refer to Table 1 for range and treatment options

5.2 FLOORING – INSTALLATION

Table 17: Flooring Frame Spacings

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing				
	Ecoply nominal thickness (mm)				
	15	17	19	21	25
1. Domestic flooring 2kPa - 1.8kN	480	540	600 F11[1] Longspan	600	750
2. Institutional and public assembly up to 4kPa - 2.7kN		300	480	540	750
3. Institutional and crowd assembly up to 5kPa - 3.6kN			400	450	600
4. Corridors, industrial up to 5kPa - 4.5kN			300	400	540
5. Domestic garage floor** 2.5kPa - 9kN					270

** Provide blocking to all edges of the sheet.

- Use the next lower recommended frame spacing or thicker Ecoply flooring where appearance is critical
- To suit frames at 900 centres, 2700 long sheets are available. See Table 16

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain. Please contact CHH Woodproducts for Span/360 deflection limits for internal membrane areas

Floor loads

For domestic garage floors blocking is required under all edges to control wheel loads on the tongue. Testing with 113 mm diameter load head (0.01 m^2) confirms commercial floor capabilities.

Refer to Table 16 to match frame set outs with 2400 mm and 700 mm sheet modules.

Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 17
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less

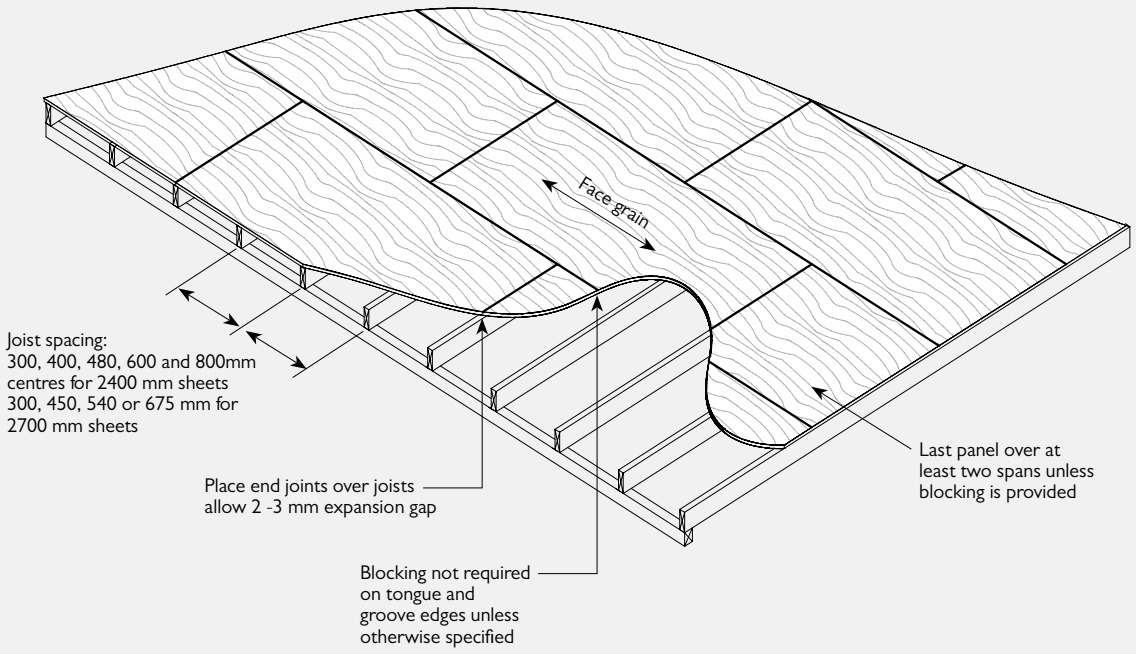
Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified (such as in domestic garage floors)

Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- For panels at floor edges where a continuous two span coverage is not possible, sheet edges must be supported by blocking
- Lay sheets in a staggered pattern
- Allow clearance for ventilation as required

EC007: Ecoply® Flooring layout



Fastener selection and treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

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.

Fasteners and fixing of sheets

- Ecoply Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet Fasteners and Fixing
- For construction adhesive specifications refer to section 2.3: Adhesives
- Ring shank or annular grooved nails, or screws are recommended for additional holding power
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails

5.3 FLOORING – FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications
- Avoid heavy sanding that may remove the critically important structural face veneer
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment in H3.2 CCA treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing
- Where clear or stained finishes are desired, designers should select sheets and protect the floor as much as possible from the weather and construction activities
- Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction
- For improved surface finish, floors should be protected from weather during construction as soon as possible

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6.0 FREQUENTLY ASKED QUESTIONS

Q: How much space should be allowed for expansion?

A: Allow a 2 - 3mm expansion gap between square edges of Ecoply® sheets. If using Ecoply Flooring, a 5 mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

Q: Can power driven nails be used to fix Ecoply?

A: Paslode power driven nails have been tested for fixing Ecoply and Shadowclad® plywood products for particular bracing and cladding applications. For power driven nail specifications refer to the Paslode Special Fixing Applications document available from http://www.paslode.co.nz/images/fix-app-CHH-woodproducts.pdf. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud. Do not overdrive.

Q: How close to sheet edges can I nail?

A: Fixings must be at least 3 fastener diameters or 7 mm from the sheet edge.

Q: Do I have to use stainless steel nails when using Ecoply for bracing?

A: Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must 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.Where stainless steel nails are required, annular grooved nails must be used.

Q: What is the weight of Ecoply?

A: Refer to Table 4A for weight (kg/m^2) of different Ecoply thicknesses.

Q: What is the R-value of Ecoply?

A: The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Q: Are there any compatibility issues when using Ecoply with other materials?

A: Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. H3.2 CCA treatment is also corrosive and this must be taken into account when specifying H3.2 CCA treated plywood next to metals. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

Q: Can Ecoply be used as a rigid sheathing (air barrier)?

A: CHH has a specific system called Ecoply Barrier. Ecoply Barrier has been developed as a rigid air barrier. Refer to the current Ecoply Barrier Specification & Installation Guide for further information. 7mm H3.2 CCA treated Ecoply can also be used if combined with building underlay in accordance with E2/AS1 for a rigid air barrier system.

Q: What is the relevance of AS/NZS 2269?

A: Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the NZBC Compliance Documents including NZS 3602 Timber and Wood-based Products for Use in Building, NZS 3603 Timber Structures, NZS 3604 Timber Framed Buildings, AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood and Acceptable Solution E2/AS1 - External Moisture. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZBC Compliance Documents.

Q: What is the relevance of the PAA stamp?

A: Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply plywood products.

Q: What is marine ply?

A: Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ Good Practice Guide – Timber Cladding). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin, fibreglass, or a paint finish for long term durability.

Q: What should a specification for structural plywood include?

A: A specification for structural plywood should include:

Specification check list	Example
Quantity/size	20 sheets of 2400 x 1200
Thickness	12 mm
Edge finish	Square edge
Brand name	Ecoply® structural plywood
Reference to Standard	To AS/NZS 2269
Stress grade[1]/layup	F8 (12-24-5)
Surface grade/bond type	CD A-Bond[2]
Accreditation	EWPAA product certified[3]

1 Stress grades may vary between different manufacturers and products.

2 Type A-bonds are suitable for permanent exposed applications and structural applications.

3 The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269

Q: What are F-grades?

A: The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11 etc as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8 is the most common structural plywood grade found in New Zealand. All Ecoply® structural products are F8. Ecoply 15 mm roofing and Ecoply 19 mm Longspan Flooring are F11/F8. Other Ecoply Flooring products are also available in F11 upon request.

Q: What are surface/appearance grades (eg CD)?

A: Appearance grades (eg BD, CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2A & 2B of this guide. The first letter describes the appearance of the face veneer and the second letter describes the back face.

Q: How long can Ecoply be left exposed to the weather?

A: Untreated Ecoply will typically maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and face checking will become evident. Where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this guide, it can be specified to meet the durability requirements of the NZBC, however appearance issues such as face checking may still occur dependent upon the degree of exposure to weather during construction.

Q: What treatment levels and types are used for Ecoply?

A: Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome Arsenate) although H3.1 LOSP Azole (Light Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for BD, Grooved Lining and Shadowclad®. CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

Q: Does Ecoply have to be treated when used as structural bracing?

A: Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

Q: Do I have to re-treat cut edges of treated Ecoply?

A: It is important to re-treat any cuts and holes with a brush on remedial treatment such as Holdfast® Metalex® Clear.

Q: What type of glue is used to manufacture Ecoply?

A: Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

Q: Does Ecoply emit formaldehyde?

A: Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E_0 - less than 0.5 mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3 mg/litre.

Q: How should Ecoply be installed to maximise its stiffness properties?

A: Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
- CHH Woodproducts technical notes - downloadable from www.chhwoodproducts.co.nz/document-library
- NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber"
- NZS 3602:2003 "Timber and Wood-based products for use in Buildings"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:2011 "Timber Framed Buildings"
- AS/NZS 1170:2011 "Structural design actions"
- AS/NZS 2269:2012 "Plywood Structural"
- AS/NZS 1604.3:2010 "Specification for Preservative Treatment, Part 3: Plywood"
- AS 1684:2010 "Residential Timber Framed Construction"
- US Product Standard PS1-95
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- BRANZ Bulletin 345: Flat membrane roofs – design and installation
- BRANZ Bulletin 346: Flat membrane roofs – materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 307, 404, 411
- Shadowclad® Specification & Installation Guide for Cavity Construction
- Ecoply® Barrier Specification & Installation Guide
- Material Safety Data Sheets
  - MSDS Azole Treated Plywood, LVL & I-Joists
  - MSDS H3 CCA Treated Plywood & I-Joist
  - MSDS Untreated Plywood
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- Product Technical Statement for Ecoply available online (www.chhwoodproducts.co.nz/product-technical-statements)
- EWPAA Technical Note - Plywood Roofing and Flooring: Installation and detail factors

Standards can be purchased online at www.standards.co.nz
Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

8.0 LIMITATIONS

The information contained in this document is current as at September 2015 and is based on data available to CHH Woodproducts at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Ecoply products installed in accordance with this document or NZBC compliance documents.

This publication replaces all previous CHH Woodproducts design information and literature relating to Ecoply structural plywood products. CHH Woodproducts reserves the right to change the information contained in this document without prior notice.

It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

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CarterHoltHarvey
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Private Bag 92-106
Victoria Street West
Auckland 1142
New Zealand

Freephone: 0800 326 759
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5.5 Veneer – Stack Bond

Introduction

This section has been prepared to provide designers, territorial authorities and builders with some standard design details for block masonry veneer using stack bond laying format.

The scope of this section is limited to the masonry modules described in the Materials section below.

Standards

The veneer and supporting construction referred to in this section is to follow the requirements of New Zealand Building Code Section E2.AS1. The following standards are referenced in that section:

- NZS 3604 Timber Framed Buildings.
- NZS 4210 Masonry Construction: Materials and Workmanship

Additionally, the provisions of this section may be applied when used in conjunction with construction to NZS 4229, Concrete Masonry Buildings Not Requiring Specific Design.

If the scope of the proposed work is outside the limitations and requirements of the above then specific engineering design advice must be sought.

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Materials

Masonry veneer shall comply with the following requirements:

- 90 mm maximum thickness, 70 mm minimum thickness.
- Length and height of units to be 390 mm and 190 mm respectively.
- May be either hollow or solid. Hollow blocks to be 10.01, Standard Whole.
- Shall be manufactured to the requirements of AS/NZS 4455.

Lattice mesh shall be Eagle Wire *Bricklock*, or equivalent, and comply with the following requirements:

- Comprise 2 parallel longitudinal steel rods of minimum 4 mm diameter, held apart approximately 55 mm on centre by welded cross wires of 2 mm diameter, at 200 mm centres.
- Steel shall have a minimum yield strength of 300 MPa and be hot dip galvanised to minimum 470 gm/m^2.
- Mesh to be supplied and installed in minimum 2 m length modules, lapped to detail shown in Figure 1 following.

Mortar shall be to the requirements of NZS 4210.

Veneer Construction

In addition to the requirements given in the Standards section above the stack bond veneer shall be constructed to the following requirements:

1. Studs in timber framed walls to be at 400 mm centres.
2. Wall ties, to the requirements of NZS 4210, are to be provided at 400 mm centres both vertically and horizontally.
3. Lattice mesh shall be laid continuously in horizontal courses at 800 mm maximum vertical centres, commencing no higher than the second course above the veneer base.
4. Lattice mesh shall also be laid in the course or courses directly above and below openings, extending a minimum 800 mm past the edge of the opening.
5. Lap joins in lattice mesh shall be made at mid-length of 390 mm block units and shall be staggered so that adjacent laps do not occur within the same vertical block stack.
6. Lattice mesh may be discontinued only at control joints.
7. Use purpose made 'L' formed lattice mesh at corner intersections.

Figure 1 (page 2), shows a typical details for stack bond veneer.

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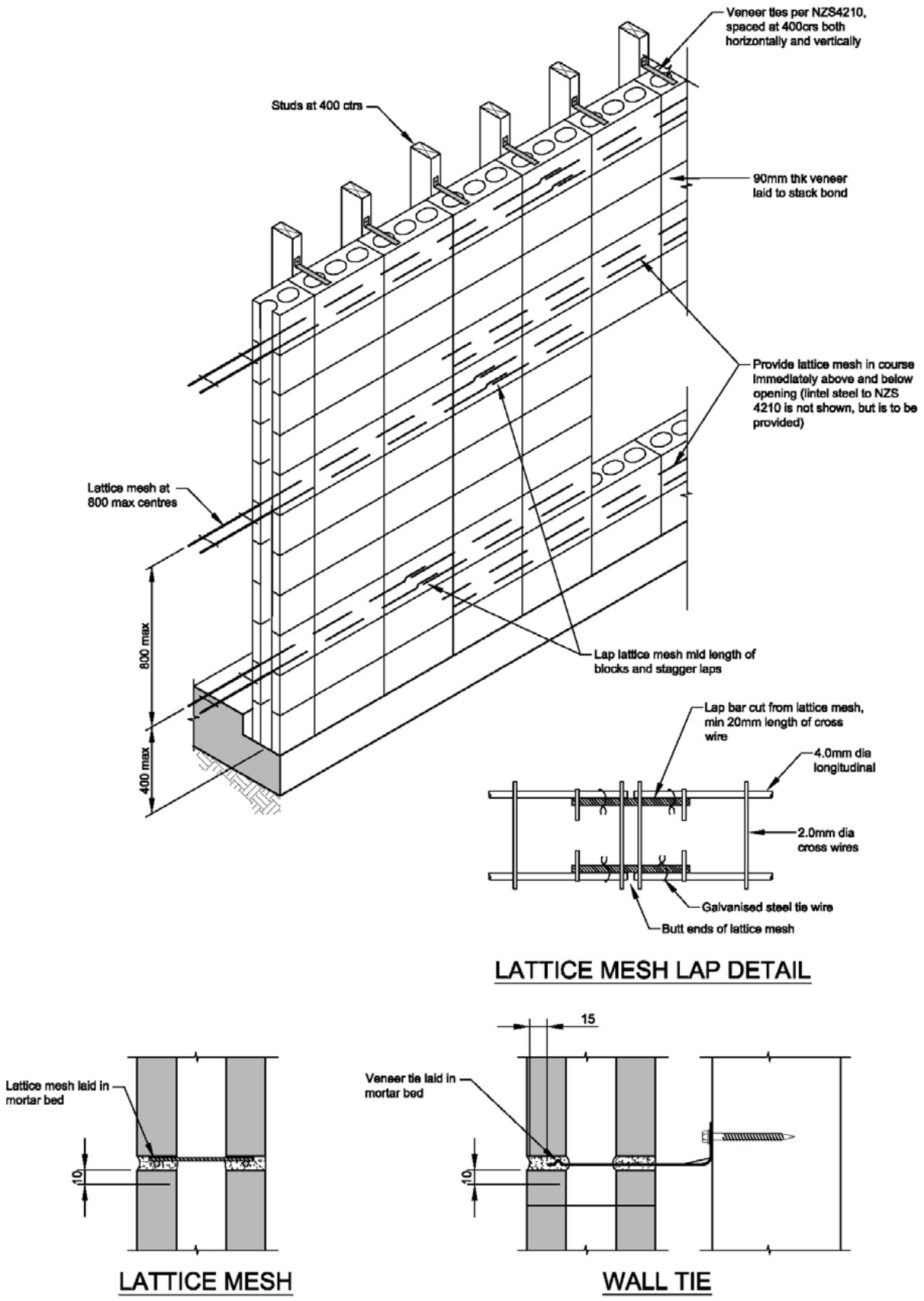

Figure 1: Stack Bond Veneer

viblock

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The team at Viblock thank you for your support this year and look forward to that continuing into the future.

We also wish you a successful and prosperous 2021.

Your inquiries are always welcome.

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Alexandra	03 449 3140
Jim Hunter	027 304 8028
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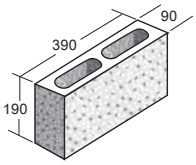
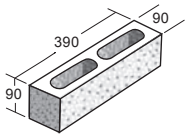
MASONRY BLOCK CHART

A quick reference guide to Masonry Block types

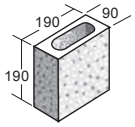
10-Series Masonry Blocks



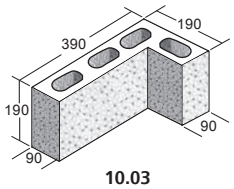
10.01
Standard



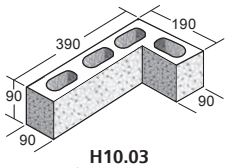
H10.01
Half High Standard



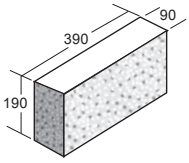
10.02
Half



10.03
Corner

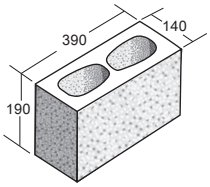


H10.03
Half High Corner

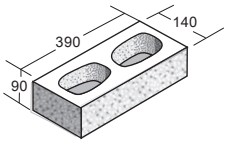


10.17
Solid (no core)
Also available rumbled

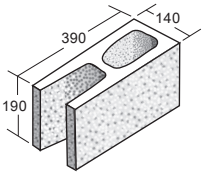
15-Series Masonry Blocks



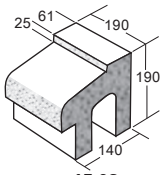
15.04
Plain Ends



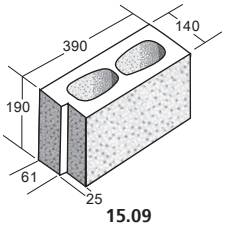
H15.04
Plain End Half High



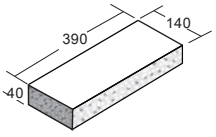
15.05
Open End



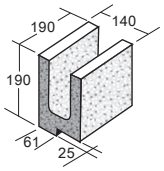
15.08
Sill



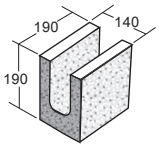
15.09
Rebate



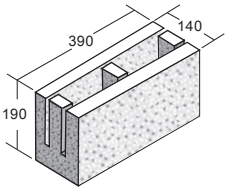
T 05.17
Capping Block



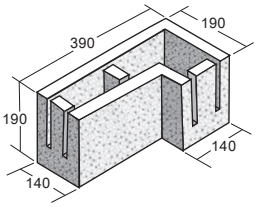
15.11
Half Rebated Lintel



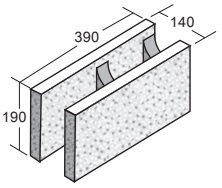
15.12
Lintel and Half End-Closer



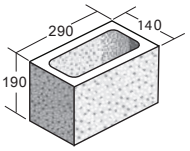
15.14
Knock-in Bond Beam



15.15
Knock-in Bond Beam Corner
RH pictured (LH available)



15.16
Open End Bond Beam



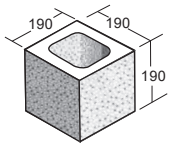
15.19
Three Quarter Block

Also made to order

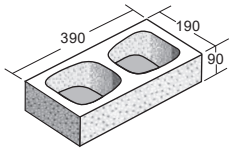
Coloured masonry in most sizes and type
Honed Blocks
Rumbled solids

15.17 Solid available

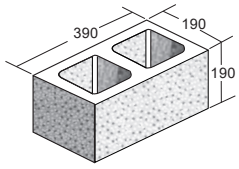
20-Series Masonry Blocks



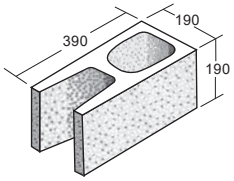
20.02
Half



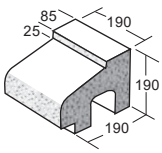
H20.04
Plain End Half High



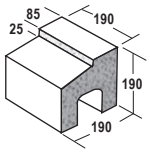
20.04
Plain Ends



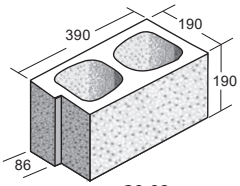
20.05
Open End



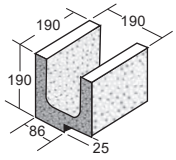
20.08
Sill Block



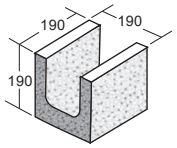
20.08
Flush Block



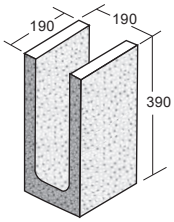
20.09
Rebate



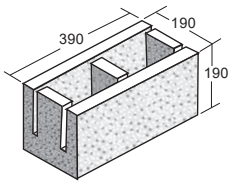
20.11
Half Rebated Lintel



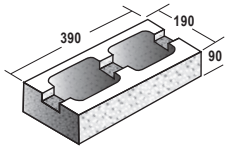
20.12
Lintel and Half End-Closer



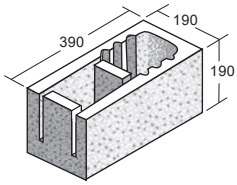
20.13
Deep Lintel



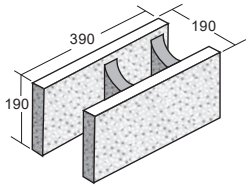
20.14
Knock-in Bond Beam



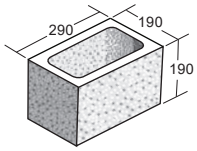
H20.14
Half High Bond Beam



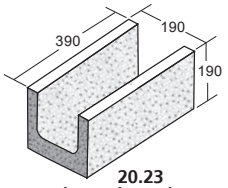
20.15
Corner Bond Beam



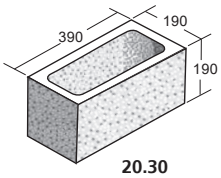
20.16
Open End Bond Beam



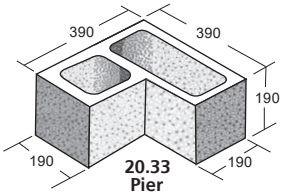
20.19
Three Quarter Block



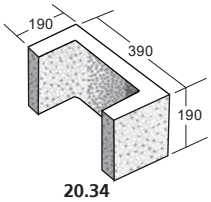
20.23
Channel Bond Beam



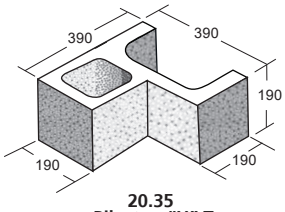
20.30
Column Block



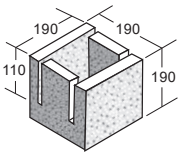
20.33
Pier



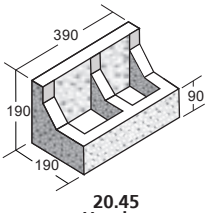
20.34
Pilaster "C" Type



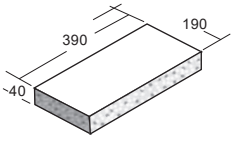
20.35
Pilaster "H" Type



20.44
Knock-in Half Bond Beam



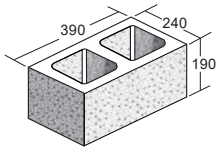
20.45
Header



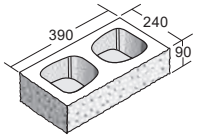
05.17
Capping Block

H20.09 and 20.17 Solid available

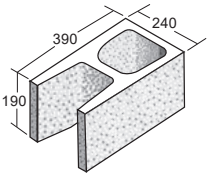
25 & 30-Series Masonry Blocks



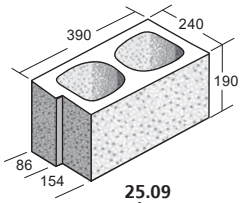
25.04
Plain Ends



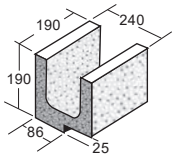
H25.04
Plain End Half High



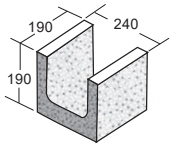
25.05
Open End



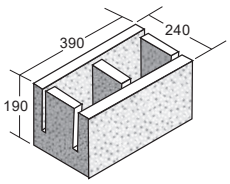
25.09
Rebate



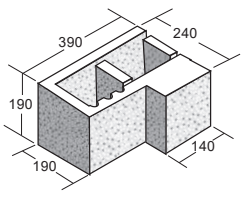
25.11
Half Rebated Lintel



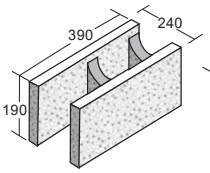
25.12
Lintel and Half End-Closer



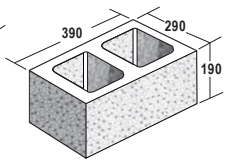
25.14
Knock-in Bond Beam



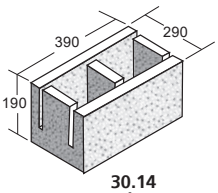
25.15
Bond Beam Corner
LH pictured (RH available)



25.16
Open End Bond Beam

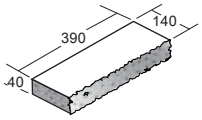


30.04
Plain Ends

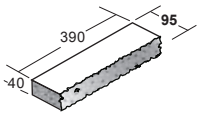


30.14
Bond Beam

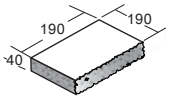
Split Face & Fluted Masonry Blocks (Made to order)



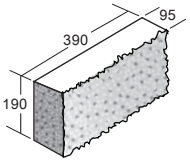
Split full
140 mm wide



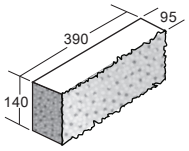
Split full
90 mm wide



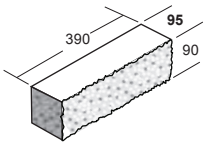
Split half
190 mm wide



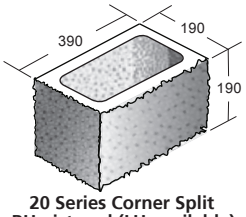
20 Series Split Solid



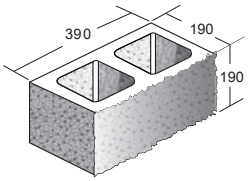
15 Series Split Solid



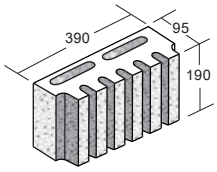
10 Series Split Solid



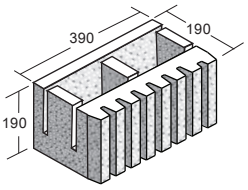
20 Series Corner Split
RH pictured (LH available)



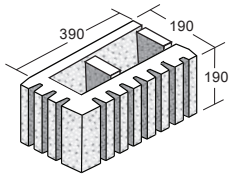
20 Series Bond Beam



10 Series Fluted

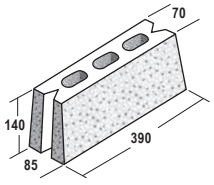


20 Series Fluted Bond Beam

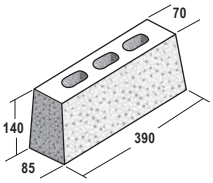


20 Series Fluted Corner
RH pictured (LH available)

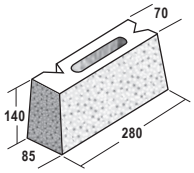
The Villa Veneer Blocks



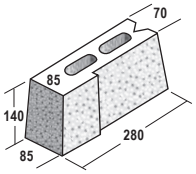
Standard Brick



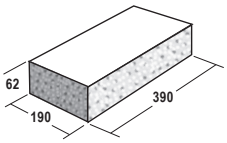
Window Brick



External Brick Corner
RH pictured (LH available)

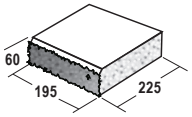


Internal Brick Corner
LH pictured (RH available)

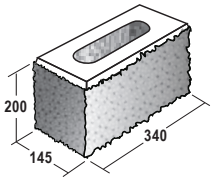


Sill Brick

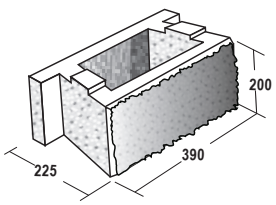
Tasman Retaining Wall Blocks



Capping Block 200mm

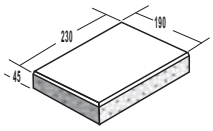


Full Corner Block

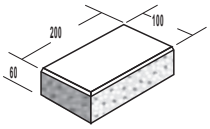


Wall Block

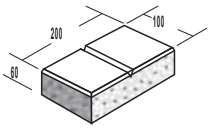
Residential Pavers



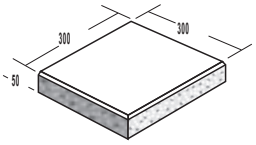
Cobblestone 230x190x45
Suitable for patios and walkways



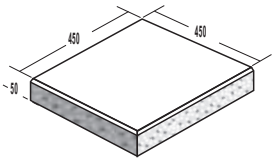
London Paver 200x100x60
Suitable for patios,walkways and light vehicle traffic



London Paver Sett 200x100x60
Suitable for patios,walkways and light vehicle traffic



Lifestyle Paver 300x300x50
Suitable for patios and walkways

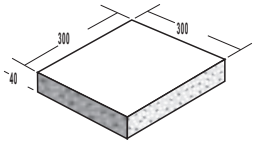


Lifestyle Paver 450x450x50
Suitable for patios and walkways

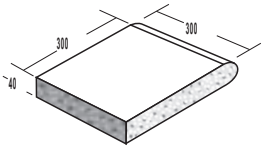
Residential Paver:

- Available in a range of colours
- Honed surface available as an option
- Bush hammering available as an option
- London Pavers and cobblestones can be rumbled

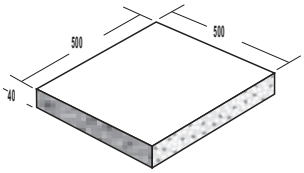
ALFRESCO Residential Paver-Wet Cast



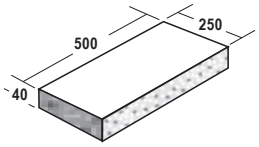
300x300x40



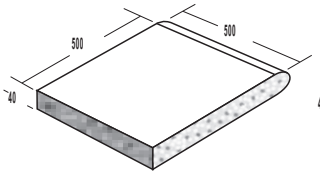
300x300x40 Bull Nose



500x500x40



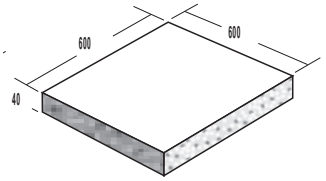
500x250x40



500x500x40 Bull Nose

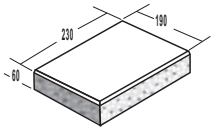
Alfresco Range:

- Available in both plain and textured finishes
- Suitable for patios and walkways
- Available in a range of colours
- Also available in Textured Bull Nose 600x600x40

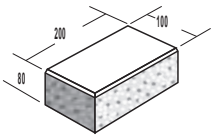


600x600x40

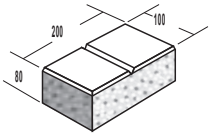
Commercial Pavers



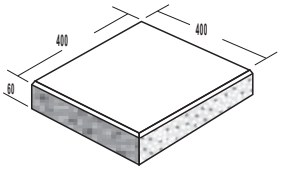
230x190x60
Cobblestone



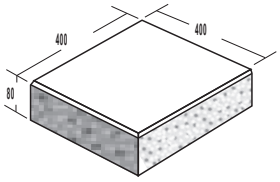
200x100x80
London Paver



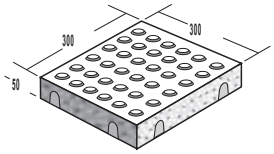
200x100x80
London Paver Sett



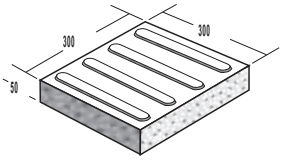
400x400x60
Lifestyle



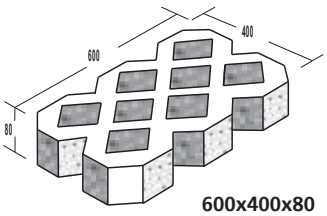
400x400x80
Lifestyle



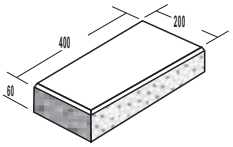
300x300x50
Tactile Paver Warning



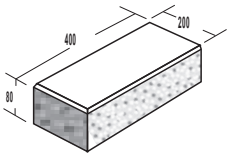
300x300x50
Tactile Paver Directional



600x400x80
Turf Block



400x200x60
Lifestyle



400x200x80
Lifestyle

Commercial Paver:

- Available in a range of colours
- Suitable for vehicle use
- Honed surface available as an option
- Bush hammering available as an option

10 Series	Per pallet
10.17	120
H10.01	300
H10.03	200
10.01	150
10.02	300
10.03	100

15 Series	Per pallet
517T	380
H15.04	190
15.04	95
15.05	95
15.08	120
15.09	95
15.11	190
15.12	190
15.14	95
15.15	90
15.16	95
15.19	120

20 Series	Per pallet
517	300
H20.04	150
H20.09	150
H20.14	150
20.02	150
20.04	75
20.05	75
20.08 sill	96
20.08 f nose	150
20.09	75
20.11	150
20.12	150
20.13	75
20.14	75
20.15	75
20.16	75
20.19	100
20.23	75
20.30	75
20.33	50
20.34	75
20.35	50
20.44	150
20.45	90

25 Series	Per pallet
H25.04	130
25.04	65
25.05	65
25.09	65
25.11	130
25.12	130
25.14	65
25.15	60
25.16	65

30 Series	Per pallet
30.04	50
30.14	50

Cobblestones (230x190)	Per pallet
45mm	384
60mm	288

London Pavers (200x100)	Per pallet
60mm	600
80mm	480

Flagstones	Per pallet
300x300x50mm	120
400x400x60mm	72
400x400x80mm	60
400x200x60mm	150
400x200x80mm	120
450x450x50mm	60

Alfresco Wet Cast Pavers	Per pallet
300x300x40mm (incl. Tactiles)	96
500x250x40mm	96
500x500x40mm	48
600x600x40mm	40

Turf Blocks	Per pallet
80mm Flat profile	45

Tasman Retaining Wall	Per pallet
Tasman Full Block	65
Tasman Full Corner	105
Tasman Cap	336

Villa Veneer	Per pallet
Veneer Standard Brick	170
Veneer Window Brick	170
Veneer Internal Corner	215
Veneer External Corner	215
62 mm Still	150

Residential and Commercial Pavers	Per m^2
Cobblestone 230x190	23
London Paver 100x200	50
Lifestyle 300x300	11
Lifestyle 400x400	6.25
Lifestyle 400x200	12.5
Lifestyle 450x450	5
Turf Block	4.2
Tactile Pavers	11

Alfresco Wet Cast Pavers	Per m^2
300x300x40mm	11
500x250x40mm	8
500x500x40mm	4
600x600x40mm	2.8

Block Units	Per m^2
10 series	12.5
15 series	12.5
20 series	12.5
25 series	12.5
30 series	12.5
H10 series	25
H15 series	25
H20 series	25
H25 series	25

Block fill (approximate)	Per m^3
15 series	180
20 series	125
25 series	85
30 series	65

ALEXANDRA
03 449 3140

CHRISTCHURCH
03 343 0394

GENERAL CONDITIONS OF SALE

ARCHITECTURAL MASONRY - Although every effort is made to maintain a certain level of consistency, some colour, aggregate and texture variation will occur and should be expected.

OWNERSHIP: Products remain the property of Viblock Limited until full payment has been received.

PAYMENT: Cash or credit card with order unless credit arrangements are made prior to delivery. Prices are subject to alterations without notice and deliveries will be made at prices current at the time of dispatch.

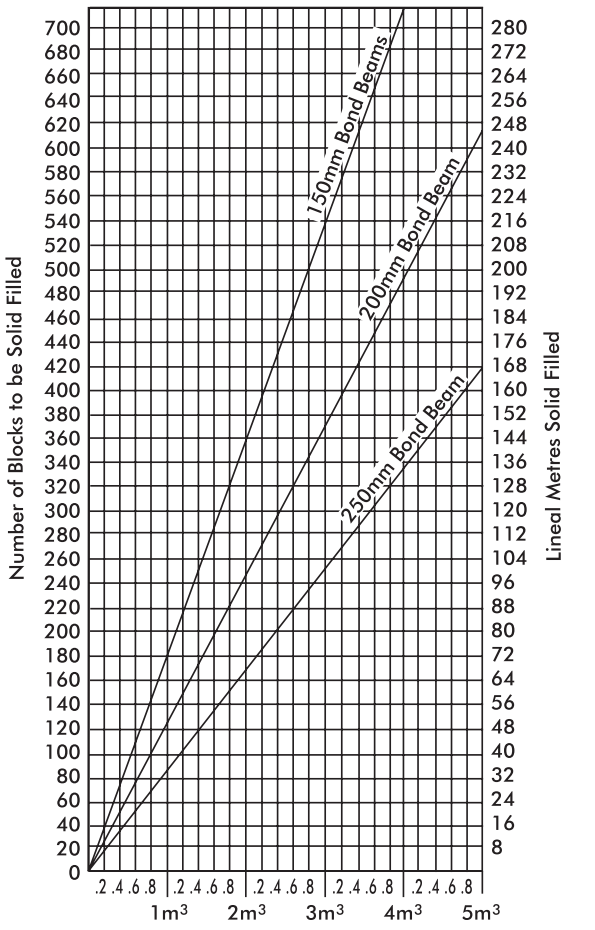
RETURNS: All pallets are returnable, in good condition (fair wear and tear accepted) and subject to a deposit which will be credited when pallets are returned to Viblock.

VARIATIONS ON DELIVERY: Variations of actual quantities from those shown on delivery docket must be notified to us at the time of delivery, otherwise no responsibility will be accepted for such variations. Goods delivered to unattended sites are the customer's responsibility and the Company will not accept claims for shortages. Delivery is deemed to be effected when the trucks have reached the closest point to the customer's property without leaving the public road. Trucks are not permitted to drive over concrete crossings or driveways, unless a council approved crossing is provided. Trucks entering customer's property at the customer's request do so at the customer's risk and the Company will not accept any liability for damage.

ESTIMATES: Estimates are given for guidance only as to the number and type of blocks required and the Company will not accept accuracy, nor accept claims for variations. The customer will be charged for all blocks delivered.

DISCLAIMER : The information contained in this document is current at the time of issue. Viblock Limited reserves the right to change product specification without prior notice. Where specification is relevant on specific product performance please check with Viblock Limited in the first instance.

GROUT QUANTITIES
BOND BEAMS



StoClear Coating Systems

Clear Coating Systems for Masonry Construction

viblock

StoClear Coating Systems

Protecting masonry construction designed to be seen

Growth on a solid foundation
The range has been thoroughly researched and developed in Europe to meet the demands of minimalistic architecture that highlights natural masonry surfaces. The focus is on quality, suitability and longevity using a combination of Silane and Clear Coating Technology to protect natural masonry surfaces.

S-Protect Silanes take us into the complex field of building protection using invisible treatments that penetrate to provide durability and resistance to masonry surfaces without having adverse effects on the function or changes in the aesthetics of the building materials.

StoProtect Clear Coatings have been developed to protect and waterproof masonry surfaces that are naturally porous by filling the pores and voids with a clear elastomeric film to repel rain driven water.
In combination or separately the perfect solution for almost every masonry requirement can be realized - a solution which makes successful long-term protection possible.

People and architecture, Sto provides the link
Architecture plays an important role in our lives. It lends urban and rural landscapes character, and should ideally be embedded in an intact environment. For us, "Building with conscience" means enhancing functionality and aesthetics on a sustainable basis and creating an environment in which people feel at one with their surroundings. Apart from researching, developing and marketing Sto products, systems and services, we also attach great importance to optimising the value added process for trades people, architects and building owners alike.

We respect the interests of people and nature at all times

In order to define and implement its ecological targets, Sto has developed a system of environmental management conforming to international standards. This relates to the entire process chain - from the procurement of the raw product, to production, packaging and logistics. Sto make a clear contribution towards improving and preserving the quality of the environment.

A Global Success Story

Sto as a brand has gained and excellent reputation in the field of building protection. Exceptional product performance, reliable service, quantifiable returns, and long-term results are the basis of our success.

StoProtect as a system for masonry block has out performed many other clear coatings in New Zealand and now that clear coatings are required to comply to CCANZ CP 01: 2014. The number of competitors with complaint products backed by warrantees has shrunk.

S-Protect Systems are designed to protect a wide range of solid masonry materials such as precast and in situ concrete as well as historic buildings. The Sydney Opera House, the Louvre in Paris and the Hang-zhou Bay Bridge (longest bridge in the world - China), Novotel Auckland Airport are just a few projects. Not all of our success is that visible to the public, but the all treatments have one object in common: Benefits exceed costs.

StoClear Coating Systems

Weathertight solutions

Protecting Your Assets

The use of watertight concrete which is impervious to the passage of water necessitates specific design criteria - CCANZ CP 01: 2014 requires.

- Concrete must comply with NZS 3104 Clause 2. 10.2
- Minimum strength of 50MPa after 28 days
- With a water/ cementitious ratio less than 0.50 by weight
- Have a permeability reducing admix as per AS 1478.1 Appendix F
- Be designed to prevent cracking in service
- Must pass an AVPV test on hardened concrete in accordance with section CC ANZ CP 01: 2014 4.5.1.

The invasive nature of moisture can be detrimental to concrete by allowing water and dissolved contaminants to penetrate through the pores and shrinkage fractures resulting in initial problems such as interior dampness or water ingress that can escalate to corrosion of the reinforcing steel, salt burst, or freeze-thaw damage. By preventing water ingress the longevity of the concrete is protected and expensive renovation work is avoided.

StoFlexyl Waterproof Membrane System
Manufactured in Germany and versatile in use: StoFlexyl is recommended for waterproofing around window and door openings, building cappings, foundations and below ground level work.

StoFlexyl waterproofing has been tested and evaluated by BRANZ to meet AS/NZ 4858 as a waterproof membrane as required for E2/AS1 & CCANZ CP:01.

S-Protect water repellent products are used to treat dense concrete such as precast or veneer masonry brick providing a water repellant barrier to liquid water while maintaining the concrete's natural vapour permeability. The S-Protect Silane molecules are particularly small in comparison to other treatments and with a low viscosity but high concentration of active ingredients penetrate deeply into the concrete substrate rendering it hydrophobic.

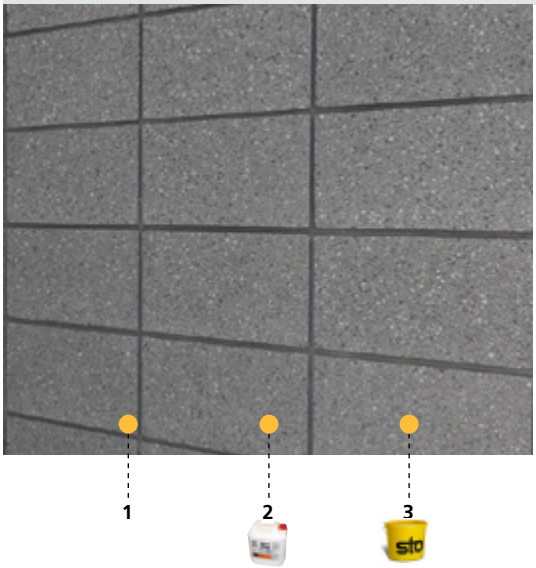
This deep penetration also provides protection against UV light degradation and mechanical wear that often destroy other treatments such as Silicones and Siloxanes based solutions that do not penetrate as deeply and are often weakened by environmental stress after a few years.

StoProtect is formulated for concrete masonry blocks as a film-forming clear coating to coat the porous block faces and mortar joints to provide an elastomeric coating system to resist mortar joint fractures that can occur during the block curing process especially on stack bonded blocks.

StoClear Coating Systems

Natural concrete protection

StoProtect Clear Coating System for Masonry Block



Perfect interaction

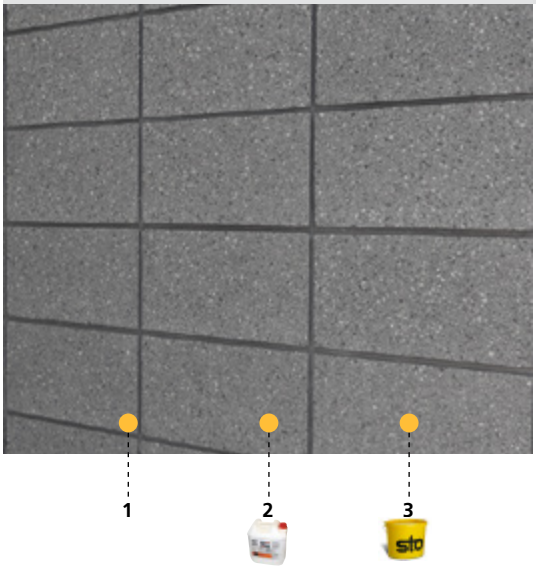
1 **Architectural & Natural Concrete Block Construction**
Clean, dry & stable masonry concrete block surfaces.

2 **S-Protect WS405**
European manufactured water repellant silane sealer.

3 **StoProtect Transparent**
European manufactured durable, UV resistant waterproof coating.

- Compliant with CCANZ CP 01:2014.
- Waterproof coating.
- Natural finish.
- Easy to maintain.
- 7½ Year StoWarranty with StoService Assurance.

StoProtect Clear Coating System for Masonry Block (Wet look)



Perfect interaction

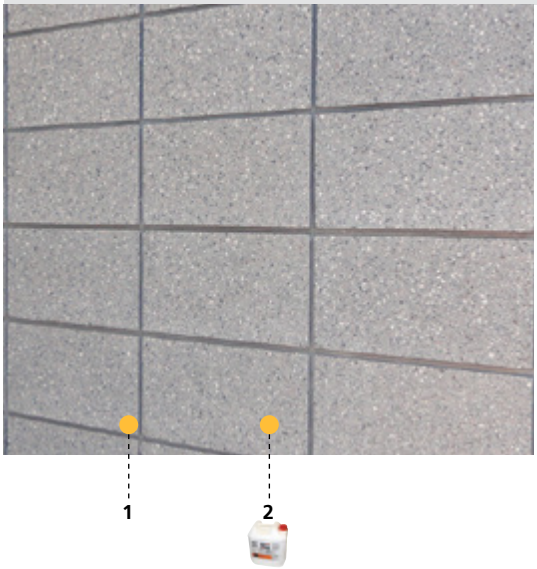
1 **Architectural & Natural Concrete Block Construction**
Clean, dry & stable masonry concrete block surfaces.

2 **StoPur WV100**
European manufactured water-based polyurethane sealer.

3 **StoProtect Transparent**
European manufactured durable, UV resistant waterproof coating.

- Compliant with CCANZ CP 01:2014
- Waterproof Coating
- Natural Finish
- Easy to maintain
- 7½ Year StoWarranty with StoService Assurance.

S-Protect Silane System for Masonry Block Veneer (Invisible look)



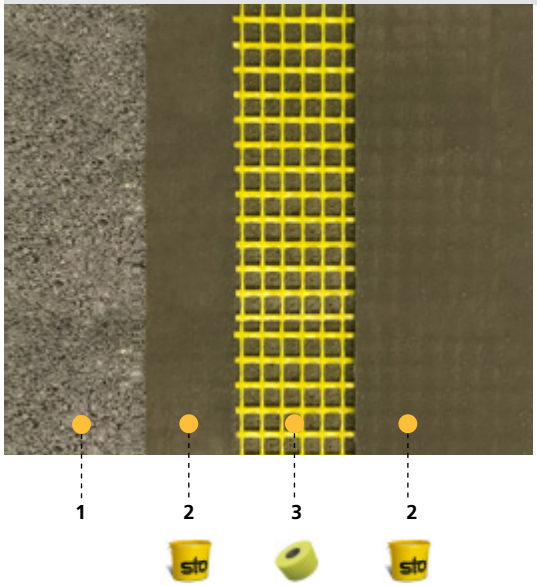
Perfect interaction

1 **Architectural Block Veneer Construction**
Clean, dry & stable masonry concrete surfaces.

2 **S-Protect SC Stay Clean**
European manufactured invisible silane treatment to repel liquid and water immediately with most contaminates washing off naturally.

- Highly reactive with masonry surfaces.
- Invisible stay dry treatment.
- Naturally self cleaning.
- 7½ Year StoWarranty with StoService Assurance.

StoFlexyl Waterproof Membrane System



Perfect interaction

1 **Masonry Construction**
Clean, dry & stable masonry concrete surfaces

2 **StoFlexyl**
An organic, flexible, highly waterproof membrane coating (mixed with cement).

3 **Sto Glass Fibre Mesh**
Easy to install, meets the highest requirements for crack, stress and alkalinity resistance.

- Waterproof membrane for window and door openings, building cappings, foundations and below ground level work.
- Evaluated by BRANZ to meet AS/NZ 4858 as a waterproof membrane as required for E2/AS1 & CCANZ CP:01.

Note:
StoPur WV 200 transparent coating system, a transparent waterborne polyurethane resin coating for concrete construction, is available on request.

The StoWarranty with StoService Assurance programme gives you peace of mind knowing you are protected.

With a legislated emphasis on building maintenance, StoService Assurance offers a simple way for property owners to demonstrate they have met their maintenance obligations.

StoService Assurance is administered by Sto and carried out by the Sto Contractor at the owners expense. It includes checks, cleaning and minor repairs of the StoClear Coating System with advice for building owners on any additional maintenance requirements. The service check provides assurance that the StoClear Coating System has been serviced, and is continuing to perform, protecting you and your property investment.

Sto Head Office

Wellington
Stoanz Ltd
72 Abel Smith Street
Wellington, New Zealand
Phone +64 4 801 7794
Fax +64 4 384 9828

General Enquiries
Phone +64 4 801 7794
info@sto.co.nz
www.sto.co.nz

Auckland & Northland
309 Rosebank Road, Avondale
Auckland, New Zealand
Phone +64 9 522 1058
Fax +64 9 522 1054

Central North Island
Phone +64 4 801 7794
Mobile +64 27 299 9290

Christchurch & Upper South Island
47A Waterloo Road, Hornby
Christchurch, New Zealand
Phone +64 3 338 3570
Fax +64 3 338 3571

Lower South Island
Phone +64 4 801 7794
Mobile +64 27 453 686

Viblock Ltd

Christchurch
11 Matipo Street,
Riccarton, New Zealand
Phone +64 3 343 0394

Alexandra
McPherson Road,
Earnscleugh, New Zealand
Phone +64 3 4493140

sales@viblock.co.nz
www. viblock.co.nz

Specialized CONSTRUCTION PRODUCTS LTD

PANEL

INSTALLATION GUIDE

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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INTRODUCTION

The EZpanel System is a cavity based autoclaved aerated concrete (AAC) panel system which when finished with a layer of fibreglass reinforced polymer modified cement plaster creates a lightweight, highly durable exterior cladding. As well as providing advantages to the exterior envelope by way of increases in impact resistance and performance during fire, EZpanels will not rot, are pest resistant and have excellent sound insulation properties. The exterior nature of the EZpanels also places their fantastic insulation characteristics as close as possible to where temperatures fluctuate reducing ongoing energy consumption compared to most conventional exterior wall systems.

The system is applied over a 20mm cavity. The system is fully flashed around all penetrations to ensure water doesn't enter the cavity. Unlike wet cavity systems, this negates the need for vents through the panels both above windows and under soffits as is required for plastered brick veneer construction.

All the UPVC flashings, fibreglass mesh, resin and plaster components used for the EZpanel System must be supplied by Specialized Construction Products Ltd or one of its Certified Distributors.

The EZpanel System has been tested and appraised for use throughout New Zealand.

This Manual has been set out as near as possible to the actual construction sequence. Preparation, fixing the EZpanels to various types of framing and backgrounds, sealing the joinery and masking out, preparation of EZpanels prior to plastering and finally the plaster techniques and sequences. This guide must be read in conjunction with the detail data sheets for the EZpanel System.

FRAMING SET OUT (Timber or Steel)

Timber framing must comply with NZS3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. In all cases studs must be set out at 600mm maximum centres. Dwangs/nogs must be flush fitted at maximum 800mm centres. Check that all soffit junctions, openings, wall/roof junctions and foundation details have support for the panel edges. Timber framing must have a maximum moisture content of 24% at the time cladding commences.

For steel framing the minimum framing specification is 'C' section studs and nogs of overall section size 75mm web and 32mm flange. Steel thickness must be a minimum of 0.75mm

BUILDING WRAP

A building paper or wrap complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal must be used in all circumstances. Building wrap must be installed horizontally and be continuous around corners. The wrap must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Where studs are at greater than 450 mm centres, polypropylene strap or additional vertical cavity battens must be installed at maximum 300 mm centres to prevent bulk insulation bulging into the cavity. Flexible sill and jamb flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11 or flexible sill and jamb flashing tapes covered by a valid BRANZ Appraisal must be used around all penetrations. All penetrations must have internal air seals applied.

HEAD FLASHINGS
Proprietary head flashings with minimum ventilation openings of 1000mm^2 per lineal metre must be installed over all window heads and door openings. If proprietary head flashings cannot be used, an acceptable alternative flashing must be provided. Please contact Specialized Construction Products Ltd for advice.

FLASHINGS IN GENERAL
Joists designed to carry decks need to have a continuous flashing fitted before the EZpanels are fixed. Check if there are any special back-flashings required where the EZpanel joins another substrate or curtain wall construction.

ROOFING
Where areas over roofs need to be plastered, the roof/wall flashing, including stop ends where required must be installed by the roofing contractor prior to the commencement of cladding.

PIPES & METER BOXES
It is critical that pipes are flashed appropriately in accordance with E2/AS1, Fig 68. All pipes must have the building paper turned to the outside of the building and have the building paper taped to the pipe. All pipes must have a downward rake of 5° minimum and must be sealed in place using Silaflex MS or another approved equivalent both before plastering and after the installation of the EZpanel base coat.

All meter boxes must be installed according to the detailed drawings provided with the EZpanel system. A polystyrene wedge must be placed and sealed with a waterproofing membrane onto the top of the meter box and must be able to drain water unimpeded into the cavity behind the cladding.

Particular attention to detail and workmanship must be given to the weatherproofing details contained in the technical literature relating to flashing and sealing building penetrations or junctions with other building materials. All junctions between the EZpanel substrate and dissimilar materials must be correctly flashed and sealed with MS Silaflex or another approved equivalent. The MS sealant must be installed in strict accordance with the manufacturer's requirements and must be left to properly cure prior to plastering.

SCAFFOLDING
Don't accept second best. You need a continuous freestanding scaffold at least 300mm clear of the framing. Movable frames can be used, but you need enough to complete one whole wall at one time.

SITE STORAGE
Products in dry form must be stored in a dry area, off the floor on a timber pallet or timber dunnage and it must be protected from the weather and from mechanical damage. Rotate the stock to ensure that the oldest material is used first. Plaster stock that is older than six months should be discarded. EPS battens, uPVC flashings and profiles must be protected from direct sunlight and physical damage. They should be stored flat and under cover. Liquid components must be stored in a frost free area.

PREPARATION OF MASONRY & CONCRETE SURFACES
All nibs, protrusions and excess mortar on the surface of the bricks/blocks or irregularities in the slab must be ground off prior to plastering.

All surfaces to receive an application of the EZpanel System must be clean and free of debris, dirt and dust, efflorescence, grease, oils, curing agents, cleaning solutions, mould and algae or

any other contaminants that may affect adhesion. Painted or glossy surfaces must be specially treated prior to the application of any plaster material, please refer to Specialized Construction Products Ltd for specialist advice before you proceed. All cracks that may be the subject to ongoing movement must be correctly repaired and reinforced.

Some smooth, dense concrete surfaces must be slush coated before the application of the EZpanel with Tankit bonding plaster to ensure suitable adhesion is created, please refer to Specialized Construction Products Ltd for specialist advice before you proceed. Tilt slab and other precast concrete items should be chemically cleaned with a water blaster to ensure any mould release agents are removed before the plaster is applied. All very porous surfaces should be sealed with an appropriate paint sealer prior to the application of the bonding plaster. Failing to correctly prepare the masonry substrate, may affect the aesthetic appearance of the finished wall.

Do not wet down masonry surfaces before plastering and do not apply base coat plaster to surfaces that are wet from rain or overnight dew.

FITTING EZPANEL BATTENS

EZpanel battens are manufactured from ultra high density (Class UHD) expanded polystyrene with an approximate density of 28kg/m^3 and measure 21mm x 45mm. They must be stapled to the framing in accordance with the batten layout shown in the detail data sheets. Additional vertical battens are required at internal and external corners and openings. At the soffit and external corners the airflow must be blocked off and gables must be lined or incorporate an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Non-rigid air barriers must have an air resistance of ≥ 0.1 MN s/m^3. Where rigid sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing. Horizontal battens must be a maximum length of 100mm long in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f) and must be stapled into place on all noggins/dwangs where required for fixings with a minimum of a 5 degree angle on the top edge. The fewer horizontal battens that are used the better.

FITTING SILL AND JAMB FLASHINGS

The use of the EZpanel UPVC sill and UPVC jamb flashings are **MANDATORY**. It is also **MANDATORY** that the sill and jamb flashings are joined and in the corner with an EZpanel corner socket using Marley uPVC pipe cement.

Begin by marking and cutting your sill flashing so that it extends 4-5mm past either end of the aluminium joinery (i.e. overall 8-10 mm wider than the window). Once the sill is cut, wipe the left hand end with pipe cement and slide it onto the prongs of the corner socket. Next wipe the right hand end with pipe cement and slide on the right hand corner socket. Slide the socket into place under the window flange and staple it into place as you did with the other end. Next cut your jamb flashings 40mm longer than the length of the window and cut the capillary lip off the top so that the top edge will finish flush with the top of the joinery when it is slid into place (i.e. overall the jamb should protrude approximately 40mm above the top of the window). Once the jambs have been cut and test fitted, choose one side and wipe the top of the corner socket with pipe cement. Immediately tuck the capillary lip of the jamb flashing behind the flange of the joinery and slide the jamb down into place onto the top of the socket and then repeat the same set of instructions for the other side. When the jambs are in place cut your head flashing 10mm wider than the joinery and staple this into place. Once firmly in place, seal the head flashing onto the jamb flashing using Silaflex MS sealant. Once all the flashings are in place seal the jamb flashing to the joinery in the 5mm gap provided by the small block on the jamb flashing and then seal the corner socket to sill flashing. You must also run a bead of sealant along under the joinery to seal the vulnerable gap where the sill flashing meets the joinery

Sealing around windows is one of the most critical operations for the success of the EZpanel system. The data sheets detail in pictorial terms how the instruction above should be carried out. Follow these details explicitly**.**

Basic principles to apply when sealing your windows:-

1. Don't be mean with your application of sealant or pipe cement. All beads of sealant must be 5mm across.
2. The sealant has to have a reasonable area to seal against so make sure the background is clean and dry
3. Always lightly tool or spread your sealant into place with your finger.

SOFFITS

Soffits shall be fixed into place before the cladding is installed and allowance made to close off the cavity with framing or battens to stop airflow into the roof space. A 5 mm bead of Silaflex MS sealant should be installed at the soffit/EZpanel intersection after the EZpanel is put in place and before plastering commences. In the case of reverse raking soffits or soffits less than 450mm wide a flashing or piece of Protecto EIFS tape shall be provided in accordance with the details shown in the technical literature.

FIXING THE EZPANELS

The sheets are butt jointed except at corners where one sheet overlaps the other to form a straight finish. The EZpanels must be supported at fixing locations with cavity spacers a maximum of 100mm long in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f). Each additional layer of panels must be installed so that the panel joints are staggered by a minimum of 150mm.

All panels must have their edges and there ends buttered with either Holdfast ‘Gorilla Grip’ 2 hour or Sika ‘Super Grip’ 2 hour glue as they are being installed. The edges of all of the EZpanel sheets must be free of all dust and debris (preferably blown down with compressed air) and should be sprayed down with a mist of water straight before the glue is applied. The glue should be laid in a bead approximately 6-8mm in width before the next sheet is laid onto its edge. This practice should be done as quickly as possible to ensure the glue remains as pliable as possible to aid in the adhesion of the panels. Care must be taken when applying the glue to ensure it does not ooze either into the cavity or onto the outside of the dwelling. Once the panels have been joined and screwed into place any glue excess that oozes out of the joints between the panels should be wiped off or cut from the surface before it has fully cured. The glue must be allowed to dry before the application of the mesh coat.

Care should be taken to carefully cut any irregular shaped holes that may be required. A jigsaw with a steel tooth blade is ideal for this purpose. It is not acceptable to simply cut a square hole for a round outlet and then assume the remaining gap will be plugged with plaster. Gaps and holes in and between the panels must only ever be filled with Ezstop Plaster and must not be filled with expanding foam. The differential thermal characteristics of the expanding foam and the AAC panels will generate a weak point in the system that can be susceptible to thermal cracking.

At the base of walls the finished level of the EZpanel must be <u>at least</u> 50mm below the supporting framing. Additional framing will be required at soffits, internal and external corners and window and door openings for the support and fixing of sheet edges.

Construction joints must be provided as follows:

Horizontal Control Joints – at maximum 6.0m centres and at inter-storey floor levels where unseasoned timber floor joists are used

Vertical Control Joints – at maximum 8.0m centres; aligned with any control joints in the structural framing, or where the system abuts different cladding types

Care should be taken with the chosen placement of control joints. To avoid difficult multi-faceted joints between the various PVC extrusions used in the EZpanel System, control joints should be placed away from the edges of joinery by a minimum of 400mm. Placing control joints directly above and below the joinery creates a weak point where the PVC's intersect that could lead to potential water ingress if not maintained or excessive movement occurs.

Construction joint details are provided in the drawings provided with the system. Inter-storey drained joints must be provided for walls over 2 storeys in height in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4(b). Inter-storey junctions must be constructed in accordance with the technical literature.

The bottom edges of the EZpanels can either be capped with a 50mm High Back U-Channel which is attached to the bottom plate of the dwelling prior application or with a 50mm lipped base bead once they have been fixed into place and trimmed as may be necessary.

TIMBER FRAMING

There are four categories listed in NZS 3604: Low, Medium, High and Very High. The 'Building Wind Zone' for the job to be completed must be clearly understood before the application of any plaster.

EZpanel panels are fixed through the cavity battens and spacers to the studs with either 100mm long AS 3566 Class 4 galvanised or Grade 316 stainless steel screws supplied by Specialized Construction Products Ltd or their agents. Typically the screws are placed into the panels 150mm from the outside edge giving overall fixing centres of approximately 300mm. Two screws should be put into each stud and one into each nog or dwang. The screws should be applied at 200mm centres into the entire base plate around the exterior of the dwelling.

Refer to the table below for fixing centres.

NZS 3604 Wind Zone Fixing Centres for EZpanel Edges and Intermediate Studs	
Low	300
Medium	300
High	300
Very High	300

Around openings, screw off at 200mm maximum centres around all windows and doors. This ensures any possible movement between the joinery frame and the finished EZpanel is greatly reduced.

STEEL FRAMING

The same fixing centres apply as for timber framing. Use Specialized Construction Products Ltd self-drilling 100 mm long AS 3566 Corrosion Class 4 self-drilling screws with a head diameter of

14 mm and a shank diameter of 5.1 mm in NZS 3604 defined Corrosion Zones 1, 2, 3 and 4 and Grade 304 Stainless Steel in the sea spray zone.

CONCRETE & MASONRY

(Note: This application is outside the scope of the BRANZ Appraisal.)

To bond EZpanel to masonry surfaces mix up Specialized Construction Products Fine Base Coat plaster with the addition of 1 litre of Specialized Construction Products resin per bag. Cut the EZpanel to size and check the fit. All of the EZpanel to receive a coat of Fine Base Coat must be properly sealed prior to the application of the plaster. To seal the panel a mix of 2 parts water to 1 part Specialized Resin must be painted over the surface and allowed to dry before bonding commences. Failing to correctly prepare and seal the aerated concrete substrate may cause delamination or failure in the to the masonry substrate. Once sealed apply the Fine Base Coat plaster to the back of the sheet with a grooved trowel around the perimeter and in vertical strips every 400mm. If there isn't a rebate in the concrete slab, EZpanel masonry anchors must be used to hold the sheets in place while the plaster is drying and to provide a mechanical fix for the EZpanel. Bed each sheet back against the wall, keeping a check that the sheets are flat by using a straight edge across their face. To ensure no thermal bridges are formed keep all the edges closely butted and clear of adhesive plaster.

FINISHING THE EZPANEL

Around the base of the building ensure all lines are straight and level. Trim and adjust where necessary.

Use a two metre straight edge and check the flatness of the EZpanel surfaces. Use a Durarasp to sand off any large irregularities or Specialized's 'Ezstop' plaster to fill any large hollows in the surface of the EZpanels to ensure the surfaces are level and the corners and edges are straight. When sanding and/or skimming is complete, sweep the walls clean of any loose material or dust.

Only once you are satisfied with the flatness of the EZpanel and the lines of the edges, fix any additional uPVC beading (i.e. uPVC corners and base U-channels) and seal around the perimeter (i.e. under the soffit).

FIXING THE UPVC BEADS

All exposed EZpanel corners and bottom edges must be protected by gluing on the appropriate uPVC section. Your detail drawings show what bead goes where.

The beads are glued on with Sika Nailbond PB Adhesive. Apply glue to all contact surfaces. With the cartridge glue, slide each uPVC bead along the EZpanel edge to spread the glue, pull away slightly for 20 seconds, and then slide into place. This spreading of the glue and allowing a few seconds for the solvents to "flash off" is very important. If you don't, the bead can come unstuck. Be careful not to cover the drainage holes punched in the base extrusions with glue.

Once all the uPVC beads are fitted, prime the uPVC with a mixture of undiluted resin and dry fine base coat plaster. Make a sloppy mix and paint on. This key coat is very important as it ensures the plaster mix sticks to the uPVC.

MASKING

Careful masking of windows, doors, roofing, decks and any other areas where plaster overspray or plaster droppings may occur is critical. Don't be mean with your protection work as it is a very costly exercise to replace roof areas and glazing because your masking wasn't up to the job. Use uPVC or vinyl tape for masking, wet strength masking paper or preferably plastic sheet material.

1. Mask out windows or doors completely to the edge of the aluminium. This will provide a nice finishing line for the 5mm sealant detail. Mask all other areas 5mm away from the edge of the EZpanel to allow for plaster build-up. Use uPVC, cloth or vinyl tape around the perimeter.

2. Don't be tempted to use the paper-backed masking tape where it will get plastered over. The tape softens and falls off.

3. After the mesh/plaster coat or subsequent base coats (not the final texture coat) remove excess plaster by running your finger around the edge masking tape, and then clean the wet plaster edge with a damp paint brush. This ensures the masking tape isn't buried under hard plaster.

EZPANEL PLASTER PREPARATION

The instructions for mixing are clearly spelt out on the bag. **Note:** During summer, you can add one litre of resin per bag to help the plaster cure better in hot weather.

It is important that each mix stands for approximately 10 minutes, and is then re-stirred and the final consistency adjusted. This allows the thickening agents in the plaster to take effect and stops the brew becoming too thick too quickly. Do not use plaster that has been mixed for more than one hour. The plaster will continue to stiffen slightly over the hour.

If you are spraying fine base coat plaster to provide a textured finish it is acceptable to add small amounts of water to maintain a regular consistency. In fact if you don't keep the plaster mix adjusted with a little water every now and then, your texture coat will vary. Clean your hopper gun, stirrer and bins between mixes. This will stop you getting contamination in fresh mixes, and will keep your gun spraying evenly.

WATERPROOFING SILL EXTRUSIONS

Prior to any window reveals being plastered all PVC sill extrusions should be coated with a minimum of 2 coats of Tankit waterproofing membrane extending a minimum of 50mm onto the surface of the wall and 100mm up the jamb flashing. Tankit must be applied in 2 coats and must have a minimum dry thickness of 800µm. Application is typically made using a brush or medium nap roller. Alternatively if it is mixed to a stiff consistency Tankit can be trowelled into place using traditional techniques.

STOPPING UP

After the EZpanel has been sanded flat and cleaned down, the UPVC flashings are in place and primed/tanked, the windows are sealed, and all the masking is complete, plastering can commence. Using a hawke and trowel, or broad knife and EZstop plaster; fill all the screw head holes, stop up and level out the edges of all uPVC beading and fill in any remaining out of level areas of sheet joints. It is important not to "over-stop" screw holes or joints. Don't leave thick edges of plaster because they will “grin through” the finished work.

PLASTER AND MESH COAT

The areas around all penetrations should be completed first using EZpanel Base Coat to bead the soft flexible 160g/m^2 alkali resistant mesh that is attached to the penetration flashings. A piece of soft mesh must be used to reinforce the head flashing onto the surface of the panels and in the corner of any penetration where the sills and jambs meet. Make sure the plaster is scraped hard back to the EZpanel on the outer edges of the mesh. Once all the window reveals, parapet tops and backs, bottom edges and other awkward areas have been completed using the soft flexible narrow mesh, all the flat areas of wall should be done using a 160g/m^2 alkali resistant hard mesh combined with EZpanel Base Coat plaster.

EZpanel Base Coat plaster is usually trowel applied with a long 20" x 4" or 20" x 5" steel trowel. The large trowel ensures the first coat of plaster can't be squeezed out too thin.

1. Start at the corner of a wall. Check all masking is done and drop cloths are in place. Plaster a full height section of wall about one and a half metres wide (the width of the mesh). You are aiming for 3mm thickness with this first coat.

2. Cut a length (drop) of mesh slightly longer than the wall area to be covered. Place the mesh against the wet plaster at the top of the EZpanel. The outer corner edge of the mesh must be 100 to 200mm past the corner of the wall.

3. Wipe the mesh very lightly at first into the plaster, starting at the middle and working out. Make sure there are no bubbles or wrinkles in the mesh. Once the mesh is flat against the plaster, apply an even trowel pressure and embed the mesh just below the surface of the plaster. Do not force the mesh hard down onto the surface of the EZpanel. The mesh pattern should be "grinning" through, but the mesh itself completely covered with plaster.

4. Apply a 100 to 200mm band of plaster around the corner and embed the overhanging corner mesh. Once embedded scrape away the plaster at the edge of the mesh to ensure there is no plaster ridge there when you join on later.

5. Repeat the process. Drops of hard mesh do not have to overlap but should be tightly butt joined. If the mesh isn't going to be overlapped any butt join that is created must offset any vertical join in the panels by a minimum of 150mm. The mesh and plaster coat must cover all EZpanel surfaces including the EZpanel edges around all window reveals and sills.

6. At the corners of all openings, apply a second layer of mesh 100 x 200mm (butterfly) embedded on the diagonal. This greatly reduces the chance of any subsequent cracking at these high stress points.

FINISHING OPTIONS
There are three options once the first mesh and plaster coat have been applied:-

Option 1: Stucco Texture
Fine base coat plaster can be sprayed through a hopper gun or a sagola gun to achieve a heavy stucco plaster finish.

Each 20kg bag of Fine base coat plaster is mixed with approximately 5 litres of clean drinking water. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it a quick restir before application and adjust the final consistency if it is necessary.

The object is to spray on a "wet" second coat of plaster 1 to 2mm thick that will flow together to form a solid flat looking texture coat. The technique could be likened to spray painting where you move on once you have achieved a "wet" finish. Fine base coat plaster mixed wetter than for a mesh coat, sprayed through a hopper gun with a 9mm tip is best for this type of texture.

Once the first spray coat is starting to "tack-off" or going grey dry, you can start to apply the final texture coat. The plaster mix for this third and final coat is about the same as for the mesh coat or slightly stiffer and is known as a "flick coat". The object is to have a plaster mix that won't run together like the previous coat. Use a 7mm nozzle.

The final texture coat is only meant to be a quick flick. The “flick-coat” will even out any discrepancies and provide a uniform texture finish. You will only use approximately 20% of the amount of plaster you used to do your first coat of spray texture. Spray part of this final texture in horizontal bands and part in vertical bands to ensure a uniform even finish. Do not stay too long in one area, as the texture coat will flow together, causing patchiness.

Always texture the external and internal corners first before doing the adjacent large wall areas. It is also good practice to spray the reveals around windows from the inside out and then fill in the areas of wall between these places.

A stucco spray texture must be finished with two coats of Plastershield100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

Option 2: Float Finish

Float Finish is a polymer modified cement based plaster which is polished flat to achieve a fine granular finish. The smooth plaster will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day.

Each 20kg bag of Float Finish is mixed with approximately 5 litres of clean drinking water. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it a quick restir before application and adjust the final consistency if it is necessary.

On large walls float finish should be applied by two or more people to ensure a wet edge is maintained. Float finish must be applied in two coats to ensure an even texture is achieved. Begin by trowelling on one tight coat of the float finish plaster with a large steel trowel using the aggregate in the plaster to establish the thickness. Once the first coat has dried, trowel on another coat of the same material (mixed to a slightly thinner consistency) over its surface. As soon as this coat has been laid down with the steel trowel flat, begin polishing its surface with a hard plastic float in a circular motion. This will cut the surface of the wall flat. Regularly clean the excess plaster off the plastic float with a broad knife to reduce the potential for swirl marks. If the plastic float is picking up too much material or is leaving swirl marks on the surface, this indicates that the plaster has not been laid on tight enough with the steel trowel. Finish with a gentle polish of the surface with the plastic float to minimise any slight swirl marks or surface irregularities. Every now and again stand back a couple of metres from the wall and inspect your work to ensure an even finish is being achieved.

Float finish can either be left as it has been finished with the plastic float or while it is still wet (but firm to touch), normally only 5 minutes after application, it can be polished with a damp sponge to close the pores in the texture. Polishing the surface of the walls with a sponge will also remove a small amount of the fines in the plaster giving the wall a grainy look.

Float Finish must be finished with two coats of Plastershield 100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

Option 3: Spanish Finish

Spanish Finish is a polymer-modified, cement based plaster used to achieve an undulating adobe style finish. This product can be applied in various thicknesses and using a number of different techniques. Before finish coating begins ensure the style of finish that is desired has been correctly communicated and understood by the plasterer. A trial sample is highly recommended.

Each 20kg bag of Spanish Finish is mixed with approximately 5 litres of clean drinking water. Once you have established how much water gives you the consistency you want, maintain this measured amount of water for the rest of your mixes. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it a quick restir before application and adjust the final consistency if it is necessary.

The finished thickness of the Spanish Finish must be between 2 to 10mm.

To achieve an uneven application of the Spanish finish use a short steel trowel and apply the plaster in a random fashion using a good amount pressure. Avoid excessive movement of the plaster under the trowel once it has been applied to the wall, otherwise you run the risk of delamination. Allow a little time for the plaster to 'suck off' and then polish all the sharp marks out of the surface using a damp sponge.

If a very thick layer of Spanish finish is being applied for a heavy pattern, wiping over the undulations using a wet soft bristled paint brush can help to soften the surface before it is sponged.

Spanish Finish must be finished with two coats of Plastershield100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

CURING

The curing time of finishing plaster will vary due to ambient temperature, relative humidity, surface temperature, surface porosity, application methods, and/or the thickness of the material. All freshly applied material must be protected from inclement weather for a minimum of 24 hours after application. It is the responsibility of the plaster applicator to determine if the product is cured and/or dry prior to applying any additional coats that may be required or exposing the applied product to rain, snow, dew, and/or any other inclement weather condition that may have a detrimental effect. Although all the finishes contain cement and will not fully cure for 28 days, as long as it is lightly hosed down with fresh water 12 hours prior to painting, it can be painted after the finish coats have cured for a minimum of 3-4 days.

PAINT SPECIFICATION

One of the following paint systems must be used over the EZpanel finishing plasters to make the system weathertight and give the desired finish colour to exterior walls.

Plastershield is a 100% acrylic-based paint that has been specially formulated for use over cement based plasters. Plastered surfaces must be coated with a minimum of 2 coats of Plastershield tinted to the selected colour and applied by brush and roller at a spread rate of approximately 6m^2/litre.

As an alternative to Plastershield, a latex based exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 may be used. The paint system must be applied in accordance with the paint manufacturer's instructions.

Other paint systems are not covered by this specification sheet and Specialized Construction Products Ltd will not warrant the use or suitability of alternative paint systems over the surface of its plaster finishes.

The chosen paint system must have a Light Reflective Value (LRV) of no less than 25.

LIMITATIONS

DO NOT apply plaster when the ambient or surface temperature is below 4ºC or above 30˚C or will be in that range for the 24-hour period after application. When hot, dry, or windy conditions exist, moist curing and protection must be provided. Material that is allowed to freeze or material that dries too quickly may suffer irreparable damage.
DO NOT add any other materials to the plasters used with the system or deviate from the mixing or application procedures outlined in any of Specialized Construction Product's technical data sheets without written approval from Specialized Constructions Products Ltd.
DO NOT apply any plaster unless the substrate has been properly cleaned and prepared.
DO NOT add any more water than prescribed by the technical data sheet for the individual products.
DO NOT wet the wall prior to the application of any plaster material.
DO NOT reactivate any plaster with more water once it has begun to set.
DO NOT mix more plaster than you can use in 45 minutes

NOTE:
Failure to follow the manufacturer's written specifications could result in the following but not limited to spalling, cracking, peeling, chipping, delamination, discoloration, wash off, and overall system failure.

GENERAL

1. Use longer steel trowels rather than short ones. The longer trowel covers the area quicker and gives a flatter finish. A long trowel will stop workers from skimping on plaster, as they are unable to push the mesh back into a thin coat of plaster. This helps quality control.

2. Have plenty of plaster buckets and water buckets on the job. Keep a 3" paint brush and water bucket handy for finishing those narrow edges and corners.

3. When applying a stucco texture keep your hopper gun clean and adjusted and your compressor pumping out 90 to 100 PSI. Remember once or twice every day to clean out your air jet with a 1/8" drill bit. A piece of wire or nail will not do this job and is unacceptable.

4. When you are spraying, maintain your plaster mix consistency as you use the plaster. Add a **little** water when you feel the plaster has stiffened a little. This is critical for a good texture coat. Do not attempt this with plaster that is older than 30 minutes.

5. Organise your day to try and keep out of the hot summer sun particularly round the middle hours of the day.

6. Try and complete a full length of wall in one go, otherwise it can be difficult to disguise the "cold" joint where you restart the next day. If circumstances prevent you finishing a complete wall, try and stop under the middle of a window opening or something similar. Ensure that you leave a leading edge of mesh uncoated so that you can overlap the new drop of mesh the next day. Also scrape off any excess plaster to further reduce the chances of the "cold" joint showing.

7. The fibreglass mesh must not bridge over any construction joints.

8. There must be no horizontal surfaces of EZpanel wall cladding which will be subject to water ponding.

9. Ensure there is no possibility of water leaking in behind the coating due to poor sealing around projections, etc.

10. Any exposed top or bottom edges of sheets must be protected by UPVC beads or by continuing the fibreglass mesh and plaster system over the edges of the sheets.

11. Carefully peel back masking tape so that the masked edge is left undisturbed. Remember, it is important not to leave this job till last. Pull off masking tape as soon as is practicable, preferably while the finish coat is still "green". This will enable you to clean all masked edges with a dry paintbrush and remove/knock off any larger dags of plaster texture.

12. Alkaline EZpanel plaster will mark aluminium joinery and "Colorsteel" roofing. Any overspray must be cleaned off immediately.

MAINTENANCE

Any paint film damage must be repaired as soon as possible to prevent water penetration and ensure that the high strength properties of the fibreglass mesh are maintained.

Any impact damaged areas must be thoroughly cleared of any loose material and repaired with a 1:1 mixture of resin and water mixed with the required amount of EZpanel plaster. This will ensure a positive bond between the original plaster and the repaired area. Repaint within the following week.

The wall cladding system should be regularly cleaned, at least annually, by washing with clean water to remove dirt and to maintain the finish appearance. Grime may be removed with warm water and detergent.

Plastered walls should be recoated with an approved paint system at 5 to 8 yearly intervals or sooner if required to maintain watertightness. Regular checks, at least annually, must be made of the system to ensure that the weather resistant coating is maintained watertight, and that the sealant, flashings, and other joints continue to perform their function and do not allow water to penetrate. Failure to correctly maintain the system may void any long-term warranties offered with the system. Any accidental damage to the cladding must be repaired immediately using Specialized Construction Products materials.

WARRANTY

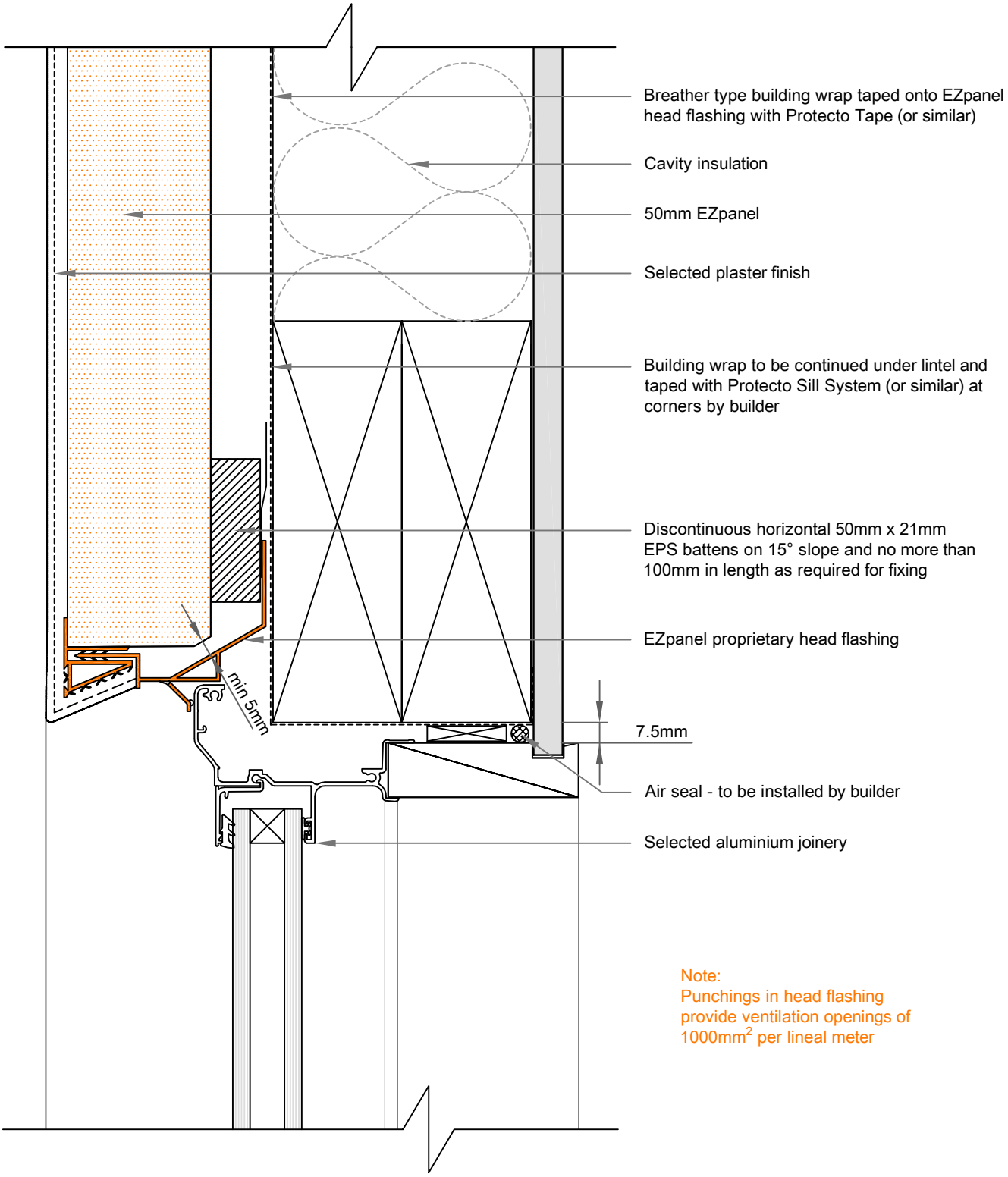
The recommendations, suggestions, statements and technical data provided by Specialized Construction Products Ltd are based on the best current knowledge available and are given for information purposes only without any responsibility for their use. It is expressly understood and agreed that the buyer's sole and exclusive remedy shall be the replacement of defective products, and under no circumstance, shall Specialized Construction Products Ltd be liable for incidental or consequential damages. Specialized Construction Products Ltd neither assumes, nor authorizes, any others to assume for it any liability with respect to furnishing of the product. Handling and use of the products are beyond the control of Specialized Construction Products Ltd; therefore, no warranty is made, expressed or implied, as to the results or on site quality that can be obtained from the use of the product.

The long-term durability of the EZpanel system is dependent upon the correct preparation and application of all of its components in strict accordance with all the relevant written instructions and detail sheets. On-site application is beyond the control of Specialized Construction Products' and it cannot guarantee workmanship or the correct preparation and application of its products

or systems. The licensed EZpanel contractor shall take the overall responsibility for on-site supervision, staff training, installation, and quality control.

EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



Note:
Punchings in head flashing provide ventilation openings of 1000mm^2 per lineal meter

01A
SCALE: 1:2

WINDOW HEAD DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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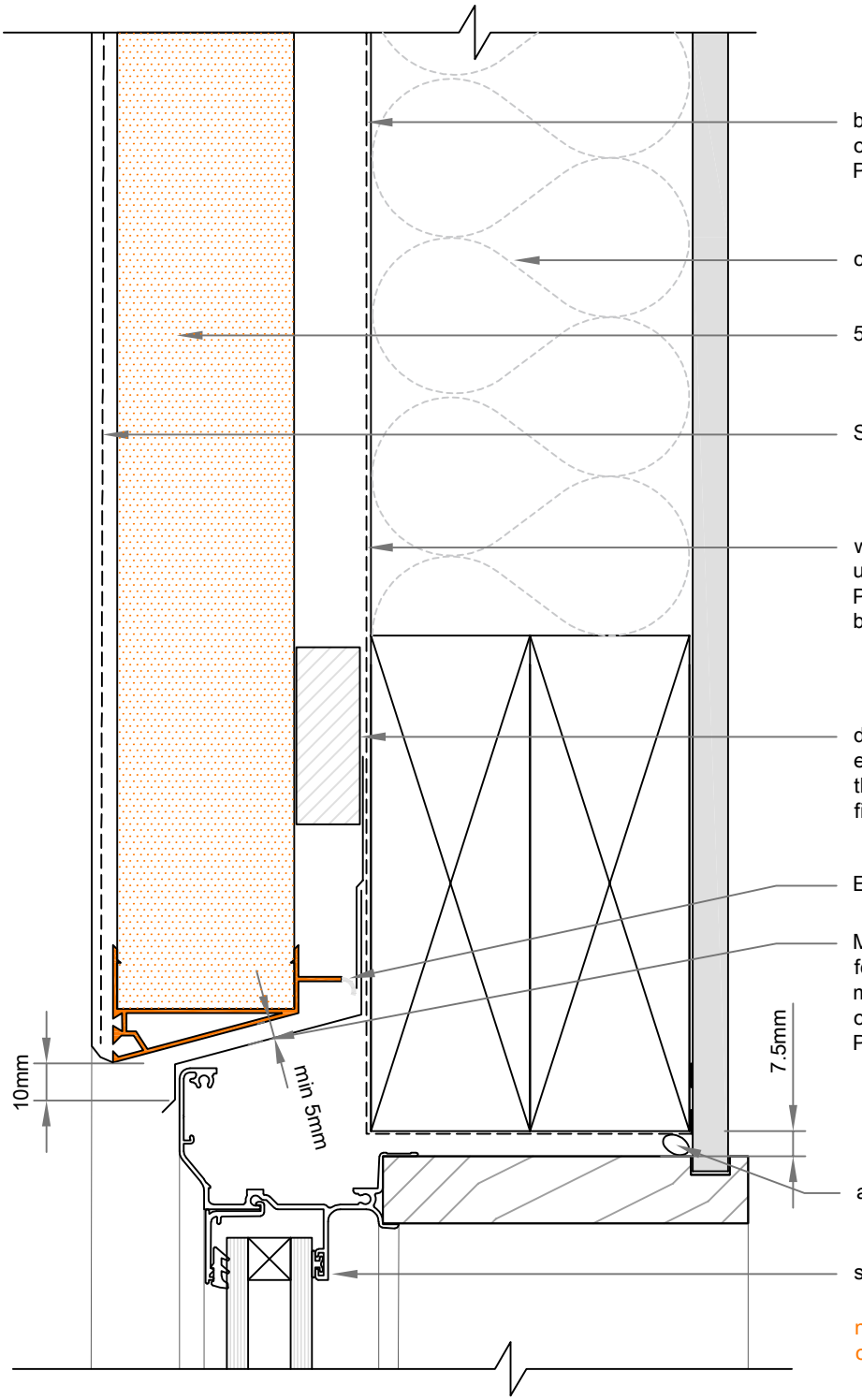
All Dimensions to be site checked before construction & installation

Feb 2020

EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



breather type wall underlay taped onto head flashing with Protecto Tape (or similar)

cavity insulation

50mm EZpanel

Selected plaster finish

wall underlay to be continued under lintel and taped with Protectowrap System (or similar) at corners by builder

discontinuous horizontal 50mm x 21mm eps battens on 15° slope and no more than 100mm in length as required for fixing

EZpanel proprietary base flashing

Metal head flashing with 15° slope with folded ends extending vertically a minimum of 25mm, to be supplied by others. Taped to buidling underlay with Protectowrap flashing tape (or similar)

air seal - to be installed by builder

selected aluminium joinery

note: punchings in head flashing provide ventilation openings of 1000mm^2 per lineal metre

caution: to ensure the proprietary jamb and sill flashings can be installed correctly, please allow a gap of 24mm from the surface of the building paper to the back side of the aluminium joinery.

01C WINDOW HEAD DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens & Head flashing

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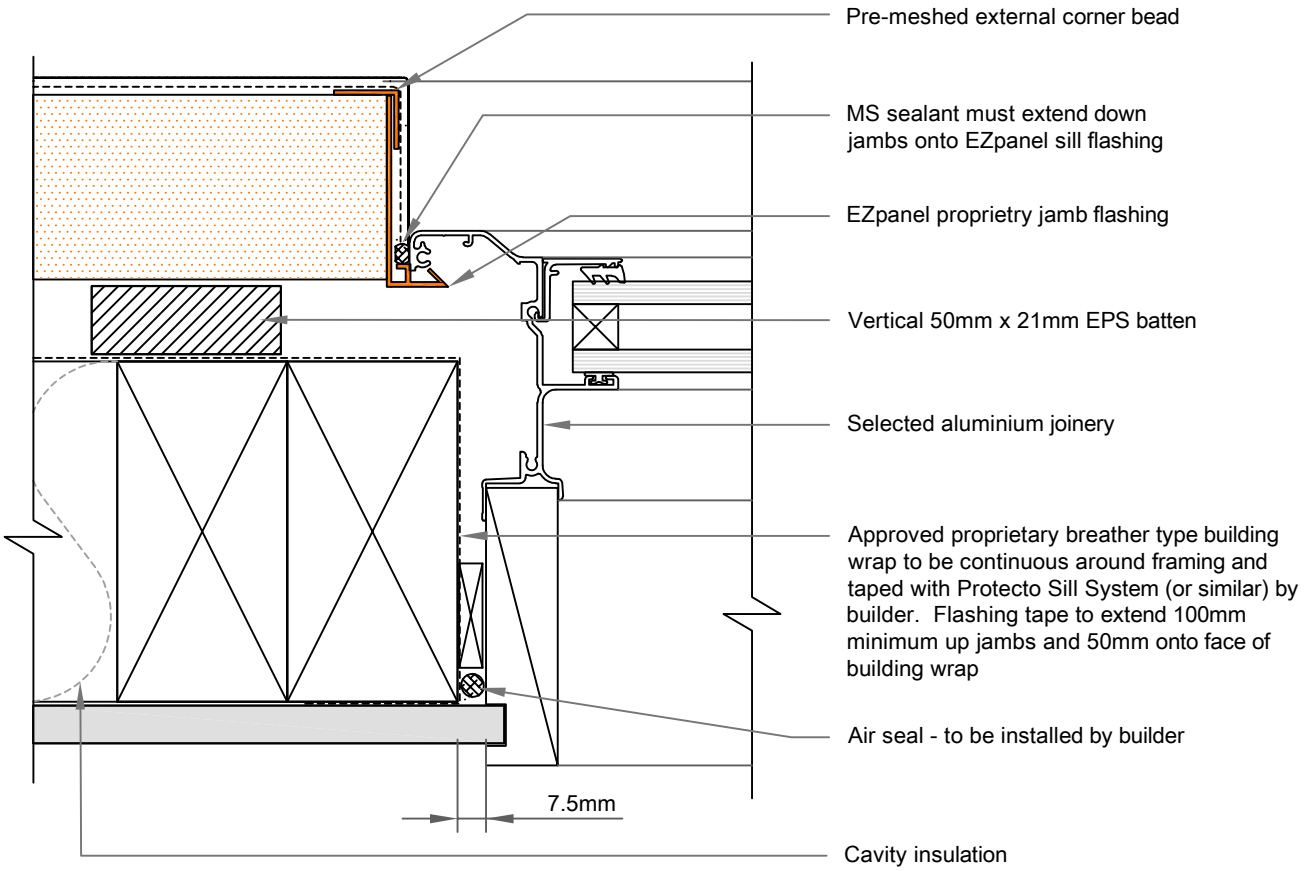
All Dimensions to be site checked before construction & installation

EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



Note:
Jambs and head flashing must be sealed or PVC welded where they intersect

Caution:
To ensure the proprietary flashing for this system can be installed correctly, please allow a gap of 24mm from the surface of the building paper to the backside of the aluminium joinery

02A
SCALE: 1:2

WINDOW JAMB DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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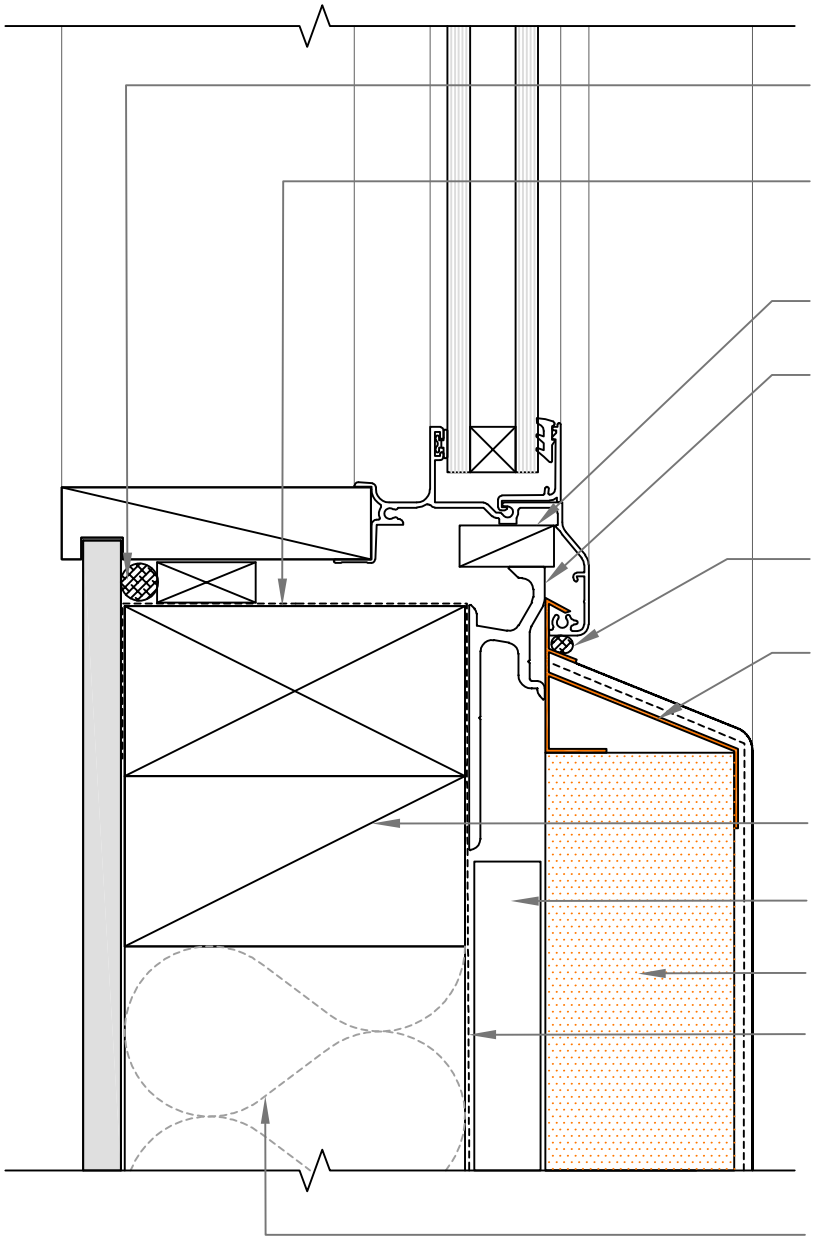
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



Note:
A 5° sloped sill trimmer must be used if the back of the glazing pocket is positioned back past the line of wall frame

Caution:
To ensure the proprietary flashing for this system can be installed correctly, please allow a gap of 24mm from the surface of the building paper to the backside of the aluminium joinery

03A
SCALE: 1:2

WINDOW SILL DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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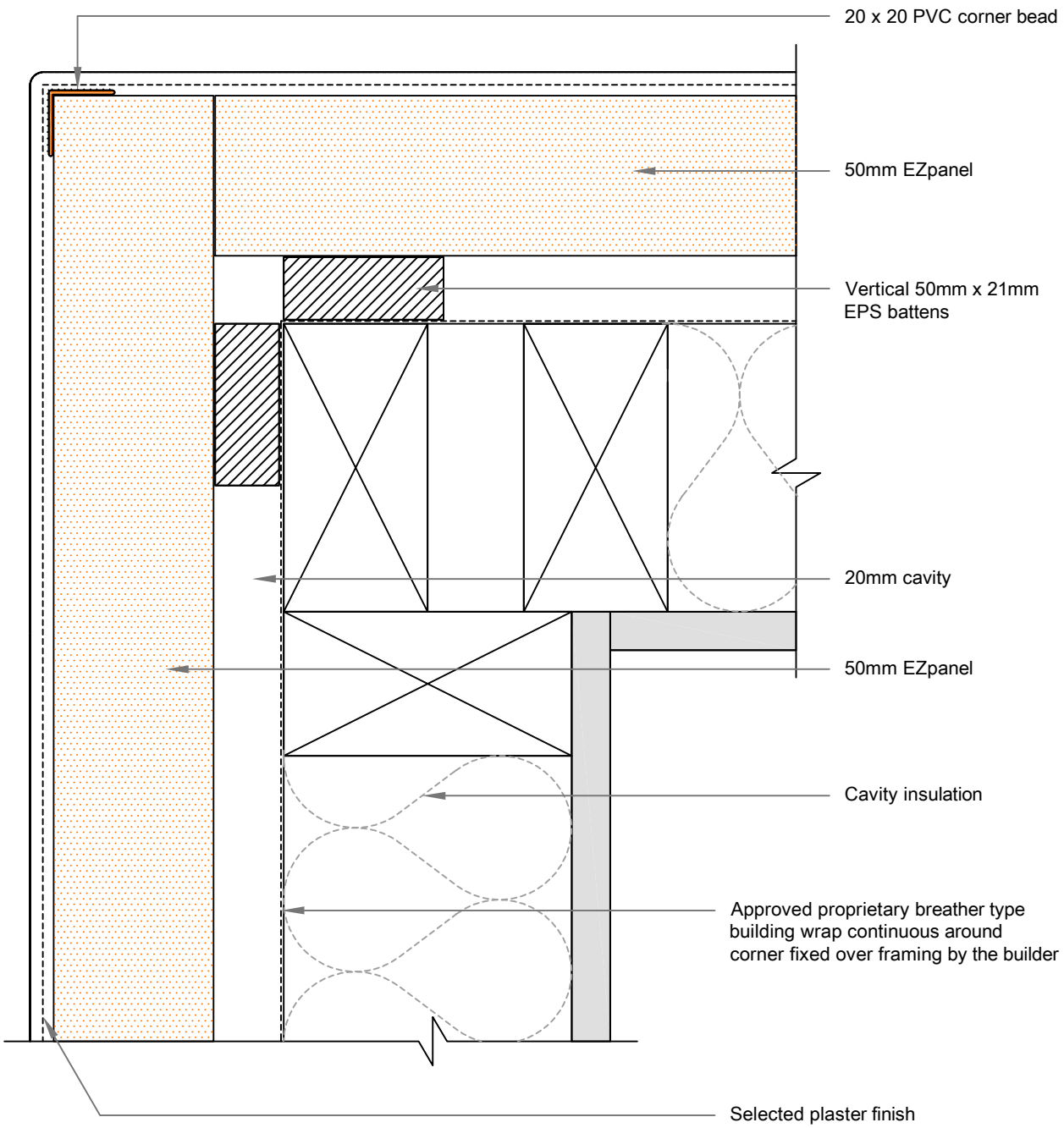
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



05A EXTERNAL CORNER DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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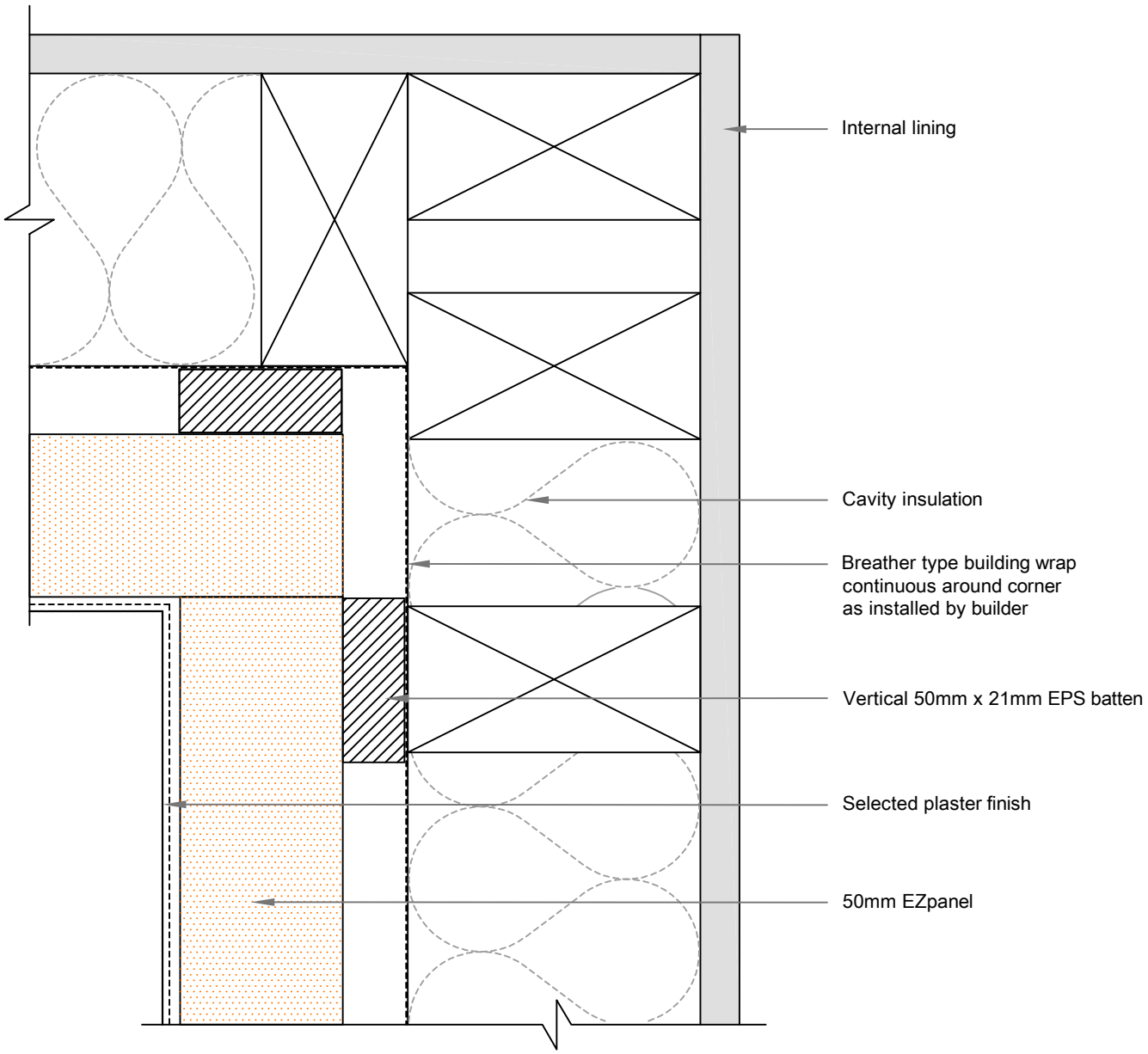
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



06A INTERNAL CORNER DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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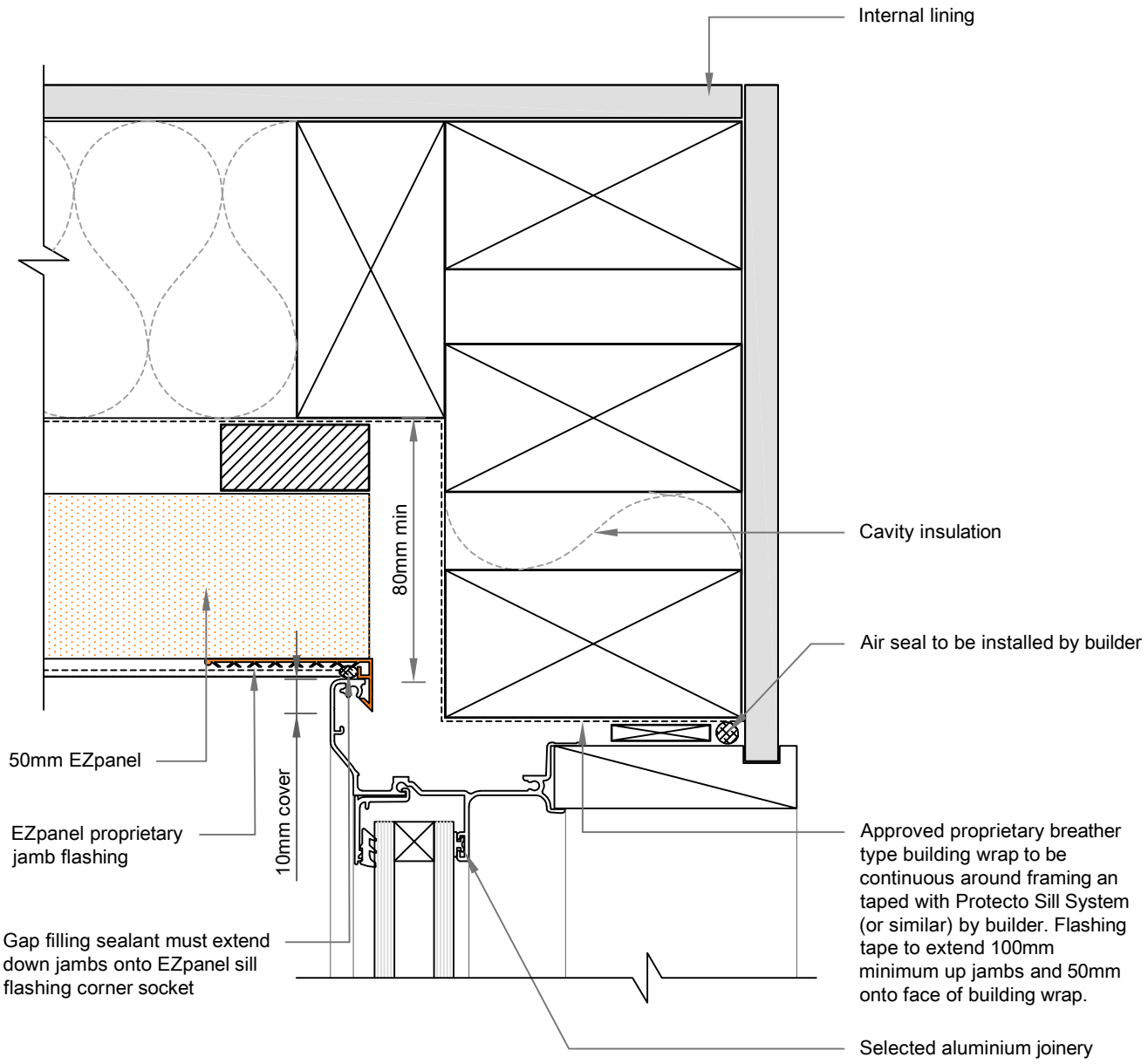
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



06I
SCALE: 1:2

INTERNAL CORNER DETAIL

Aluminum Joinery - 50mm EZpanel - 20mm cavity with EPS Battens

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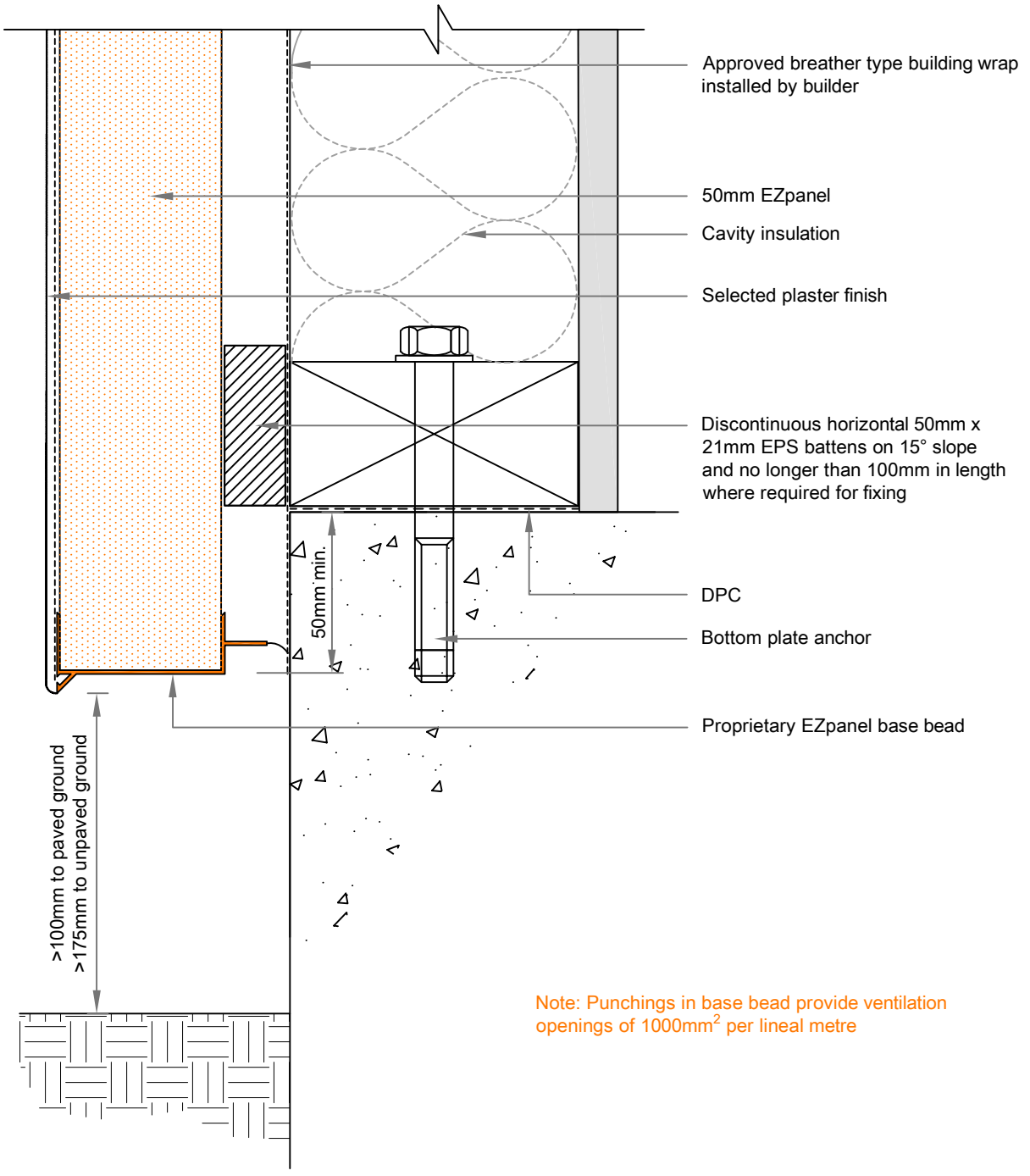
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



Note: Punchings in base bead provide ventilation openings of 1000mm^2 per lineal metre

07A
SCALE: 1:2

CONCRETE SLAB DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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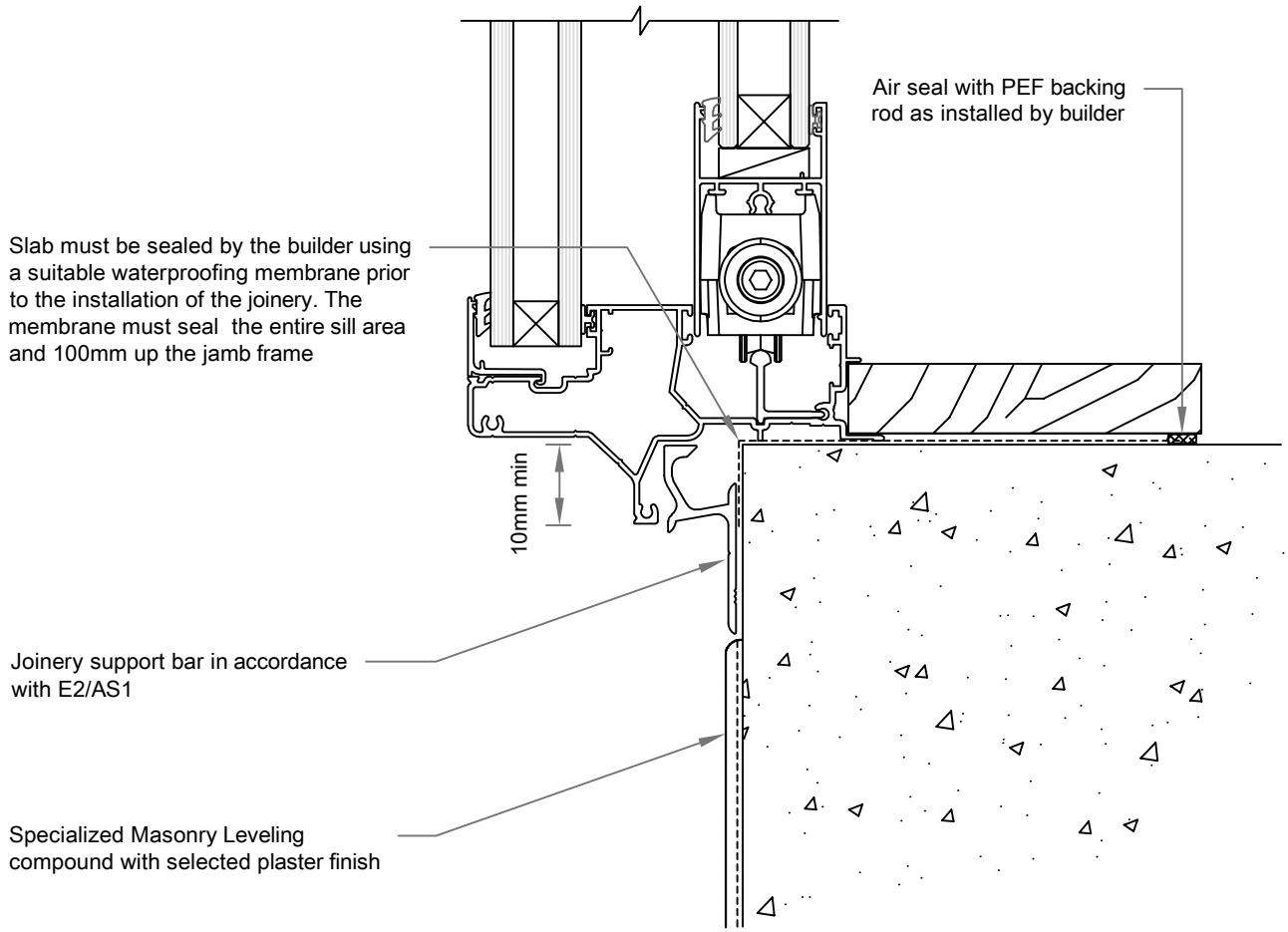
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



09B
SCALE: 1:2

DOOR SILL DETAIL - SLAB

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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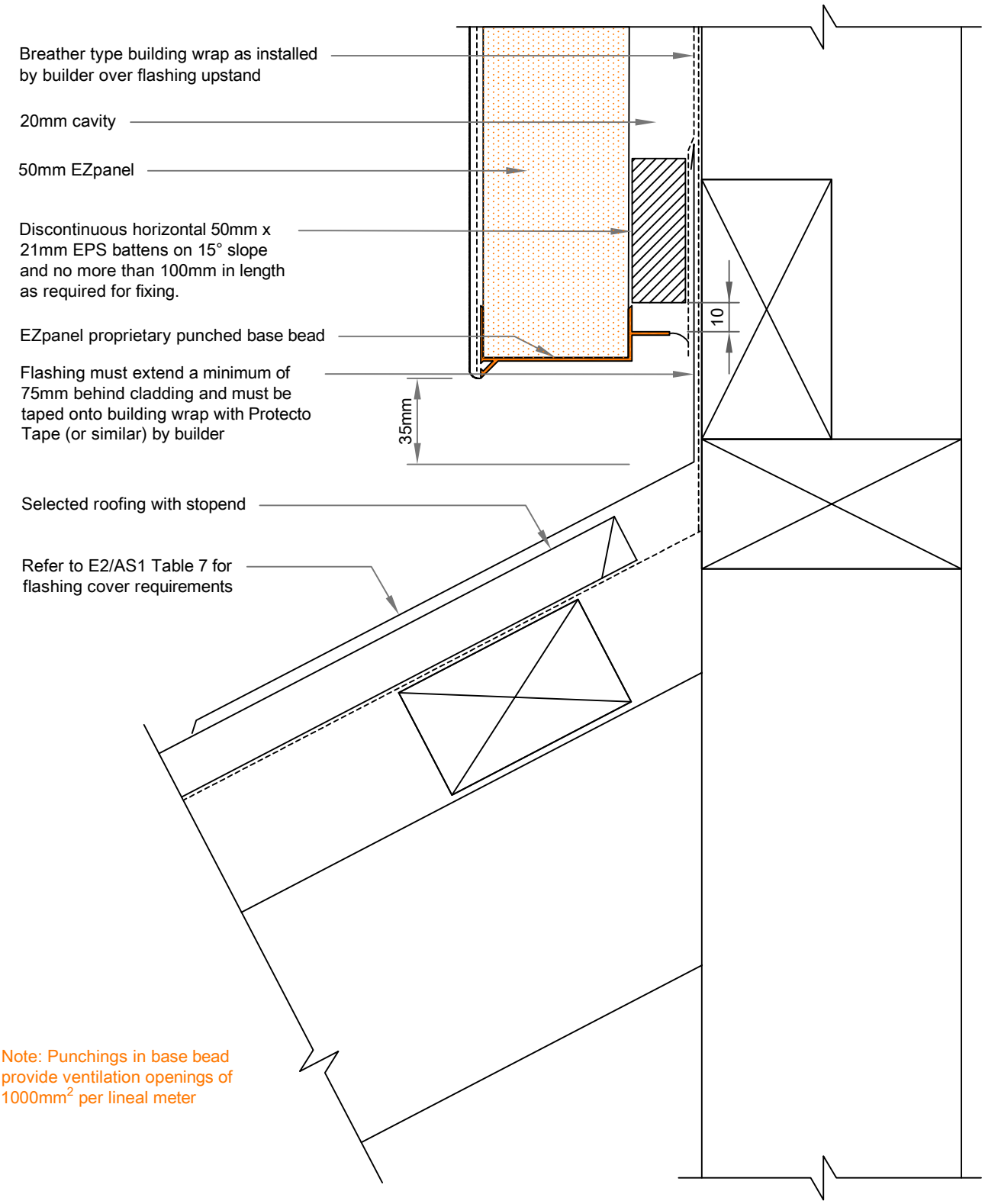

Note: Punchings in base bead provide ventilation openings of 1000mm^2 per lineal meter

10A
SCALE: 1:2

ROOF / WALL DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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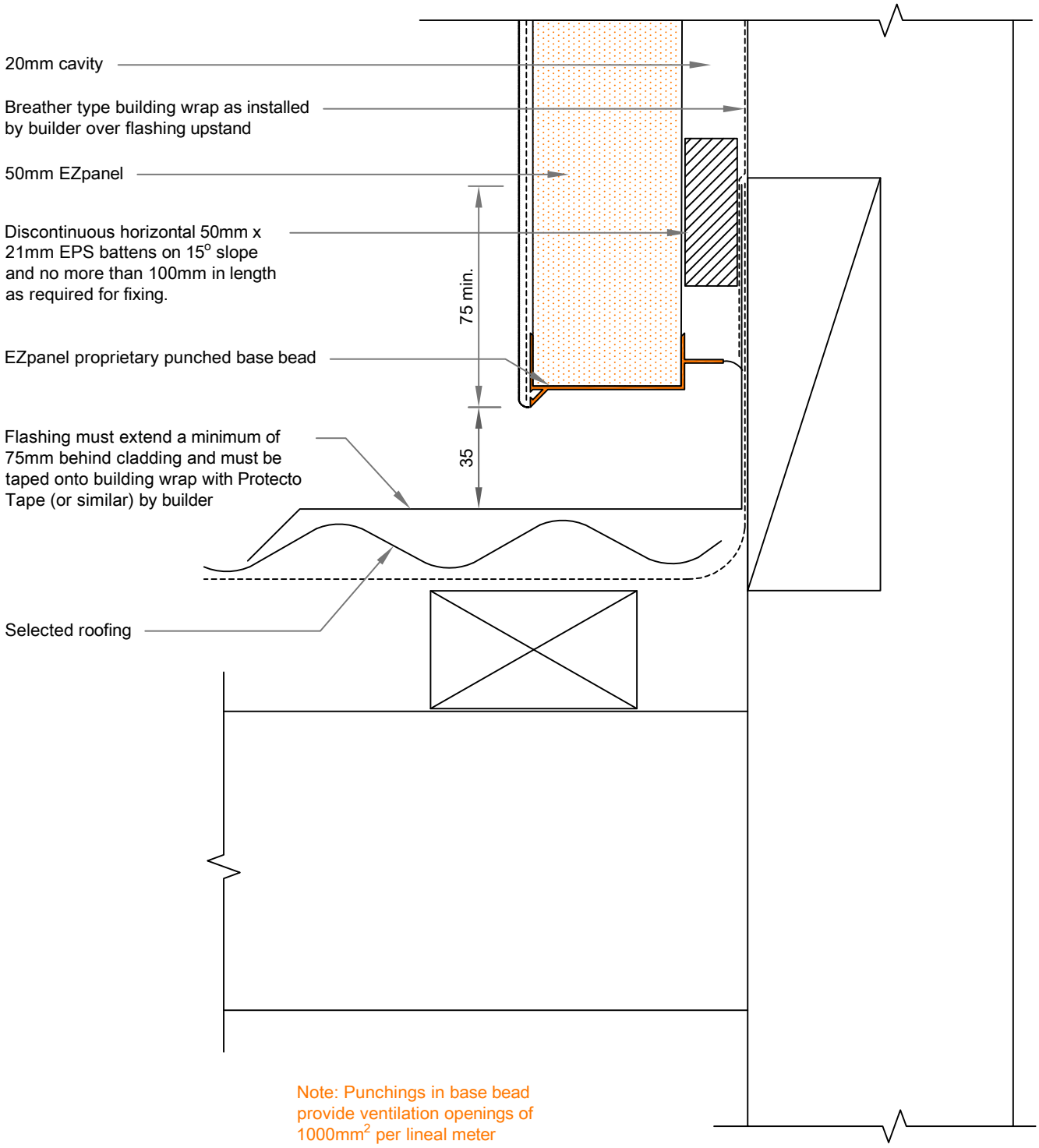

Note: Punchings in base bead provide ventilation openings of 1000mm^2 per lineal meter

10B
SCALE: 1:2

ROOF / WALL DETAIL - TRANSVERSE FLASHING

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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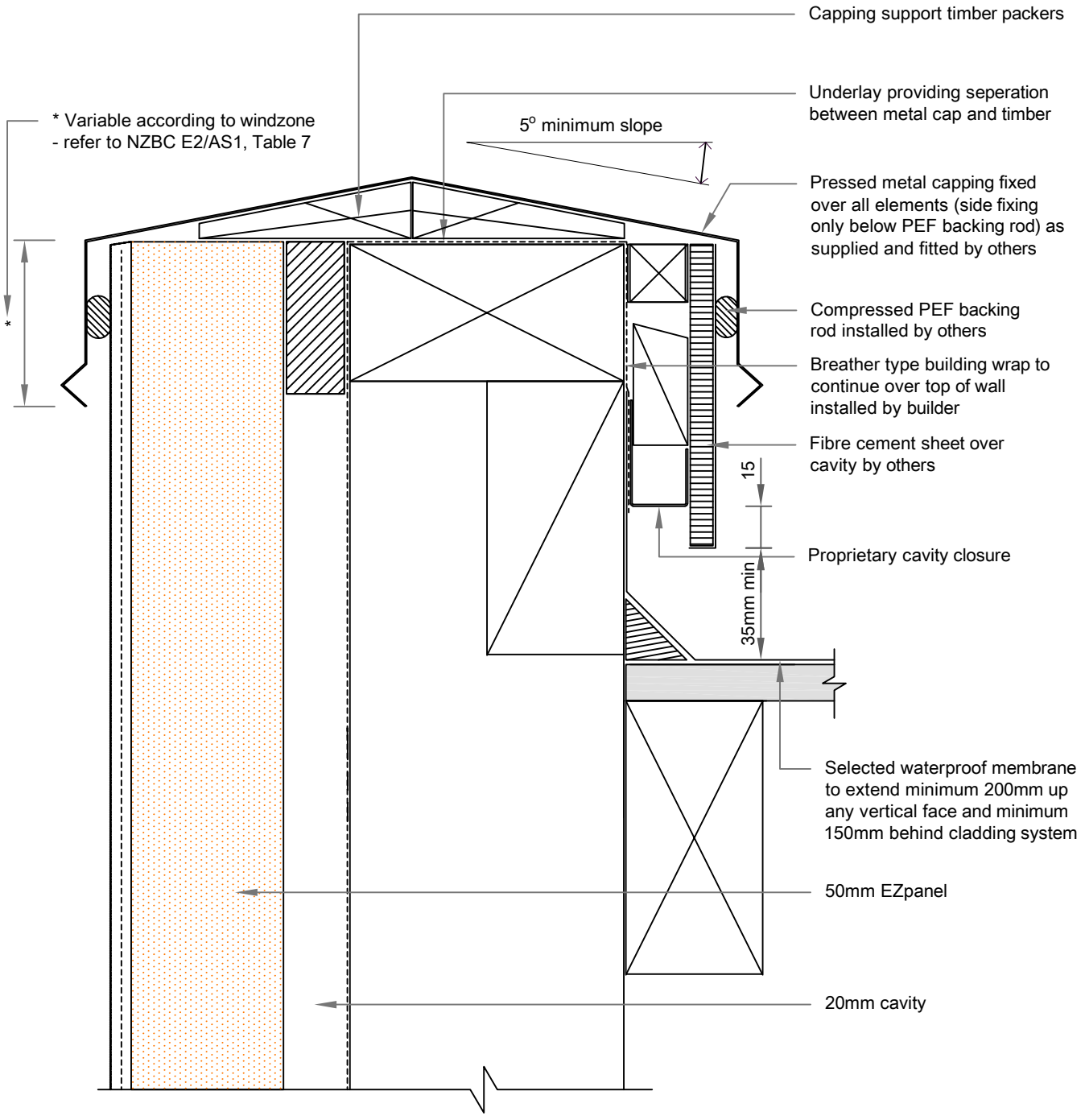

13A PARAPET METAL CAPPING DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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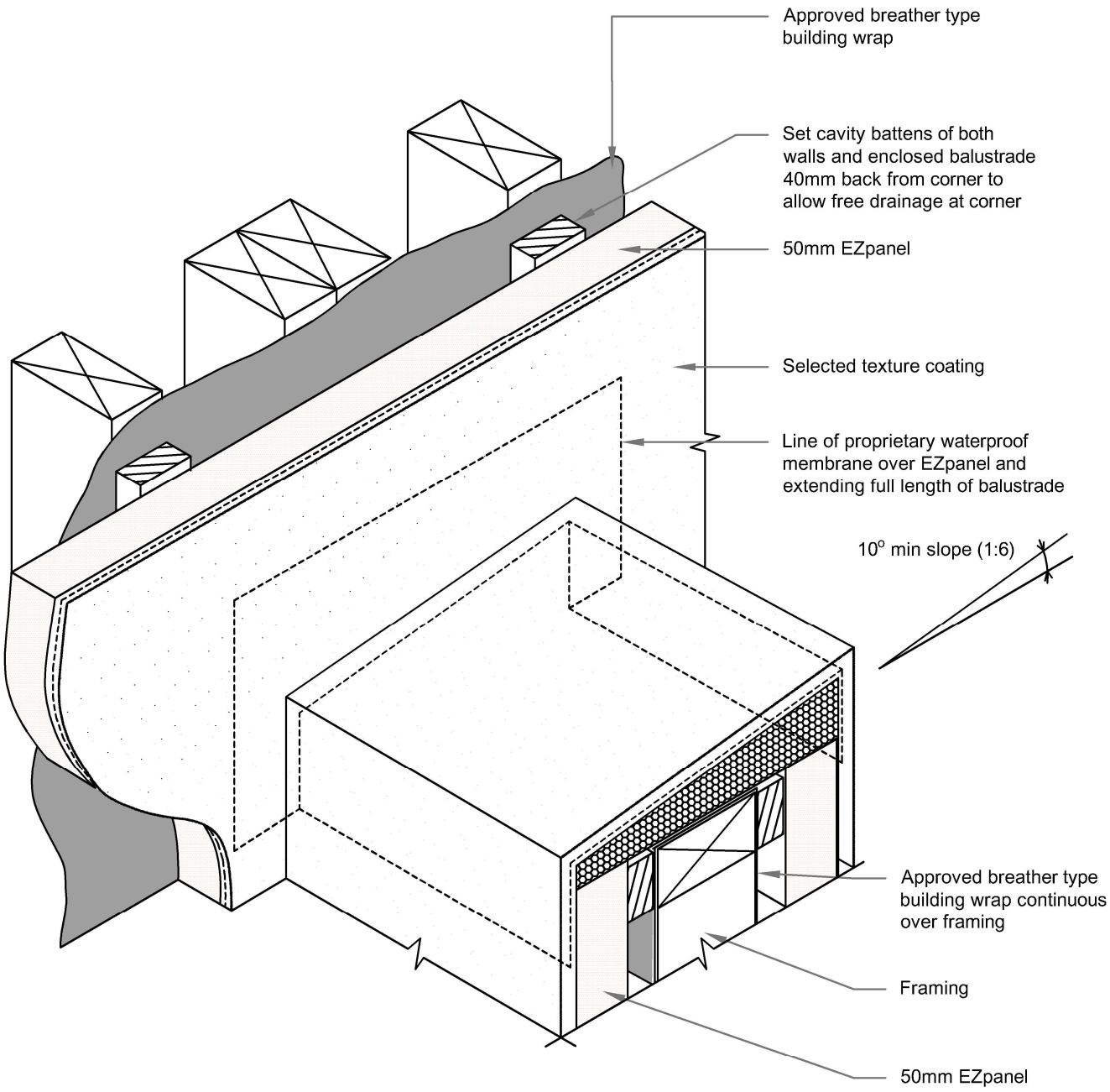

14C BALUSTRADE TO WALL JUNCTION DETAIL - 3D

N.T.S

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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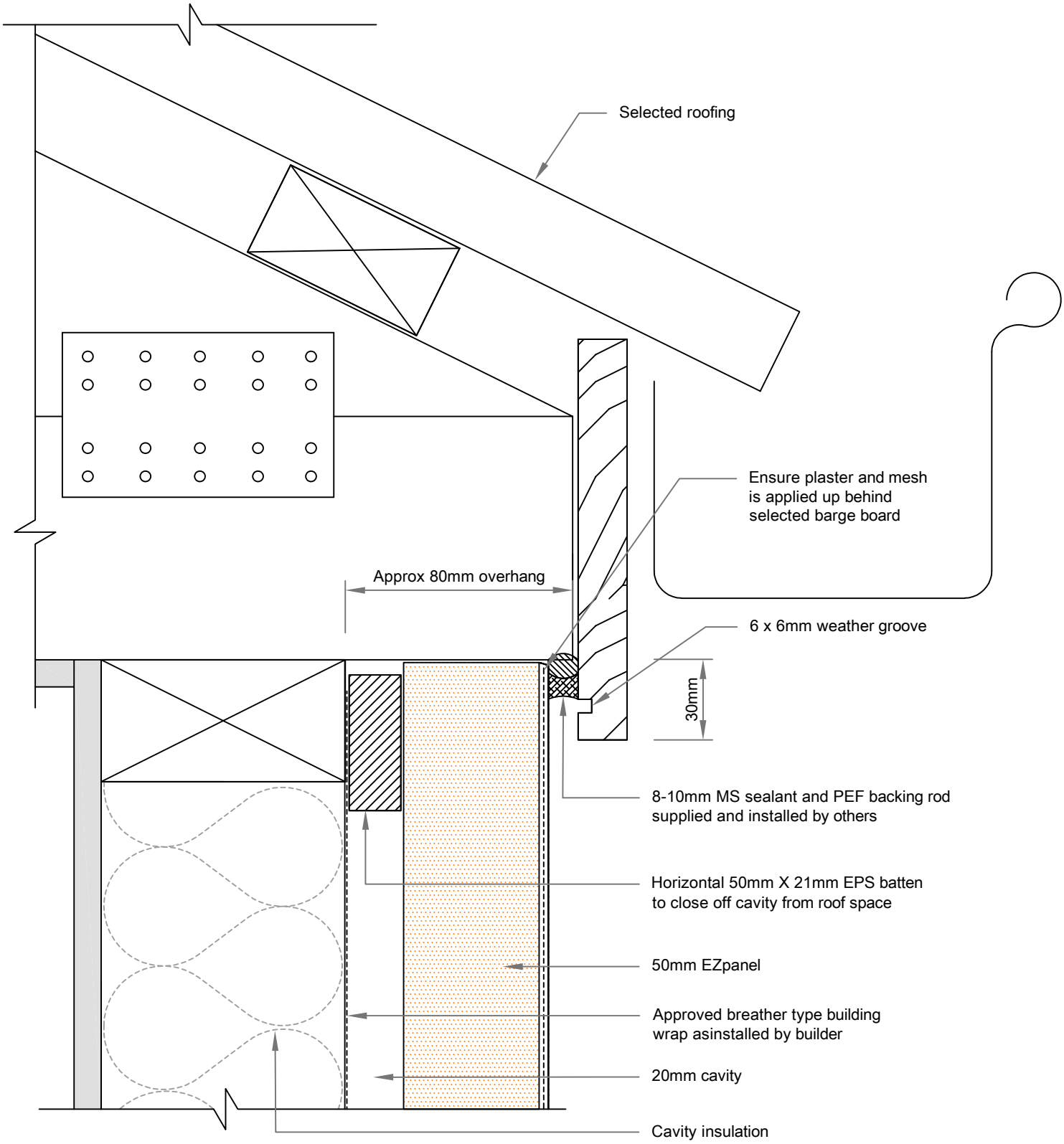

15A

SCALE: 1:2

FLUSH GUTTER EAVES DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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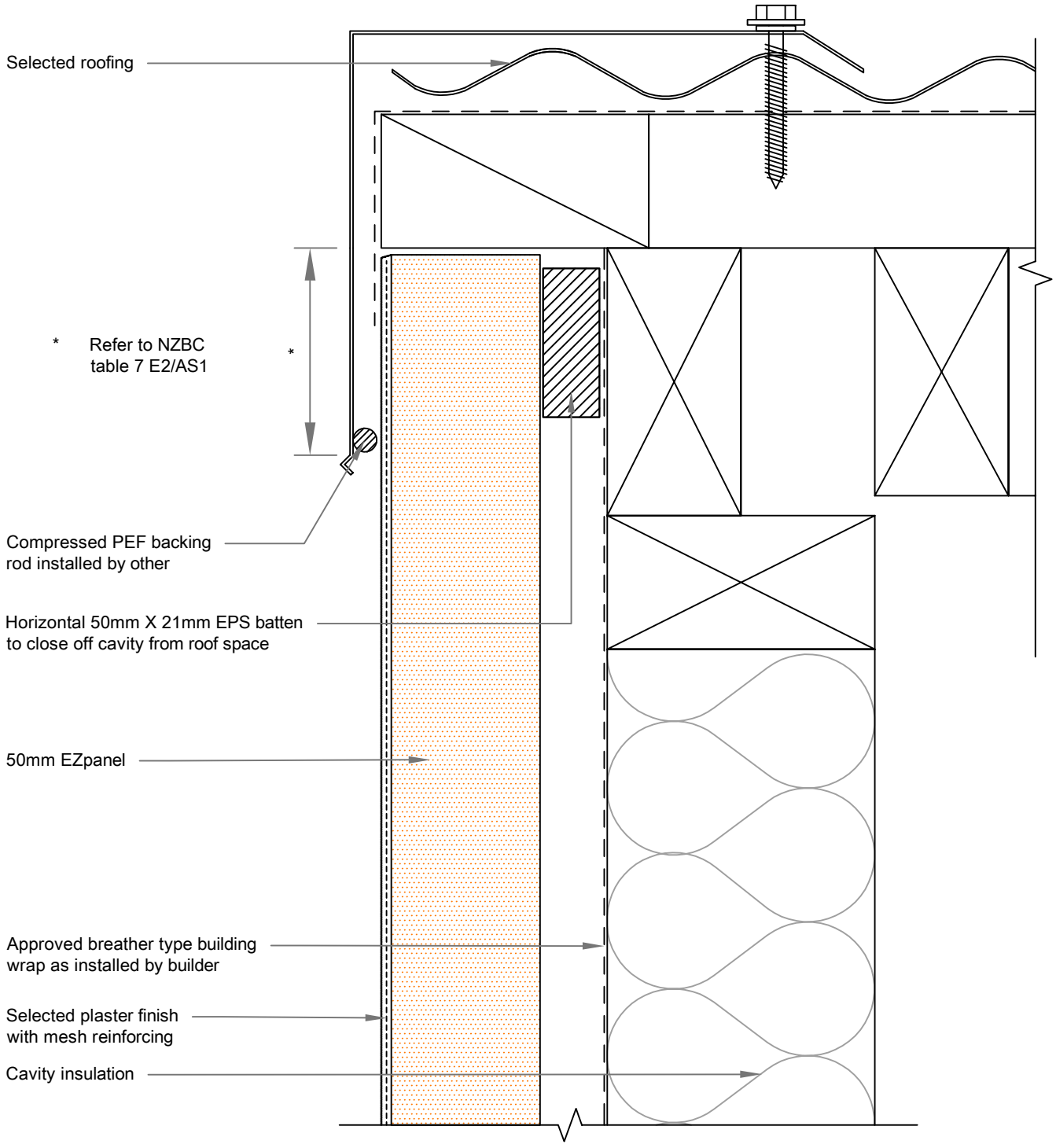

15B CLIPPED EAVE BARGE FLASHING DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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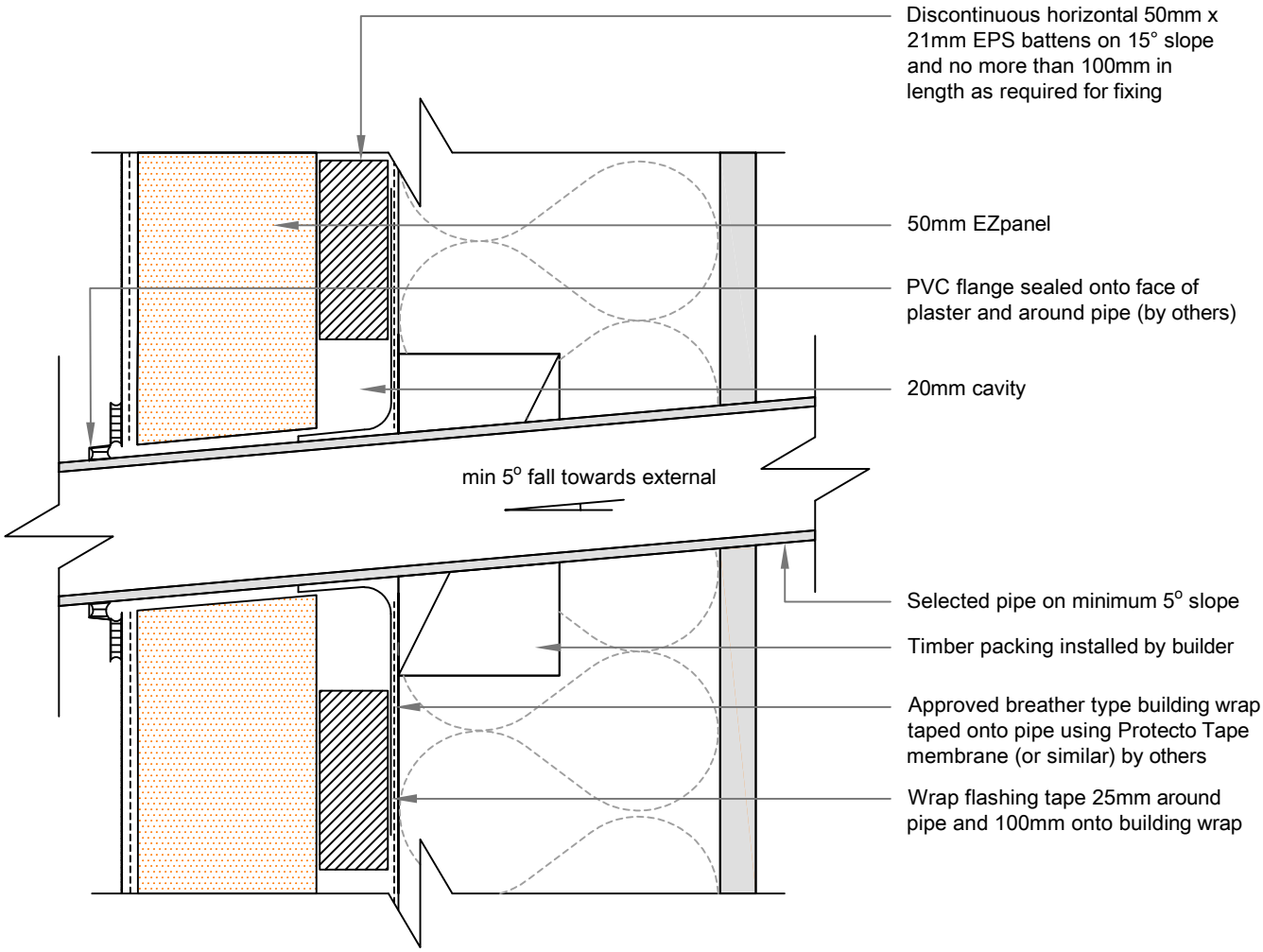

16A
SCALE: 1:2

PIPE PENETRATION DETAIL

50mm EZpanel - 20mm cavity with EPS Battens

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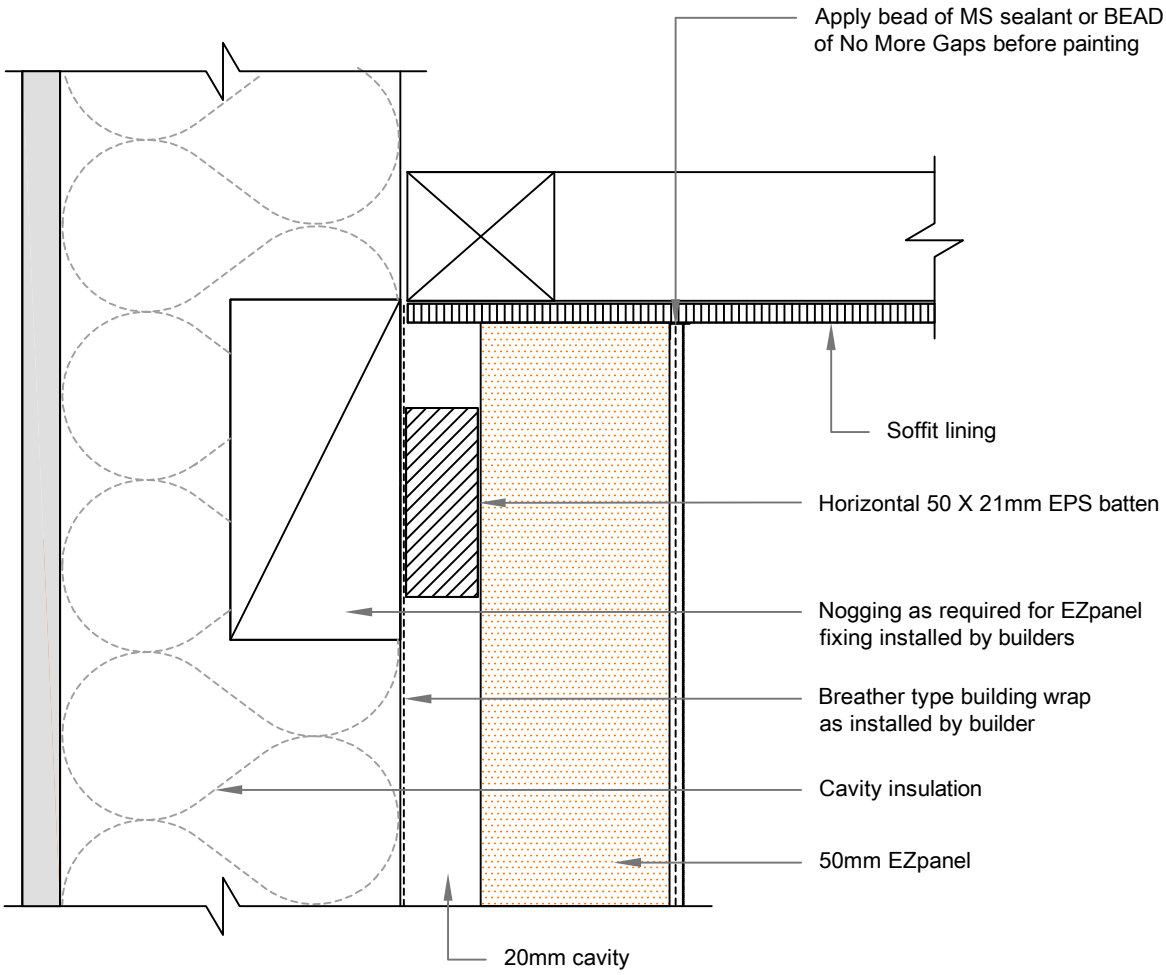
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD

Note: this drawing is outside of the BRANZ Appraisal.



17A SOFFIT DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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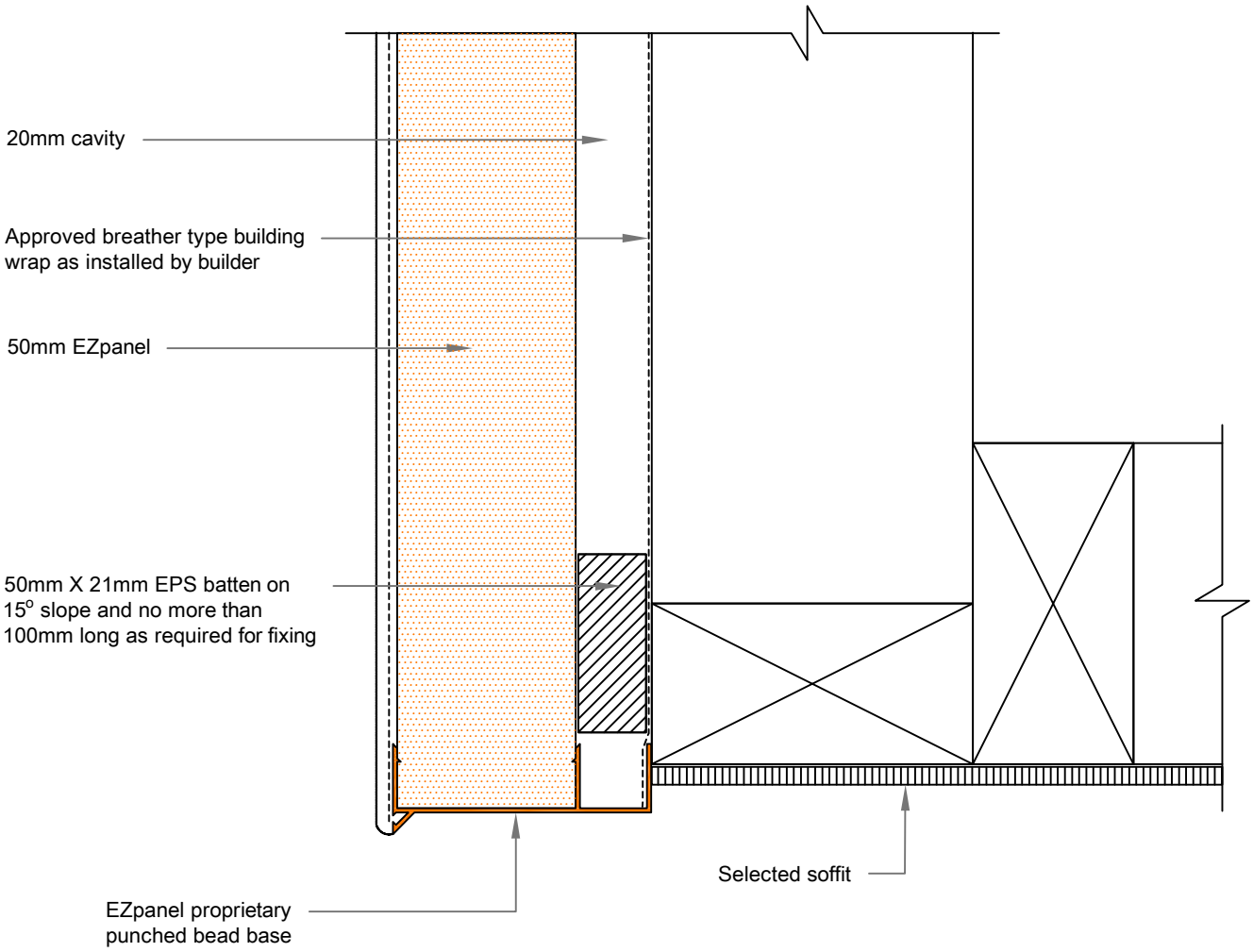
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



17B SOFFIT EDGE DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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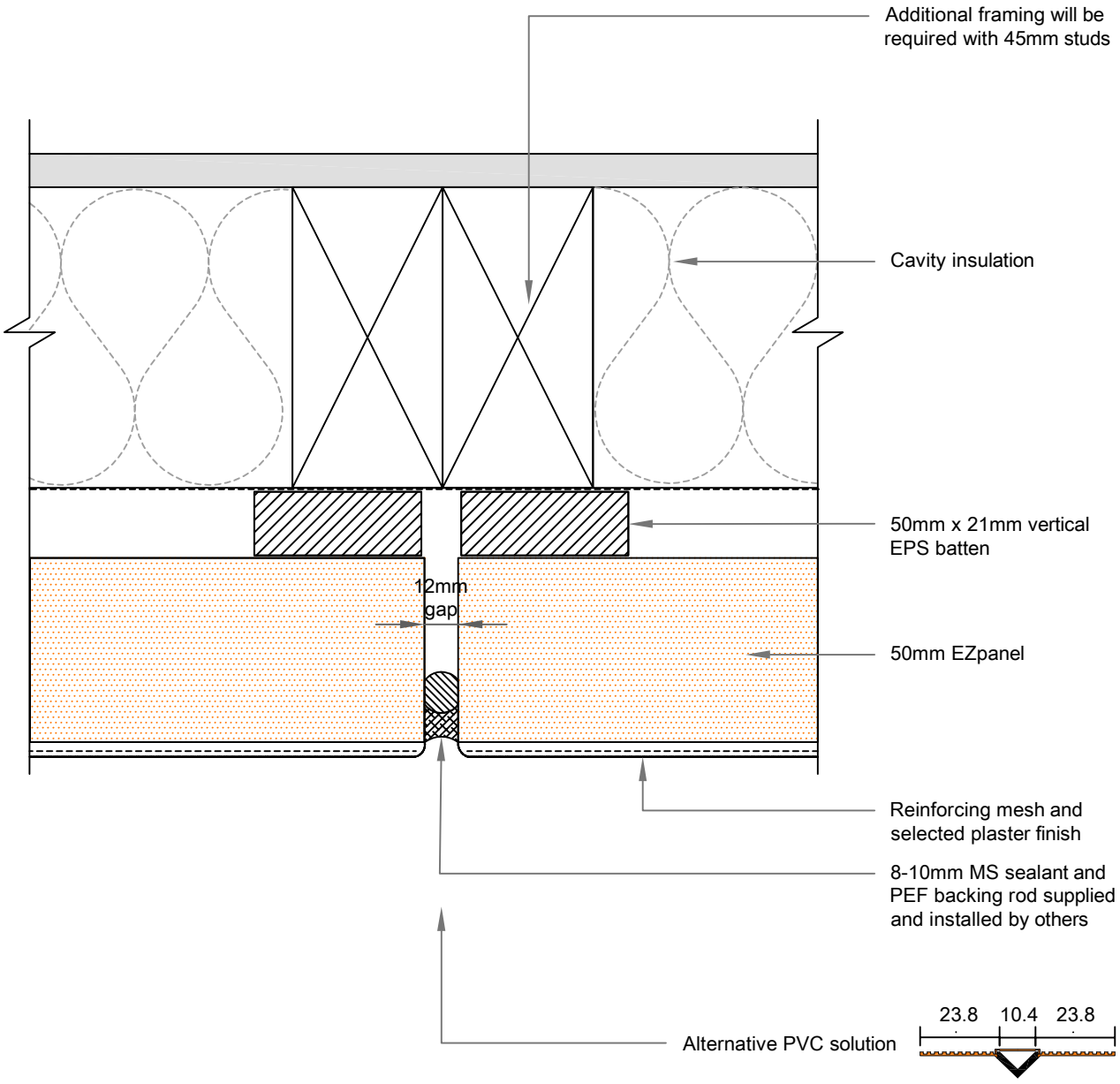
EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Specialized CONSTRUCTION PRODUCTS LTD



18B VERTICAL CONTROL JOINT DETAIL

SCALE: 1:2

50mm EZpanel - 20mm cavity with EPS Battens

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EzPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

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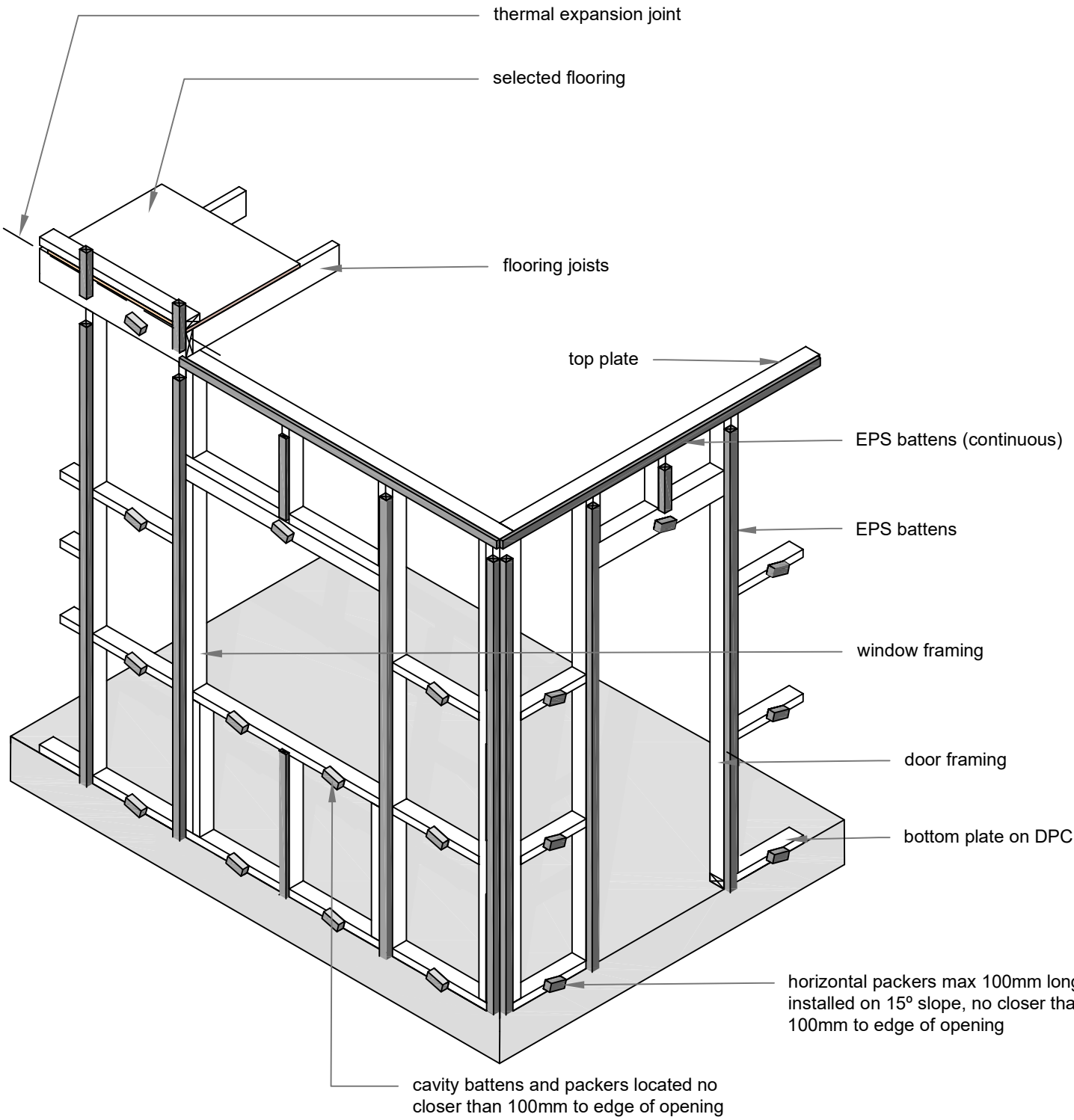

Note: For all wind zones EZpanel fixings to be at maximum 300mm centers to perimeter of panel edges and to intermediate studs.

Note: building wrap omitted for clarity

26

N.T.S

BATTEN LAYOUT

50mm EZpanel - 20mm cavity with EPS Battens

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Feb 2020

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CONSENT ISSUED BC201209 - Page 512 of 689

Application BC201209
Received 12/01/2021

BRANZ Appraised
Appraisal No. 649 [2020]

EZPANEL CAVITY SYSTEM

Appraisal No. 649 (2020)

This Appraisal replaces BRANZ Appraisal No. 649 (2009)

BRANZ Appraisals

Technical Assessments of products for building and construction.

Specialized Construction Products Ltd
PO Box 101 127
North Shore Mail Centre
Auckland
Tel: 0800 0800 79
Email: info@specialized.co.nz
Web: www.specialized.co.nz

BRANZ
1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

Product

1.1 The EZpanel Cavity System is a cavity-based external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used. The system consists of autoclaved aerated concrete (AAC) panels (EZpanels) fixed over polystyrene battens to form a 20 or 40 mm cavity, or timber batten blocks to form a 40 mm cavity.

1.2 The EZpanel Cavity System is finished with either a cement-based option or an acrylic-based option. The cement-based option consists of a base coat of MLC plaster followed by either a cement-based finishing plaster or an acrylic-based finishing plaster. The acrylic-based option consists of a flanking coat of MLC plaster followed by a mesh coat of Powaflex acrylic plaster and an acrylic-based finishing plaster. Both base coat options are finished with an acrylic exterior paint system.

1.3 The system incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm or 40 mm drained cavity.

Scope

2.1 The EZpanel Cavity System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/ AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including Extra High.

2.2 The EZpanel Cavity System has also been appraised for weathertightness and structural wind loading when used as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber and steel framing subject to specific engineering design; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

2.3 The EZpanel Cavity System must only be installed on vertical surfaces *(except for tops of parapets, sills and balustrades, which must have a minimum 10° slope and be waterproofed in accordance with the Technical Literature).*

2.4 The system is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(The Appraisal of the EZpanel Cavity System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or wind pressure.)*

2.5 Installation of components and accessories supplied by Specialized Construction Products Ltd, its certified distributors and approved applicators must be carried out only by Specialized Construction Products Ltd approved applicators.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the EZpanel Cavity System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. The EZpanel Cavity System meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 10.1 - 10.5.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years, B2.3.1 (c), 5 years, and B2.3.2. The EZpanel Cavity System meets these requirements. See Paragraphs 11.1 - 11.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The EZpanel Cavity System meets this requirement. See Paragraphs 17.1 - 17.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The EZpanel Cavity System meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 System components and accessories supplied by Specialized Construction Products Ltd are as follows:

EZpanel

- EZpanel panels are 50 mm thick, manufactured from AAC with an approximate density of 690 kg/m^3. EZpanel panels are supplied in lengths of 2.2 m long x 600 mm wide.

Cavity Battens

- Cavity battens are manufactured from ultra high density (Class UHD) EPS with a density of no less than 28 kg/m^3. The battens are 50 mm wide by 21 mm thick or 50 mm wide by 41 mm thick and are supplied in 1200 mm lengths.

Cavity Batten Blocks

- Cavity batten blocks are 200 mm long x 40 mm thick x 40 mm wide timber treated to Hazard Class H3.2 CCA. The blocks are cut with a 15° slope on the top edge.

Base Coat Plasters

- **EZpanel Base Coat** is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is applied as the base coat around window and door joinery penetrations in a minimum 2-3 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.
- **Powaflex** is a fibre-reinforced acrylic plaster supplied in 20 kg bags that is mixed on site with clean water. It is applied in a minimum 2-3 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.

Finishing Plasters

- **Fine Mesh Coat** is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is used to achieve a heavy stucco texture finish when sprayed through a hopper gun or a sagola gun.
- **Spanish Finish** is a polymer modified, Portland cement-based finishing plaster supplied in 20 kg bags and is mixed on site with clean water. It is trowel applied in various thicknesses over the mesh coat to achieve an undulating style finish.
- **Float Finish** is a polymer modified, Portland cement-based finishing plaster supplied in 20 kg bags and is mixed on site with clean water. It is trowel applied in two coats (1-2 mm per layer) over the mesh coat and is polished flat to achieve a fine granular finish.
- **Coarse Texture** is a coarse mesh coat. A polymer-modified, cement-based plaster which can be sprayed through a sagola gun to achieve a finely spiked texture finish.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

- **Granopor Fine 1.0 mm Acrylic Texture** is a ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish. It is supplied in 30 kg pails.
- **Granopor Top 1.5 mm Acrylic Texture** is a ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish or spray applied to achieve a fine stippled appearance. It is supplied in 30 kg pails.

Accessories

- **Reinforcing mesh** - alkali-resistant fibreglass mesh with a nominal mesh size of 4 mm square and a weight of 150 g/m^2 for use in domestic and light commercial situations.
- **uPVC components** - base bead, EZpanel sill/jamb flashing, head flashing, edge bead, high backed U-Channel, flat 70 mm U-Channel, 20 x 20 L-Bead, 50 x 20 L-Bead, 8 mm control joint and corner socket.
- **EZpanel fixings (timber frame with EPS battens)** - 100 mm long (for 20 mm cavity) and 120 mm long (for 40 mm cavity) AS 3566 Corrosion Class 4 wood screws with a head diameter of 14 mm and a shank diameter of 5.1 mm in NZS 3604 defined Exposure Zones B and C and Grade 304 Stainless Steel in Exposure Zone D.
- **EZpanel fixings (timber frame with cavity batten blocks)** - 75 mm long AS 3566 Corrosion Class 4 wood screws with a head diameter of 14 mm and a shank diameter of 5.3 mm in NZS 3604 defined Exposure Zones B and C and Grade 304 Stainless Steel in Exposure Zone D.
- **EZpanel fixings (steel frame with EPS battens)** - 100 mm long (for 20 mm cavity) and 120 mm long (for 40 mm cavity) AS 3566 Corrosion Class 4 self-drilling screws with a head diameter of 14 mm and a shank diameter of 5.1 mm in NZS 3604 defined Exposure Zones B and C and Grade 304 Stainless Steel in Exposure Zone D. Refer to Paragraph 7.8 for foundation support requirements.
- **EZpanel Adhesive** - AAC compatible adhesive for temporarily bonding EZpanel panel joints during construction and for adhering uPVC components to the EZpanel panels as and where required.

Plastershield

- Plastershield is a 100% acrylic-based exterior paint formulated for use over Specialized Construction Products Ltd cement-based and acrylic-based finishing plasters. It is supplied in 10 litre and 20 litre pails.

4.2 Accessories used with the system which are supplied by the Specialized Construction Products Ltd approved applicators are:

- **Cavity batten fixings** - 30 x 2.5 mm hot-dip galvanised steel flat head nails for timber frame, or construction adhesive for temporary fixing to building underlay over timber or steel frame.
- **Cavity batten block fixings** - 75 x 3.15 mm hot-dip galvanised ring shank flat head nails. *(Note: the hot-dip galvanising must comply with AS 3566.2.)*
- **Waterproof membrane tapes** - tapes covered by a valid BRANZ Appraisal for use as waterproof membranes over the tops of plastered parapets, balustrades, fixing blocks and the like.
- **Flexible sealant** - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.

4.3 Accessories used with the system which are supplied by the building contractor are:

- **Flexible wall underlay** - building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- **Flexible building underlay support** - polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *(Note: mesh and wire galvanising must comply with AS/NZS 4534.)*
- **Rigid wall underlay** - Plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1 Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

- **Flexible sill and jamb tapes** - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- **Window and door trim cavity air seal** - air seals complying with NZBC Acceptable Solution E2/AS1 Paragraph 9.1.6, or self expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal for use around window, door and other wall penetration openings.

Paint System Specification

4.4 At least two coats of a 100% acrylic-based exterior paint must be used over the finishing plasters to make the system weathertight and give the desired finish colour to exterior walls. Specialized Construction Products Ltd allows the use of other acrylic exterior paint systems over the finishing plasters. An acrylic exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 may be used. Paint colours must have a light reflectance value of 25% minimum regardless of gloss value. Proprietary paint systems not supplied by Specialized Construction Products Ltd have not been assessed and are therefore outside the scope of this Appraisal.

Handling and Storage

5.1 Handling and storage of all materials supplied by Specialized Construction Products Ltd or the approved applicators, whether on or off site, are under the control of Specialized Construction Products Ltd approved applicators. Dry storage must be provided on site for the EZpanel panels, fibreglass mesh and bags of plaster. EPS battens, uPVC flashings and profiles must be protected from direct sunlight and physical damage, and should be stored flat and under cover. Liquid components must be stored in frost-free conditions.

5.2 Handling and storage of all materials supplied by the building contractor, whether on or off site, are under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer's instructions.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the EZpanel Cavity System. 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. Reference can also be made to the BRANZ Texture Coated Claddings Good Practice Guide for general design and installation information.

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind the EZpanel Cavity System must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

7.2 Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. In all cases studs must be at maximum 600 mm centres. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

7.3 For specifically designed timber framed buildings situated in Wind Zones above NZS 3604 defined Extra High, there must be a minimum timber framing size of 90 x 45 mm, and a minimum timber grade of MSG8.

7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *(Note: If EZpanel panels are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)*

Steel Framing

7.5 Steel framing must be to a specific design meeting the requirements of the NZBC.

7.6 The minimum framing specification is 'C' section studs and nogs of overall section size of 75 mm web and 32 mm flange. Steel thickness must be a minimum 0.75 mm.

7.7 In all cases, studs must be at maximum 600 mm centres. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

EZpanel Setout

7.8 EZpanels are installed horizontally. Vertical panel edges may be jointed on-stud or off-stud. Horizontal EZpanel panel edges do not require edge fixing, but where 41 mm EPS cavity battens are used with steel framed construction, the bottom row of EZpanels must be fully supported on a rebated foundation. Vertical panel joints must be staggered for each row. The EZpanels must be supported at fixing locations with vertical cavity battens or cavity spacers 100 mm long maximum in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 (f). At the base of the wall, the EZpanel panels must hang 50 mm below the supporting framing.

General

8.1 When the EZpanel Cavity System is used for specifically designed buildings up to design differential 2.5 kPa ULS wind pressure, only the weathertightness aspects of the cladding, maximum framing centres and EZpanel fixing centres are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Punchings in the base bead and head flashing provide a minimum ventilation opening area of 1,000 mm^2 per lineal metre of wall in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3(b).

8.3 The ground clearance to finished floor levels as set out in NZS 3604 must be adhered to at all times. At ground level, paved surfaces, such as footpaths, must be kept clear of the bottom edge of the cladding system by a minimum of 100 mm, and unpaved surfaces by 175 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Table 18. *(Note: A detail showing EZpanel carried into the ground is included in the Technical Literature. This detail is outside the scope of this Appraisal and approval for its use is by specific design.)*

8.4 At balcony, deck or roof/wall junctions, the bottom edge of the EZpanel Cavity System must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.

8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for Wind Zones up to and including Very High, and rigid underlays for buildings in the Extra High Wind Zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the fixing lengths must be increased by a minimum of the thickness of the underlay.

8.6 Where penetrations through the EZpanel Cavity System are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities. A minimum 10 mm gap must be left between the bottom of the vertical cavity batten and the flashing to the opening.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

8.7 Where the system abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. The Technical Literature provides some guidance. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Electrical Cables

8.8 PVC sheathed electrical cables must be prevented from direct contact with EPS cavity battens. When cables must penetrate the EPS cavity battens for exterior electrical connections, the cable must be directly supported by passing through an electrical conduit. There is no separation requirement for PVC sheathed electrical cables passing through EZpanel panels.

Control Joints

9.1 Control joints where EZpanel panels are used must be constructed in accordance with the Technical Literature and be provided as follows:

- **Horizontal control joints** - at maximum 6.0 m centres and at inter-storey floor levels.
- **Vertical control joints** - at maximum 8.0 m centres; aligned with any control joint in the structural framing, or where the system abuts different cladding types.

(Note: Horizontal and vertical control joints must be located over structural supports. The Technical Literature provides some guidance for the design of vertical control joints where the system abuts different cladding types. Details not included within the Technical Literature are outside the scope of this Appraisal and are the responsibility of the designer - see Paragraph 8.7.)

Inter-storey Junctions

9.2 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 m in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 (b).

Structure

Mass

10.1 The mass of the EZpanel Cavity System is approximately 34.5 kg/m^2, therefore it is considered a medium wall cladding in terms of NZS 3604.

Impact Resistance

10.2 The system has adequate resistance to impact loads likely to be encountered in normal residential use. The likelihood of impact damage to the system when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers should be considered for vulnerable areas.

Wind Zones

10.3 The EZpanel Cavity System is suitable for use in all Wind Zones of NZS 3604, up to, and including 'Extra High' where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to design differential 2.5 kPa ULS wind pressure when the buildings are specifically designed.

EZpanel Fixing (EPS Cavity Battens)

10.4 EZpanel panels must be fixed through the cavity battens and cavity spacers to the wall framing at maximum centres specified in Table 1.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

Table 1: EZpanel fixing centres

Wind Zone / Wind Pressure	Fixing Centres (mm) to studs[1]
NZS 3604 Wind Zones up to and including Extra High and specific design wind pressures up to design differential 2.5 kPa ULS with studs at maximum 600 mm centres	300

1. Fixings to be positioned 150 mm in from the panel edge giving an overall fixing layout of 300 mm vertical centres.

Cavity Batten Block and EZpanel Fixing

10.5 Cavity batten blocks must be fixed to the timber framing with two 75 x 3.15 mm hot-dip galvanised ring shank flat head nails, spaced 100 to 140 mm apart from each other. The cavity batten blocks must be fixed to the studs at maximum 600 mm horizontal centres (stud centres), and at maximum 600 mm vertical centres (at all horizontal joints between EZpanel panels). Additional cavity batten blocks may be required at corners and around openings. EZpanel panels must be fixed to the cavity batten blocks with 75 mm long wood screws with a head diameter of 14 mm and a shank diameter of 5.3 mm. The screws must be positioned 50 mm minimum from the edge of the panel and the fixing heads must finish 5 mm below the surface of the panel. The cavity batten block and EZpanel fixing centres as detailed in this paragraph are suitable for NZS 3604 Wind Zones up to and including Extra High and specific design wind pressures up to design differential 2.5 kPa ULS.

Durability

11.1 The EZpanel Cavity System meets the performance requirements of NZBC Clause B2.3.1 (b), 15 years for the cladding system and plaster finish, and the performance requirements of NZBC Clause B2.3.1 (c), 5 years for the exterior paint system.

Serviceable Life

11.2 The EZpanel Cavity System is expected to have a serviceable life of at least 30 years provided the system is maintained in accordance with this Appraisal, and the EZpanel panels, fixings and plaster are continuously protected by a weathertight coating and remain dry in service.

11.3 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of EZpanel panels in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604 Paragraph 4.2.4, and is outside the scope of this Appraisal.

Maintenance

12.1 Regular maintenance is essential to ensure the performance requirements of the NZBC are continually met and to ensure the maximum serviceability of the system.

12.2 Regular cleaning (at least annually) of the paint coating is required to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Grime may be removed by brushing with a soft brush, warm water and detergent. Paint systems must be recoated at approximately 5-8 yearly intervals in accordance with the paint manufacturer's instructions.

12.3 Annual inspections must be made to ensure that all aspects of the cladding system, including the coating system, plasters, flashings and any sealed joints remain in a weatherproof condition. Any cracks, damaged areas or areas showing signs of deterioration which could allow water ingress, must be repaired immediately. The EZpanel Cavity System must be repaired in accordance with the instructions of Specialized Construction Products Ltd.

12.4 Minimum ground clearances as set out in this Appraisal and the Technical Literature must be maintained at all times during the life of the system. *(Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the EZpanel Cavity System.)*

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

Prevention of Fire Occurring

13.1 The EZpanel panels are considered a non-combustible material and need not be separated from heat sources such as fireplaces, heating appliances, flues and chimneys. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from heat sources such as fire places, heating appliances, flues and chimneys in accordance with the requirements of Part 7 of NZBC Acceptable Solutions C/AS1 and C/AS2 and NZBC Verification Method C/VM1.

Fire Affecting Areas Beyond the Fire Source

Vertical Fire Spread

14.1 This Appraisal only covers buildings 10 m or less in height. NZBC Functional Requirement C3.2 identifies that external vertical fire spread to upper floors only needs be considered for buildings with a building height greater than 10 m. Control of external vertical fire spread is therefore outside the scope of this Appraisal.

Horizontal Fire Spread

14.2 The EZpanel panels and plaster finishes have a peak heat release rate of less than 100 kw/m^2 and a total heat released of less than 25 MJ/m^2. Testing was carried out as per Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. The EZpanel Cavity System can therefore be used within 1 m of the relevant boundary.

14.3 Refer to NZBC Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2 for fire resistance rating and control of external fire spread requirements for external walls.

Fire Resistance Rating of External Walls

15.1 EZpanel Cavity System can be used for load-bearing and non-load-bearing walls to provide two-way passive fire protection. Fire Resistance Ratings (FRRs) of up to 120/120/120 can be achieved with the system. Construction details are contained in the Technical Literature and must be strictly followed to obtain the required FRR.

Movement to Place of Safety

Structural Stability during Fire

16.1 In order to satisfy the requirements of NZBC C6 Structural Stability, designers must ensure that elements with a FRR are structurally supported by elements with at least the equivalent FRR.

External Moisture

17.1 The EZpanel Cavity System, when installed in accordance with this Appraisal and the Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

17.2 The cavity must be sealed off from the roof and sub-floor space to meet the performance requirements of Clause E2.3.5.

17.3 The EZpanel Cavity System allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet the performance requirements of Clause E2.3.6.

17.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

17.5 The use of the EZpanel Cavity System where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc. to remain weather resistant.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

Internal Moisture

18.1 The EZpanel Cavity System alone does not meet NZBC Acceptable Solution E3/AS1, Paragraph 1.1.1 (a). Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

18.2 The EZpanel Cavity System is not a barrier to the passage of water vapour, and when correctly installed will not create or increase the risk of moisture damage resulting from condensation. Refer to Paragraph 18.3 below for specific requirements for steel framed buildings.

18.3 When the EZpanel Cavity System is installed over a steel frame, an expanded polystyrene thermal break must be installed over the building underlay over each steel member to provide a thermal break in accordance with the requirements of NZBC Acceptable Solution E3/AS1, Paragraph 1.1.4 (d). The cavity battens and the rest of the EZpanel Cavity System are then installed over top of the thermal break in accordance with the Technical Literature and this Appraisal.

Installation Information

Installation Skill Level Requirements

19.1 All design and building work must be carried out in accordance with the EZpanel Cavity System Technical Literature and this Appraisal. All building work must be undertaken by Specialized Construction Products Ltd Approved Applicators. Where the work involves Restricted Building Work this must also be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

20.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the EZpanel Cavity System. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

20.2 Where studs are at greater than 450 mm centres and a flexible wall underlay is being used, a building underlay support must be installed over the underlay at maximum 300 mm centres horizontally.

Aluminium Joinery Installation

20.3 Aluminium joinery must be installed by the building contractor in accordance with the Technical Literature. A 7.5-10 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place. The joinery must be spaced 22-23 mm off of the wall frame to allow the EZpanel Cavity System flashings to be installed.

The EZpanel Cavity System

20.4 The system must be installed in accordance with the Technical Literature by Specialized Construction Products Ltd approved applicators.

20.5 The EZpanel Cavity System plaster system must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

Inspections

20.6 The Technical Literature must be referred to during the inspection of EZpanel Cavity System installations.

Finishing

20.7 The paint manufacturers' instructions must be followed at all times for application of the paint finish. The plaster must be cured for a minimum of 2-3 days and must be dry before commencing painting.

Health and Safety

21.1 Cutting of EZpanel Cavity System panels must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

21.2 When power tools are used for cutting, grinding or forming holes, health and safety measures must be observed because of the amount of dust generated.

21.3 Safe use and handling procedures for the components that make up the EZpanel Cavity System are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

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

Tests

22.1 The following testing has been undertaken by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for the EZpanel Cavity System was based on evaluation of all details within the scope and as stated within this Appraisal and testing of the Caviteclad Wall Cladding System to E2/VM1 (as contained within NZBC Clause E2, Amendment 5). The testing assessed the performance of the foundation detail, window head, jamb and sill details, meter box head, jamb and sill details, vertical and horizontal control joints, internal and external corners and balustrade to wall junction with a plastered cap. The EZpanel Cavity System follows the same flashing and weathertightness design principles as the Caviteclad Wall Cladding System. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of Acceptable Solution E2/AS1 for drained cavity claddings.
- Wind face load and fastener pull through testing for the EZpanel Cavity System. BRANZ determined design wind suction pressures, and by comparing these pressures with the NZS 3604 design wind speeds and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- In-plane shear testing of the EZpanel Cavity System to determine the system's ability to resist its self-weight.
- A racking test was completed to examine the performance of the EZpanel Cavity System when the system was subjected to both serviceability level and ultimate level seismic racking deflections, taken to be ±8 mm and ±36 mm respectively. The plaster system did not crack or show signs of damage for the entire test program.
- Durability testing of the EZpanel panels to verify the durability of the system. The testing included compressive strength, length change during moisture movement, corrosion protection of steel reinforcement and mineralogy by x-ray diffraction crystallography.
- Cone calorimeter testing to determine the peak rate of heat release and total heat release. The results were used to provide an assessment of the EZpanel Cavity System. The testing was carried out in accordance with ISO 5660.
- Fire resistance testing of EZpanel loadbearing timber framed wall systems was carried out in accordance with AS 1530.4.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

Other Investigations

23.1 Structural and durability opinions have been provided by BRANZ technical experts.

23.2 Site inspections of EZpanel Cavity System installations have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

23.3 The Technical Literature for the EZpanel Cavity System has been examined by BRANZ and found to be satisfactory.

Quality

24.1 The manufacture of the plasters has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

24.2 The manufacture of the EZpanel panels has been examined by an agent of BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

24.3 The quality of materials, components and accessories supplied by Specialized Construction Products Ltd is the responsibility of Specialized Construction Products Ltd.

24.4 Quality on site is the responsibility of the Specialized Construction Products Ltd approved applicators.

24.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, building wraps, flashing tapes and air seals in accordance with the instructions of Specialized Construction Products Ltd.

24.6 Building owners are responsible for the maintenance of the EZpanel Cavity System installations in accordance with the instructions of Specialized Construction Products Ltd.

Sources of Information

- AS 1530.4: 2014 Methods for fire tests on building materials, components and structures. Fire-resistance tests for elements of construction.
- AS 3566.2: 2002 Self-drilling screws for the building and construction industries.
- AS 3730: 2006 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 4534: 2006 Zinc and zinc/aluminium-alloy coatings on steel wire.
- BRANZ Good Practice Guide: Texture-coated Claddings, 3rd Edition, May 2018.
- ISO 5660.1: 2002 Heat release rate (cone calorimeter method).
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

BRANZ

In the opinion of BRANZ, the EZpanel Cavity System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Specialized Construction Products Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

   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.
4. BRANZ provides no certification, guarantee, indemnity or warranty, to Specialized Construction Products Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
27 May 2020

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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Application BC201209
Received 12/01/2021

EZPANEL SPECIFICATION

EZPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Project details

Project Name:

Project Address:

Specification Prepared For:

Specifier's Name:

Date:

Certified Specialized Plastering Contractor:

Licensed Building Practitioner Number:

Contact Us

Specialized Construction Products Ltd

Auckland Branch
79 Porana Rd, Glenfield
Ph: + 64 9 414 4499

Christchurch Branch
178b Carlyle Rd, Sydenham
Ph: + 64 3 365 3202

info@specialized.co.nz
www.specialized.co.nz

Introduction

This specification is for the application of Specialized Construction Products EZpanel Autoclaved Aerated Concrete Panel System. The EZpanel system is made up of 50mm Autoclaved Aerated Concrete Panels that are fixed to timber or steel framing over the surface of a 20mm or a 40mm cavity. The backing substrate is then over coated and reinforced with a range of specially blended proprietary cement- or acrylic-based plasters before the walls are finished with a chosen finishing plaster and painted with a 100% acrylic paint system. EZpanels can also be bonded or mechanically fixed to concrete or masonry walls. (Note: This Application is outside the scope of the BRANZ Appraisal.)

All the PVC flashings, fibreglass mesh, resin, fixings and plaster components used for the EZpanel System must be supplied by Specialized Construction Products Ltd or one of its certified distributors.

BRANZ Appraised
Appraisal No.649 (2009)

NEW ZEALAND MADE

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

EZPanel

LIGHTWEIGHT CONCRETE CLADDING SYSTEM

This specification has been set out as near as possible to the actual construction sequence and it must be read in conjunction with the detail data sheets for the EZpanel System and the EZpanel Installation Guide.

Framing Set Out (Timber or Steel)

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. In all cases studs must be set out at 600mm maximum centres. Dwangs/nogs must be flush fitted at maximum 800mm centres. All soffit junctions, openings, wall/roof junctions and foundation details must have support for the sheet edges. Timber framing must have a maximum moisture content of 24% at the time cladding commences. For steel framing the minimum framing specification is 'C' section studs and nogs of overall section size 75mm web and 32mm flange. Steel thickness must be a minimum of 0.75mm.

Building Wrap

All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for wind zones up to and including Very High. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Flexible wall underlay shall be building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays. Rigid wall underlay shall be plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1 Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems. The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the EZpanel System. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall under- lay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected. Where studs are at greater than 450 mm centres and a flexible wall underlay is being used, a building underlay support must be installed over the underlay at maximum 300mm centres horizontally.

Head Flashings

Proprietary PVC head flashings with minimum ventilation openings of 1000mm2 per lineal metre must be installed over all window heads and door openings. If proprietary PVC head flashings cannot be used, an acceptable alternative flashing must be provided. Please contact Specialized Construction Products Ltd for advice.

Flashings in General

Joists designed to carry decks need to have a continuous flashing fitted before the EZpanel is fixed. Check if there are any special back-flashings required where the EZpanel joins another substrate or curtain wall construction.

Roofing

Where areas over roofs need to be plastered, the roof/wall flashing must be installed prior to the commencement of cladding.

Pipes & Meter Boxes

It is critical that pipes are flashed appropriately in accordance with E2/AS1 fig 68. All pipes must have the building underlay turned to the outside of the building and have the building underlay taped to the outside of the pipe. All pipes must have a downward rake of a minimum of 5° and must be sealed in place using MS Silicone or another approved equivalent both before plastering and after the installation of the base coat. All meter boxes must be correctly flashed in accordance with the detailed drawings for the EZpanel System. Particular attention to detail and workmanship must be given to the weatherproofing details contained in the technical literature relating to flashing and sealing building penetrations or junctions with other building materials. All junctions between the EZpanel substrate and dissimilar materials must be correctly flashed and sealed with MS Silicone or another approved equivalent. The sealant must be installed in strict accordance with the manufacturer's requirements and must be left to properly cure prior to plastering.

Site Storage

Products in dry form must be stored in a dry area, off the floor on a timber pallet or timber dunnage and must be protected from the weather and from mechanical damage. Stock must be rotated to ensure that the oldest material is used first. Plaster stock that is older than six months must be discarded. EPS battens, uPVC flashings and profiles must be protected from direct sunlight and physical damage. They should be stored flat and under cover. Liquid components must be stored in a frost free area.

Preparation of Masonry and Concrete Surfaces

Note: This application is outside the scope of the BRANZ Appraisal.

All surfaces to receive a direct bonded application of the EZpanel System must be clean and free of debris, dirt and dust, efflorescence, grease, oils, curing agents, cleaning solutions, mould and algae or any other contaminants that may affect adhesion. Painted or glossy surfaces must be specially treated prior to the application of any plaster material, please refer to Specialized Construction Products for specialist advice before you proceed. All cracks that may be the subject to ongoing movement must be correctly repaired and reinforced.

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Some smooth, dense concrete surfaces must be slush coated before the application of the EZpanel bonding plaster to ensure suitable adhesion is created, please refer to Specialized Construction Products for specialist advice before you proceed. Tilt slab and other precast concrete items should be chemically cleaned with a water blaster to ensure any mould release agents are removed before the plaster is applied. All very porous surfaces should be sealed with an appropriate paint sealer prior to the application of the bonding plaster. Failing to correctly prepare the masonry substrate, may affect the aesthetic appearance of the finished wall. Do not wet down masonry surfaces before plastering and do not apply base coat plaster to surfaces that are wet from rain or overnight dew.

EZpanel Battens

20mm Cavity – EZPanel battens for a 20mm cavity installation are manufactured from Ultra High Density (Class UHD) expanded polystyrene with an approximate density of 28kg/m3 and measure 21mm X 50mm.

40mm Cavity – EZpanel battens for a 40mm cavity installation are manufactured from either; (a) Ultra High Density (class UHD) expanded polystyrene with an approximate density of 28kg/m3 measuring 41mm X 50mm and are fixed with glue or 50mm galvanised flat head nails or (b) 40 X 40 X 200 H3.2 timber batten blocks with a minimum slope of 15 degrees on the top edge, fixed with two 75mm galvanised ring shank nails. 40mm polystyrene battens must only be used in situations where the bottom edge of the sheet is fully supported by a rebate in the slab or an appropriate weight bearing lintel.

All battens must be fixed to the framing over the surface of the chosen building underlay in accordance with the batten layout shown in the detail data sheets. Horizontal battens must be a maximum length of 100mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 (f) and must be fixed into place on all nogs/dwangs where required for fixing with a minimum of a 5 degree angle on the top edge. The fewer horizontal battens that are used the better.

Sill and Jamb Flashings

The use of the EZpanel PVC sill and PVC Jamb flashings is MANDATORY. It is also MANDATORY that the sill and jamb flashings are joined in the corner with a Specialized Construction Products EZpanel corner socket.

Soffits, Gable Ends and Unlined Walls

Soffits shall be fixed into place before the cladding is installed and allowance made to close off the cavity with framing or battens to stop airflow into the roof space. After the mesh and plaster system has been completed a 5mm bead of MS sealant or 'no more gaps' should be installed at the soffit EZpanel intersection. In the case of reverse raking soffits a flashing or piece of Protecto EIFS tape shall be provided in accordance with the details shown in the technical literature.

To ensure the EZpanel substrate is not affected by timber shrinkage in areas that are not traditionally lined (e.g. gable ends), it is highly recommended that the internal walls of these areas are adequately braced with a thin sheet of plywood or an alternative bracing material.

Alternatively, the timber in these areas must have a moisture content of no greater than 18% and must remain that way throughout the entire construction process.

Fixing the EZpanel

The panels are butt jointed except at corners where one panel overlaps the other to form a straight finish. The EZpanel must be supported at fixing locations with cavity spacers a maximum of 100mm long in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f). Each additional layer of panels must be installed so that the panel joints are staggered by a minimum of 150mm. Anti-corrosion paint must be applied to all exposed reinforcing in the panels.

All panels must have their edges and their ends buttered with Sabre Fix PU glue as they are being installed. The edges of all of the EZpanel panels must be free of all dust and debris (preferably blown down with compressed air) and should be sprayed down with a mist of water immediately before the glue is applied. The glue should be laid in a bead approximately 6-8mm in width before the next panel is laid onto its edge. This practice should be done as quickly as possible to ensure the glue remains as pliable as possible to aid in the adhesion of the panels. Care must be taken when applying the glue to ensure it does not ooze either into the cavity or onto the outside of the dwelling. Once the panels have been joined and screwed into place any glue excess that oozes out of the joints between the panels should be wiped off or cut from the surface before it has fully cured. The glue must be allowed to dry before the application of the mesh coat.

At the base of walls the finished level of the EZpanel must be at least 50mm below the supporting framing. Additional framing maybe required at soffits, internal and external corners and window and door openings for the support and fixing of sheet edges. As edge fixing is not required for Ezpanel control joints can be created off stud and off nog.

Construction joints must be provided as follows:

- Vertical control joints – at maximum 8m centres; aligned with any control joint in the structural framing, or where the system abuts different cladding types.
- Horizontal control joints – at maximum 6m centres and at inter-storey floor levels where unseasoned timber floor joists are used.

Construction joint details are provided in the drawings provided with the system. Inter-storey drained joints must be provided for walls over 2 storeys or maximum 7m in height in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph .1.4. Inter-storey junctions must be constructed in accordance with the technical literature.

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The bottom edges of the EZpanel can either be capped with a 50mm High Back U-Channel which is attached to the bottom plate of the dwelling prior application or with a 50mm lipped base bead once they have been fixed into place and trimmed as may be necessary.

Timber Framing

There are five categories listed in NZS 3604: Low, Medium, High, Very High and Extra High. The "Wind Zone" for the job must be clearly understood before the application of any EZpanel.

Fixing over EPS battens

EZpanel panels are fixed through the polystyrene cavity battens and spacers to the studs with 100mm or 120mm long Class 4 galvanised or Grade 302 stainless steel screws that have a head size of 14mm. Typically the screws are placed into the panels 150mm from the outside edge giving overall fixing centres of approximately 300mm. Two screws should be put into each stud per panel. Refer to the table 1 for fixing centres.

Fixing to timber battens

For timber framed buildings, installations in NZS3604 Wind Zones up to, and including, 'Extra High' and specific design wind pressures up to and including design differential 2.5kPa ULS, the timber battens/ blocks must be fixed to the timber framing with two 75mm long galvanised or stainless steel ring-shank nails. The battens are fixed to the studs at maximum 600mm horizontal centres (stud centres), and at maximum 600mm vertical centres (at all horizontal joints between the EZpanel). Additional battens may be required at corners and around openings. The EZpanels are fixed to the battens with 10g x 75mm long, countersunk head Class 4 galvanised screws (Grade 302 Stainless in sea spray zones). The screws must be positioned 50mm minimum from the edge of the panel and the fixing heads should finish 5mm below the surface of the panel. The need to screw off at 200mm centres on bottom plates is not required for timber battens. However, if more fixing is preferred this can easily be achieved by correctly positioning additional timber batten blocks.

Table 1: EZpanel fixing centres through EPS battens

Wind Zone/Wind Pressure	Fixing centres (mm) to studs
Low - Very High NZS 3604 defined Wind Zones with studs at maximum 600 mm centres	300
NZS 3604 Wind Zone Extra High and specifically designed buildings up to design differential 2.5 kPa ULS wind pressure with studs at maximum 600 mm centres	300

1. Fixings to be positioned 150mm in from the panel edge giving an overall fixing layout of 300 mm vertical centres.

Steel Framing

The same fixing centres apply as for timber framing. Use Specialized Construction Products Ltd self-drilling 100mm long AS 3566 Corrosion Class 4 self-drilling screws with a head diameter of 14mm and a shank diameter of 5.1mm in NZS 3604 defined Exposure Zones B, C and D. EPS battens only for steel frame.

Concrete & Masonry

(Note: This application is outside the scope of the BRANZ Appraisal.)

To bond EZpanel to masonry surfaces mix up Specialized Construction Products Fine Mesh Coat plaster with the addition of 1 litre of Specialized Construction Products resin per bag. Cut the EZpanel to size and check the fit. All of the EZpanel to receive a coat of Fine Mesh Coat must be properly sealed prior to the application of the plaster. To seal the panel a mix of 2 parts water to 1 part Specialized Resin must be painted over the surface and allowed to dry before bonding commences. Failing to correctly prepare and seal the aerated concrete substrate may cause delamination or failure in the system. Once sealed apply the Fine Mesh Coat plaster to the back of the sheet with a grooved trowel around the perimeter and in vertical strips every 400mm. If there isn't a rebate in the concrete slab, EZpanel masonry anchors must be used to hold the sheets in place while the plaster is drying and to provide a mechanical fixing.

Sealing the Substrate

The surface of the EZpanels must be properly sealed prior to the application of any plaster. To seal the EZpanels, apply one good coat of undiluted Specialized EZpanel sealer over the entire surface of the dwelling and allow it too completely dry before plastering commences. EZpanel sealer can be applied with a pump up sprayer, long nap roller or wide paint brush at a spread rate of 10-12m2 per litre. Failing to correctly prepare and seal the surface of the aerated concrete panels may cause delamination, chalking or failure in the base coat.

PVC Beads

All exposed corners and bottom edges must be protected by gluing on the appropriate PVC section. The beads are glued on with Sbrefix PS Adhesive.

Stopping Up Prior to Mesh Coating

Once the EZpanels have been correctly fixed, a two metre straight edge should be used to check the flatness of the walls surface. Durarasps should be used to sand off any large irregularities. Deviations and holes in the surface of the EZpanels should be filled with EZstop plaster and screeded flat. Once the surface is flat and true all screw holes and PVC extrusions should be stopped with a layer of Fine Mesh Coat plaster. This will help to ensure any shrinkage in the preceding mesh coat is kept to a minimum. Only once the walls are flat and true and have been well stopped should mesh coating commence.

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CEMENT PLASTER OPTION (A)

Mesh Coating

The areas around all penetrations should be completed first by using Fine Mesh Coat imbedded in soft flexible 160g/m2 alkali resistant mesh to all reveals. A piece of soft mesh must be used to reinforce the head, sill and jamb flashing onto the surface of the panels and in the corner of any penetration where the sills and jambs meet. Once all penetrations and awkward areas have been completed all the flat areas of wall should be done using a 160g/m2 alkali resistant hard mesh embedded in EZpanel base coat. Drops of hard mesh do not have to overlap, but should be tightly butt joined. If the mesh isn't going to be overlapped any butt join that is created must offset any vertical join in the panels by a minimum of 150mm.

Finishing Options

There are six options once the EZpanel base coat plaster and mesh have been applied:

Option 1: Stucco Texture

Fine base coat plaster can be sprayed through a hopper gun or a sagola gun to achieve a heavy stucco plaster finish.

Option 2: Float Finish

Float Finish is a polymer modified cement based plaster which is polished flat to achieve a fine granular finish. The smooth plaster will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day.

Option 3: Spanish Finish

Spanish Finish is a polymer-modified, cement based plaster used to achieve an undulating adobe style finish. This product can be applied in various thicknesses and using a number of different techniques. Before finish coating begins ensure the style of finish that is desired has been correctly communicated and understood by the plasterer. A trial sample is highly recommended.

Option 4: Fine Spray Texture

Spray texture is a granular plaster designed to give a fine stippled appearance. Spray texture is best applied using a sagola gun with a 7mm tip and with the compressor set at approximately 60psi.

Option 5: GranoporTop 1.5mm Acrylic Texture

Ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish.

Option 6: Granopor Fine 1.0 mm Acrylic Texture

Ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish or sprayed through a hopper gun or a sagola gun to achieve a fine stippled appearance. Smooth textures will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day

ACRYLIC PLASTER OPTION (B)

Powaflex Acrylic System

The areas around all penetrations should completed first using Powaflex imbedded in soft flexible 160g/m2 alkali resistant mesh to all reveals. A piece of soft mesh must be used to reinforce the head flashings, jambs and sills onto the surface of the panels and in the corner of any penetration where the sills and jambs meet. Once all penetrations and awkward areas have been completed all the flat areas of wall should be done using a 160g/m2 alkali resistant hard mesh. Drops of hard mesh do not have to overlap but should be tightly butt joined. If the mesh isn't going to be overlapped any butt join that is created must offset any vertical join in the panels by a minimum of 150mm.

Finishing Options

There are two options once the Powaflex Base Coat as been applied:

Option 1: GranoporTop 1.5mm Acrylic Texture

Ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish.

Option 2: Granopor Fine 1.0 mm Acrylic Texture

Ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish or sprayed through a hopper gun or a sagola gun to achieve a fine stippled appearance. Smooth textures will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day

Curing

The curing time of finishing plaster will vary due to ambient temperature, relative humidity, surface temperature, surface porosity, application methods, and/or the thickness of the material. All freshly applied material must be protected from inclement weather for a minimum of 24 hours after application. It is the responsibility of the plaster applicator to determine if the product is cured and/or dry prior to applying any additional coats that may be required or exposing the applied product to rain, snow, dew, and/or any other inclement weather condition that may have a detrimental affect. Although some finishes contain cement and will not fully cure for 28 days, as long as it is lightly hosed down with fresh water 12 hours prior to painting, it can be painted after the finish coats have cured for a minimum of 3-4 days.

Painting

One of the following paint systems must be used over the EZpanel finishing plasters to make the system weathertight and give the desired finish colour to exterior walls. Plastershield is a 100% acrylic-based paint that has been specially formulated for use over cement based plasters. Plastered surfaces must be coated with a minimum of 2 coats of Plastershield tinted to the selected colour and applied by brush and roller at a spread rate of approximately 6m2/litre.

As an alternative to Plastershield, a latex based exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 may be used. The paint system must be applied in accordance with the paint manufacturer's instructions.
Other paint systems are not covered by this specification sheet and Specialized Construction Products Ltd will not warrant the use or suitability of alternative paint systems over the surface of its plaster finishes.
The chosen paint system must have a Light Reflective Value (LRV) of no less than 25.

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EZPanel

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Limitations

DO NOT apply plaster when the ambient or surface temperature is below 4°C or above 30°C or will be in that range for the 24-hour period after application. When hot, dry, or windy conditions exist, moist curing and protection must be provided. Material that is allowed to freeze or material that dries too quickly may suffer irreparable damage.

DO NOT add any other materials to the plasters used with the system or deviate from the mixing or application procedures outlined in any of Specialized Construction Product's technical data sheets without written approval from Specialized Constructions Products Ltd.

DO NOT apply any plaster material unless the substrate has been properly cleaned and prepared.

DO NOT add any more water than prescribed by the technical data sheet for the individual products.

DO NOT wet the wall prior to the application of any plaster.

DO NOT reactivate any plaster with more water once it has begun to set.

DO NOT mix more plaster than you can use in 45 minutes.

NOTE: Failure to follow the manufacturer's written specifications could result in the following but not limited to spalling, cracking, peeling, chipping, delamination, discoloration, wash off, and overall system failure.

Maintenance

Any paint film damage must be repaired as soon as possible to prevent water penetration and ensure that the high strength properties of the fibreglass mesh are maintained. Any impact damaged areas must be thoroughly cleared of any loose material and repaired with a 1:1 mixture of resin and water mixed with the required amount of EZpanel plaster. This will ensure a positive bond between the original plaster and the repaired area. Repaint within the following week. The wall cladding system should be regularly cleaned, at least annually, by washing with clean water to remove dirt and to maintain the finish appearance. Grime may be removed with warm water and detergent. Plastered walls should be recoated with an approved paint system at 5 to 8 yearly intervals or sooner if required to maintain weather-tightness. Regular checks, at least annually, must be made of the system to ensure that the weather resistant coating is maintained watertight, and that the sealant, flashings, and other joints continue to perform their function and do not allow water to penetrate. Failure to correctly maintain the system may void any long term warranties offered with the system. Any accidental damage to the cladding must be repaired immediately using Specialized Construction Products materials. For further information please refer to Specialized Construction Products plaster maintenance guide.

Warranty

The recommendations, suggestions, statements and technical data provided by Specialized Construction Products Ltd are based on the best current knowledge available and are given for information purposes only without any responsibility for their use. It is expressly understood and agreed that the buyer's sole and exclusive remedy shall be the replacement of defective products, and under no circumstance, shall Specialized Construction Products Ltd be liable for incidental or consequential damages. Specialized Construction Products Ltd neither assumes, nor authorizes, any others to assume for it any liability with respect to furnishing of the product. Handling and use of the products are beyond the control of Specialized Construction Products Ltd; therefore, no warranty is made, expressed or implied, as to the results or on site quality that can be obtained from the use of the product.

The long-term durability of the EZpanel system is dependent upon the correct preparation and application of all of its components in strict accordance with all the relevant written instructions and detail sheets. On-site application is beyond the control of Specialized Construction Products Ltd and it cannot guarantee workmanship or the correct preparation and application of its products or systems. The certified EZpanel contractor shall take the overall responsibility for; on-site supervision, staff training, installation, and quality control.

System Guarantee Period
15 years from date of practical completion to plastering.

Workmanship Guarantee Period
5 years from date of practical completion to plastering.

Technical Assistance

Assistance and information is available by calling Specialized Construction Products Ltd on **(09) 414 4499** or by e-mail at **info@specialized.co.nz.**

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EZPANEL INSTALLATION GUIDE

EZPanel
LIGHTWEIGHT CONCRETE CLADDING SYSTEM

Project Details

Project Name:

Project Address:

Specification Prepared For:

Specifier's Name:

Date:

Certified Specialized Plastering Contractor:

Licensed Building Practitioner Number:

Contact Us

Specialized Construction Products Ltd

Auckland Branch
79 Porana Rd, Glenfield
Ph: + 64 9 414 4499

Christchurch Branch
178b Carlyle Rd, Sydenham
Ph: + 64 3 365 3202

Tauranga Branch
90a Maleme St, Greerton
Ph: 07 541 3384

info@specialized.co.nz
www.specialized.co.nz

Introduction

The EZpanel System is a cavity based autoclaved aerated concrete (AAC) panel system which when finished with a layer of fibreglass reinforced polymer modified plaster creates a lightweight, highly durable exterior cladding. As well as providing advantages to the exterior envelope by way of increases in impact resistance and performance during fire, EZpanels will not rot, are pest resistant and have excellent sound insulation properties. The exterior nature of the EZpanels also places their insulation characteristics as close as possible to where temperatures fluctuate reducing ongoing energy consumption compared to most conventional exterior wall systems.

The system is applied over a 20mm 0r 40mm cavity. The system is fully flashed around all penetrations to ensure water doesn't enter the cavity. Unlike wet cavity systems, this negates the need for vents through the panels both above windows and under soffits as is required for plastered brick veneer construction.

BRANZ Appraised
Appraisal No.649 (2009)

NEW ZEALAND MADE

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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EZPanel

LIGHTWEIGHT CONCRETE CLADDING SYSTEM

All the uPVC flashings, fibreglass mesh, resin and plaster components used for the EZpanel System must be supplied by Specialized Construction Products Ltd or one of its Certified Distributors.

The EZpanel System has been tested and appraised for use throughout New Zealand. (BRANZ Appraisal No. 649)

This Manual has been set out as near as possible to the actual construction sequence. Preparation, fixing the EZpanels to various types of framing and backgrounds, sealing the joinery and masking out, preparation of EZpanels prior to plastering and finally the plaster techniques and sequences. This guide must be read in conjunction with the detail data sheets for the EZpanel System.

Framing Set Out (Timber or Steel)

Timber framing must comply with NZS3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. In all cases studs must be set out at 600mm maximum centres. Dwangs/nogs must be flush fitted at maximum 800mm centres. Timber framing must have a maximum moisture content of 24% at the time cladding commences.

For steel framing the minimum framing specification is 'C' section studs and nogs of overall section size 75mm web and 32mm flange. Steel thickness must be a minimum of 0.75mm

Building Wrap

A building wrap complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal must be used in all circumstances. Building wrap must be installed horizontally and be continuous around corners. The wrap must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Where studs are at greater than 450 mm centres, polypropylene strap or additional vertical cavity battens must be installed at maximum 300 mm centres to prevent bulk insulation bulging into the cavity. Flexible sill and jamb flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11 or flexible sill and jamb flashing tapes covered by a valid BRANZ Appraisal must be used around all penetrations. All penetrations must have internal air seals applied.

Head Flashings

Proprietary head flashings with minimum ventilation openings of 1000mm2 per lineal metre must be installed over all window heads and door openings. If proprietary head flashings cannot be used, an acceptable alternative flashing must be provided. Please contact Specialized Construction Products Ltd for advice.

Flashings In General

Joists designed to carry decks need to have a continuous flashing fitted before the EZpanels are fixed. Check if there are any special back-flashings required where the EZpanel joins another substrate or curtain wall construction.

Roofing

Where areas over roofs need to be plastered, the roof/wall flashing, including stop ends must be installed by the roofing contractor prior to the commencement of cladding.

Pipes & Meter Boxes

It is critical that pipes are flashed appropriately in accordance with E2/AS1, Fig 68. All pipes must have the building paper turned to the outside of the building and have the building paper taped to the pipe. All pipes must have a downward rake of 5° minimum and must be sealed in place using Silaflex MS or another approved equivalent both before plastering and after the installation of the EZpanel base coat.

All meter boxes must be installed according to the detailed drawings provided with the EZpanel system. A polystyrene wedge must be placed and sealed with a waterproofing membrane onto the top of the meter box and must be able to drain water unimpeded into the cavity behind the cladding.

Particular attention to detail and workmanship must be given to the weatherproofing details contained in the technical literature relating to flashing and sealing building penetrations or junctions with other building materials. All junctions between the EZpanel substrate and dissimilar materials must be correctly flashed and sealed with MS Silaflex or another approved equivalent. The MS sealant must be installed in strict accordance with the manufacturer's requirements and must be left to properly cure prior to plastering.

Scaffolding

Don't accept second best. You need a continuous freestanding scaffold at least 300mm clear of the framing. Movable frames can be used, but you need enough to complete one whole wall at one time.

Site Storage

Products in dry form must be stored in a dry area, off the floor on a timber pallet or timber dunnage and it must be protected from the weather and from mechanical damage. Rotate the stock to ensure that the oldest material is used first. Plaster stock that is older than six months should be discarded. EPS battens, uPVC flashings and profiles must be protected from direct sunlight and physical damage. They should be stored flat and under cover. Liquid components must be stored in a frost free area.

Preparation of Masonry & Concrete Surfaces (Direct Fix Applications)

All nibs, protrusions and excess mortar on the surface of the bricks/blocks or irregularities in the slab must be ground off prior to plastering.

All surfaces to receive an application of the EZpanel System must be clean and free of debris, dirt and dust, efflorescence, grease, oils, curing agents, cleaning solutions, mould and algae or any other contaminants that may affect adhesion. Painted or glossy surfaces must be specially treated prior to the application of any plaster material, please refer to Specialized Construction Products Ltd for specialist advice before you proceed. All cracks that may be the subject to ongoing movement must be correctly repaired and reinforced.

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Some smooth, dense concrete surfaces must be slush coated before the application of the EZpanel with Tankit bonding plaster to ensure suitable adhesion is created, please refer to Specialized Construction Products Ltd for specialist advice before you proceed. Tilt slab and other precast concrete items should be chemically cleaned with a water blaster to ensure any mould release agents are removed before the plaster is applied. All very porous surfaces should be sealed with an appropriate paint sealer prior to the application of the bonding plaster. Failing to correctly prepare the masonry substrate, may affect the aesthetic appearance of the finished wall.

Do not wet down masonry surfaces before plastering and do not apply base coat plaster to surfaces that are wet from rain or overnight dew.

Fitting EZpanel Battens

20mm Cavity - EZpanel battens are manufactured from ultra high density (Class UHD) expanded polystyrene with an approximate density of 28kg/m3 and measure 21mm x 45mm. They must be fixed to the framing with nails/staples or an appropriate polystyrene compatible adhesive in accordance with the batten layout shown in the detail data sheets.

40mm Cavity – EZpanel battens for a 40mm cavity installation are manufactured from either; (a) Ultra High Density (class UHD) expanded polystyrene with an approximate density of 28kg/m3 measuring 41mm X 55mm and are fixed with an appropriate polystyrene compatible adhesive or 50mm galvanised flat head nails or (b) 40 X 40 X 200 H3.2 timber batten ties with a minimum slope of 15 degrees on the top edge, fixed with 75mm galvanised ringshank nails. 40mm polystyrene battens must only be used in situations where the bottom edge of the sheet is fully supported by a rebate in the slab or an appropriate weight bearing lintel.

All battens must be fixed to the framing over the surface of the chosen building paper in accordance with the batten layout shown in the detail data sheets. Additional vertical battens may be required at internal and external corners and openings. At the soffit the airflow must be blocked off with a continuous horizontal batten and gables must be lined or incorporate an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Non-rigid air barriers must have an air resistance of >0.1MN s/m3. Where rigid sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing. Horizontal battens must be a maximum length of 100mm long in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 (f) and can be fixed into place on all noggins/dwangs where required for fixing with a minimum of a 5-degree angle on the top edge. The fewer horizontal battens that are used the better.

Fitting Sill & Jamb Flashings

The use of the EZpanel uPVC sill and uPVC jamb flashings is **MANDATORY.** It is also **MANDATORY** that the sill and jamb flashings are joined in the corner with an EZpanel corner socket using Marley uPVC pipe cement.

Begin by marking and cutting your sill flashing so that it extends 4-5mm past either end of the aluminium joinery (i.e. overall 8-10 mm wider than the window). Once the sill is cut, wipe the left hand end with pipe cement and slide it onto the prongs of the corner socket. Next wipe the right hand end with pipe cement and slide on the right hand corner socket. Slide the socket into place under the window flange and staple it into place as you did with the other end. Next cut your jamb flashings 40mm longer than the length of the window and cut the capillary lip off the top so that the top edge of the capillary lip will finish flush with the top of the joinery when it is slid into place (i.e. overall the jamb should protrude approximately 40mm above the top of the window). Once the jambs have been cut and test fitted, choose one side and wipe the top of the corner socket with pipe cement. Immediately tuck the capillary lip of the jamb flashing behind the flange of the joinery and slide the jamb down into place onto the top of the socket and then repeat the same set of instructions for the other side. When the jambs are in place cut your head flashing 6mm wider than the joinery and glue a uPVC stop end to the flashing before it is stapled into place. Once firmly in place, seal the head flashing uPVC stop ends onto the jamb flashing using Silaflex MS sealant. Once all the flashings are in place seal the jamb flashing to the joinery in the 5mm gap provided by the small block on the jamb flashing and then seal the corner socket to sill flashing. You must also run a bead of sealant along under the joinery to seal the vulnerable gap where the sill flashing meets the joinery.

Sealing around windows is one of the most critical operations for the success of the EZpanel system. The data sheets detail in pictorial terms how the instruction above should be carried out. Follow these details explicitly.
Basic principles to apply when sealing your windows:-

1. Don't be mean with your application of sealant or pipe cement. All beads of sealant must be 5mm across.

2. The sealant has to have a reasonable area to seal against so make sure the background is clean and dry.

3. Always lightly tool or spread your sealant into place with your finger.

Soffits

Soffits shall be fixed into place before the cladding is installed and allowance made to close off the cavity with framing or battens to stop airflow into the roof space. A 5 mm bead of Silaflex MS sealant should be installed at the soffit/EZpanel intersection after the EZpanel is put in place and before plastering commences. In the case of reverse raking soffits or soffits less than 450mm wide a flashing or piece of Protecto EIFS tape shall be provided in accordance with the details shown in the technical literature.

Fixing The EZpanels

The sheets are butt jointed except at corners where one sheet overlaps the other to form a straight finish. The EZpanels must be supported at fixing locations

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with cavity spacers a maximum of 100mm long in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f). Each additional layer of panels must be installed so that the panel joints are staggered by a minimum of 150mm.

All panels must have their edges and there ends buttered with EZfix PU adhesive as they are being installed. The edges of all of the EZpanel sheets must be free of all dust and debris (preferably blown down with compressed air) and should be sprayed down with a mist of water straight before the glue is applied. The glue should be laid in a bead approximately 6-8mm in width before the next sheet is laid onto its edge. This practice should be done as quickly as possible to ensure the glue remains as pliable as possible to aid in the adhesion of the panels. Care must be taken when applying the glue to ensure it does not ooze either into the cavity or onto the outside of the dwelling. Once the panels have been joined and screwed into place any excess glue that oozes out of the joints between the panels should be wiped off or cut from the surface before it has fully cured. The glue must be allowed to dry before the application of the mesh coat.

Care should be taken to carefully cut any irregular shaped holes that may be required. A jigsaw with a steel tooth blade is ideal for this purpose. It is not acceptable to simply cut a square hole for a round outlet and then assume the remaining gap will be plugged with plaster. Gaps and holes in and between the panels must only ever be filled with Ezstop Plaster and must not be filled with expanding foam. The differential thermal characteristics of the expanding foam and the AAC panels will generate a weak point in the system that can be susceptible to thermal cracking.

At the base of walls the finished level of the EZpanel must be at least 50mm below the supporting framing. Additional framing may be required at soffits, internal and external corners and window and door openings for the support and fixing of sheet edges.

Construction joints must be provided as follows:

Horizontal Control Joints – at maximum 6.0m centres and at inter-storey floor levels where unseasoned timber floor joists are used

Vertical Control Joints – at maximum 8.0m centres; aligned with any control joints in the structural framing, or where the system abuts different cladding types

Care should be taken with the chosen placement of control joints. To avoid difficult multi-faceted joints between the various PVC extrusions used in the EZpanel System, control joints should be placed away from the edges of joinery by a minimum of 400mm. Placing control joints directly above and below the joinery creates a weak point where the PVC's intersect that could lead to potential water ingress if not maintained or excessive movement occurs.

Construction joint details are provided in the drawings provided with the system. Inter-storey drained joints must be provided for walls over 2 storeys in height in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4(b). Inter-storey junctions must be constructed in accordance with the technical literature.

The bottom edges of the EZpanels can either be capped with a 50mm High Back U-Channel which is attached to the bottom plate of the dwelling prior application or with a 50mm lipped base bead once they have been fixed into place and trimmed as may be necessary.

Timber Framing

There are four categories listed in NZS 3604: Low, Medium, High and Very High. The 'Building Wind Zone' for the job to be completed must be clearly understood before the application of any plaster.

Fixing Over EPS Battens

EZpanel panels are fixed through the polystyrene cavity battens and spacers to the studs with 100mm or 120mm long Class 4 galvanised or Grade 302 stainless steel screws that have a head size of 14mm. Typically the screws are placed into the panels 150mm from the outside edge giving overall fixing centres of approximately 300mm. Two screws should be put into each stud per panel. Refer to the table 1 for fixing centres.

Table 1: NZS 3604 Wind Zone Fixing Centres for EZpanel Edges and Intermediate Studs

Wind Zone/Pressure	Fixing Centres
Low	300mm
Medium	300mm
High	300mm
Very High	300mm

In high and very high wind zones the screw spacing around penetrations should be reduced to approximately 200mm. This ensures any possible movement between the joinery frame and the finished EZpanel is greatly reduced.

Fixing Over Timber Batten Blocks

For timber framed buildings, installations in NZS3604 Wind Zones up to, and including, 'Extra High' and specific design wind pressures up to and including design differential 2.5kPa ULS, the cavity battens must be fixed to the timber framing with two 75mm long galvanised or stainless steel ring-shank nails. Battens are fixed to studs at maximum 600 horizontal centres, at all horizontal joints between the EZpanels. Additional battens may be required at corners and around openings. The EZpanels are fixed to the battens with 10g x 75mm long, countersunk head Class 4 galvanised screws (Grade 302 Stainless in sea spray zones). The screws must be positioned 50mm minimum from the edge of the panel and the fixing heads must finish 5mm below the surface of the panel.

Steel Framing

The same fixing centres apply as for timber framing. Use Specialized Construction Products Ltd self-drilling 100 mm long AS 3566 Corrosion Class 4 self-drilling screws with a head diameter of 14 mm and a shank diameter of 5.1 mm in NZS 3604 defined Corrosion Zones 1, 2, 3 and 4 and Grade

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304 Stainless Steel in the sea spray zone.

Concrete & Masonry

(Note: This application is outside the scope of the BRANZ Appraisal.)
To bond EZpanel to masonry surfaces mix up Specialized Construction Products Fine Base Coat plaster with the addition of 1 litre of Specialized Construction Products resin per bag. Cut the EZpanel to size and check the fit. All of the EZpanel to receive a coat of Fine Base Coat must be properly sealed prior to the application of the plaster. To seal the panel a mix of 2 parts water to 1 part Specialized Resin must be painted over the surface and allowed to dry before bonding commences. Failing to correctly prepare and seal the aerated concrete substrate may cause delamination or failure. Once sealed apply the Fine Base Coat plaster to the back of the sheet with a grooved trowel around the perimeter and in vertical strips every 400mm. If there isn't a rebate in the concrete slab, EZpanel masonry anchors must be used to hold the sheets in place while the plaster is drying and to provide a mechanical fix for the EZpanel. Bed each sheet back against the wall, keeping a check that the sheets are flat by using a straight edge across their face. To ensure no thermal bridges are formed keep all the edges closely butted and clear of adhesive plaster.

Finishing The EZpanel

Around the base of the building ensure all lines are straight and level. Trim and adjust where necessary.

Use a two metre straight edge and check the flatness of the EZpanel surfaces. Use a Durarasp to sand off any large irregularities or Specialized's 'Ezstop' plaster to fill any large hollows in the surface of the EZpanels to ensure the surfaces are level and the corners and edges are straight. When sanding and/or skimming is complete, sweep the walls clean of any loose material or dust.

Only once you are satisfied with the flatness of the EZpanel and the lines of the edges, fix any additional uPVC beading (i.e. uPVC corners and base U-channels) and seal around the perimeter (i.e. under the soffit).

Fixing The UPVC Beads

All exposed EZpanel corners and bottom edges must be protected by gluing on the appropriate uPVC section. Your detail drawings show what bead goes where.

The beads are glued on with Maxilam PB Adhesive. Apply glue to all contact surfaces. With the cartridge glue, slide each uPVC bead along the EZpanel edge to spread the glue, pull away slightly for 20 seconds, and then slide into place. This spreading of the glue and allowing a few seconds for the solvents to "flash off" is very important. If you don't, the bead can come unstuck. Be careful not to cover the drainage holes punched in the base extrusions with glue.

Masking

Careful masking of windows, doors, roofing, decks and any other areas where plaster overspray or plaster droppings may occur is critical. Don't be mean with your protection work as it is a very costly exercise to replace roof areas and glazing because your masking wasn't up to the job. Use uPVC or vinyl tape for masking, wet strength masking paper or preferably plastic sheet material.

1. Mask out windows or doors completely to the edge of the aluminium. This will provide a nice finishing line for the 5mm sealant detail. Mask all other areas 5mm away from the edge of the EZpanel to allow for plaster build-up. Use uPVC, cloth or vinyl tape around the perimeter.

2. Don't be tempted to use the paper-backed masking tape where it will get plastered over. The tape softens and falls off.

3. After the mesh/plaster coat or subsequent base coats (not the final texture coat) remove excess plaster by running your finger around the edge masking tape, and then clean the wet plaster edge with a damp paint brush. This ensures the masking tape isn't buried under hard plaster.

Stopping Up

After the EZpanel has; been sanded flat and cleaned down, the uPVC flashings are in place, the windows are sealed, and all the masking is complete, all surfaces that are to be plastered must be sealed using EZpanel sealer. Using a hawke and trowel, or broad knife and EZstop plaster; fill all the screw head holes, stop up and level out the edges of all uPVC beading and fill in any remaining out of level areas of sheet joints. It is important not to "over-stop" screw holes or joints. Don't leave thick edges of plaster because they will "grin through" the finished work.

Sealing The Substrate

The surface of the EZpanels must be properly sealed prior to the application of any plaster. To seal the EZpanels, apply one good coat of undiluted Specialized EZpanel sealer over the entire surface of the dwelling and allow it to completely dry before plastering commences. EZpanel sealer can be applied with a pump-up sprayer, long nap roller or wide paint brush at a spread rate of 10-12m2 per litre. Failing to correctly prepare and seal the surface of the aerated concrete panels may cause delamination, chalking or failure in the base coat.

EZpanel Plaster Preparation

The instructions for mixing are clearly spelt out on the bag. Note: During summer, you can add one litre of resin per bag to help the plaster cure better in hot weather.

It is important that each mix stands for approximately 10 minutes, and is then re-stirred and the final consistency adjusted. This allows the thickening agents in the plaster to take effect and stops the brew becoming too thick too quickly. Do not use plaster that has been mixed for more than one hour. The plaster will continue to stiffen slightly over the hour.

If you are spraying fine base coat plaster to provide a textured finish it is acceptable to add small amounts of water to maintain a regular consistency. In fact if you don't keep the plaster mix adjusted with a little water every now and then, your texture coat will

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vary. Clean your hopper gun, stirrer and bins between mixes. This will stop you getting contamination in fresh mixes, and will keep your gun spraying evenly.

Plaster & Mesh Coat

The areas around all penetrations should be completed first using EZpanel Base Coat or Fine Mesh Coat to bed soft flexible 160g/m2 alkali resistant mesh. A piece of soft mesh must be used to reinforce the sill, jamb and head flashing onto the surface of the panels and in the corner of any penetration where the sills and jambs meet. Make sure the plaster is scraped hard back to the EZpanel on the outer edges of the mesh. Once all the window reveals, parapet tops and backs, bottom edges and other awkward areas have been completed using the soft flexible narrow mesh, all the flat areas of wall should be done using a 160g/m2 alkali resistant hard mesh combined with EZpanel Base Coat plaster.

EZpanel Base Coat plaster is usually trowel applied with a long 20" x 4" or 20" x 5" steel trowel. The large trowel ensures the first coat of plaster can't be squeezed out too thin.

1. Start at the corner of a wall. Check all masking is done and drop cloths are in place. Plaster a full height section of wall about one and a half metres wide (the width of the mesh). You are aiming for 3mm thickness with this first coat.

2. Cut a length (drop) of mesh slightly longer than the wall area to be covered. Place the mesh against the wet plaster at the top of the EZpanel. The outer corner edge of the mesh must be 100 to 200mm past the corner of the wall.

3. Wipe the mesh very lightly at first into the plaster, starting at the middle and working out. Make sure there are no bubbles or wrinkles in the mesh. Once the mesh is flat against the plaster, apply an even trowel pressure and embed the mesh just below the surface of the plaster. Do not force the mesh hard down onto the surface of the EZpanel. The mesh pattern should be "grinning" through, but the mesh itself completely covered with plaster.

4. Apply a 100 to 200mm band of plaster around the corner and embed the overhanging corner mesh. Once embedded scrape away the plaster at the edge of the mesh to ensure there is no plaster ridge there when you join on later.

5. Repeat the process. Drops of hard mesh do not have to overlap but should be tightly butt joined. If the mesh isn't going to be overlapped any butt join that is created must offset any vertical join in the panels by a minimum of 150mm. The mesh and plaster coat must cover all EZpanel surfaces including the EZpanel edges around all window reveals and sills.

6. At the corners of all openings, apply a second layer of mesh 100 x 200mm (butterfly) embedded on the diagonal. This greatly reduces the chance of any subsequent cracking at these high stress points.

Finishing Options

There are four options once the first mesh and plaster coat have been applied: -

Option 1: Stucco Texture

Fine base coat plaster can be sprayed through a hopper gun or a sagola gun to achieve a heavy stucco plaster finish.

Each 20kg bag of Fine base coat plaster is mixed with approximately 5 litres of clean drinking water. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it a quick restir before application and adjust the final consistency if it is necessary.

The object is to spray on a "wet" second coat of plaster 1 to 2mm thick that will flow together to form a solid flat looking texture coat. The technique could be likened to spray painting where you move on once you have achieved a "wet" finish. Fine base coat plaster mixed wetter than for a mesh coat, sprayed through a hopper gun with a 9mm tip is best for this type of texture.

Once the first spray coat is starting to "tack-off" or going grey dry, you can start to apply the final texture coat. The plaster mix for this third and final coat is about the same as for the mesh coat or slightly stiffer and is known as a "flick coat". The object is to have a plaster mix that won't run together like the previous coat. Use a 7mm nozzle.

The final texture coat is only meant to be a quick flick. The "flick-coat" will even out any discrepancies and provide a uniform texture finish. You will only use approximately 20% of the amount of plaster you used to do your first coat of spray texture. Spray part of this final texture in horizontal bands and part in vertical bands to ensure a uniform even finish. Do not stay too long in one area, as the texture coat will flow together, causing patchiness.

Always texture the external and internal corners first before doing the adjacent large wall areas. It is also good practice to spray the reveals around windows from the inside out and then fill in the areas of wall between these places.

A stucco spray texture must be finished with two coats of Plastershield100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

Option 2: Float Finish

Float Finish is a polymer modified cement based plaster which is polished flat to achieve a fine granular finish. The smooth plaster will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day.

Each 20kg bag of Float Finish is mixed with approximately 5 litres of clean drinking water. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it

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a quick restir before application and adjust the final consistency if it is necessary.

On large walls float finish should be applied by two or more people to ensure a wet edge is maintained. Float finish must be applied in two coats to ensure an even texture is achieved. Begin by trowelling on one tight coat of the float finish plaster with a large steel trowel using the aggregate in the plaster to establish the thickness. Once the first coat has dried, trowel on another coat of the same material (mixed to a slightly thinner consistency) over its surface. As soon as this coat has been laid down with the steel trowel flat, begin polishing its surface with a hard plastic float in a circular motion. This will cut the surface of the wall flat. Regularly clean the excess plaster off the plastic float with a broad knife to reduce the potential for swirl marks. If the plastic float is picking up too much material or is leaving swirl marks on the surface, this indicates that the plaster has not been laid on tight enough with the steel trowel. Finish with a gentle polish of the surface with the plastic float to minimise any slight swirl marks or surface irregularities. Every now and again stand back a couple of metres from the wall and inspect your work to ensure an even finish is being achieved.

Float finish can either be left as it has been finished with the plastic float or while it is still wet (but firm to touch), normally only 5 minutes after application, it can be polished with a damp sponge to close the pores in the texture. Polishing the surface of the walls with a sponge will also remove a small amount of the fines in the plaster giving the wall a grainy look.

Float Finish must be finished with two coats of Plastershield 100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

Option 3: Spanish Finish
Spanish Finish is a polymer-modified, cement based plaster used to achieve an undulating adobe style finish. This product can be applied in various thicknesses and using a number of different techniques.

Before finish coating begins ensure the style of finish that is desired has been correctly communicated and understood by the plasterer. A trial sample is highly recommended.

Each 20kg bag of Spanish Finish is mixed with approximately 5 litres of clean drinking water. Once you have established how much water gives you the consistency you want, maintain this measured amount of water for the rest of your mixes. Place all the water for your plaster mix into a clean bucket and while stirring with a powered whisk, add the 20kg bag of plaster and mix to an even consistency. Let the mix stand for 5 minutes and give it a quick restir before application and adjust the final consistency if it is necessary.

The finished thickness of the Spanish Finish must be between 2 to 10mm.

To achieve an uneven application of the Spanish finish use a short steel trowel and apply the plaster in a random fashion using a good amount pressure. Avoid excessive movement of the plaster under the trowel once it has been applied to the wall, otherwise you run the risk of delamination. Allow a little time for the plaster to 'suck off' and then polish all the sharp marks out of the surface using a damp sponge.

If a very thick layer of Spanish finish is being applied for a heavy pattern, wiping over the undulations using a wet soft bristled paint brush can help to soften the surface before it is sponged.

Spanish Finish must be finished with two coats of Plastershield100% acrylic paint or an approved latex exterior paint system in accordance with the paint specification.

Option 4: Baumit GranoporTop 1.5mm Acrylic Texture or GranoporFine 1.0mm Acrylic Texture
(It is recommended to seal the base coat plaster with Baumit Tiefengrund primer before applying Baumit Granopor. Allow to dry for 24 hours).
GranoporTop 1.5mm Acrylic Texture is a ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish.
GranoporFine 1.0mm Acrylic Texture is a ready to use, synthetic resin-based render which is polished flat to achieve a fine granular finish or sprayed through a hopper gun or a sagola gun to achieve a fine stippled appearance. Smooth textures will not cover up background imperfections, particularly when walls are subject to side lighting at certain times of the day.

Granopor is to be mixed thoroughly with a stirrer before application. The consistency can be adjusted by adding a little bit of water. Baumit Granopor is to be applied to the entire surface with a rust-free steel trowel or sprayed on with a suitable plaster machine, levelled to grain thickness and rubbed with a plastic plasterer's float. Do not mix with other substances. Work evenly and without interruption.

Air, material and subsurface temperatures have to be higher than +5 degrees Celsius during processing and setting. Protect façade against direct solar radiation, rain or strong wind (e.g. scaffolding protection net). High temperatures during summer shorten the drying time and can lead to untimely drying out of the plaster.

Curing

The curing time of finishing plaster will vary due to ambient temperature, relative humidity, surface temperature, surface porosity, application methods, and/or the thickness of the material. All freshly applied material must be protected from inclement weather for a minimum of 24 hours after application. It is the responsibility of the plaster applicator to determine if the product is cured and/or dry prior to applying any additional coats that may be required or exposing the applied product to rain, snow, dew, and/or any other inclement weather condition that may have a detrimental effect. Although some of the finishes contain cement and will not fully cure for 28 days, as long as it is lightly hosed down with fresh water 12 hours prior to painting, it can be painted after the finish coats have cured for a minimum of 3-4 days. Acrylic plaster finishes can be painted as soon as the finished surface has

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hardened enough for application to take place.

Paint specification

One of the following paint systems must be used over the EZpanel finishing plasters to make the system weathertight and give the desired finish colour to exterior walls.

Plastershield is a 100% acrylic-based paint that has been specially formulated for use over cement based plasters. Plastered surfaces must be coated with a minimum of 2 coats of Plastershield tinted to the selected colour and applied by brush and roller at a spread rate of approximately 6m2/litre. If a dark colour is being applied, we highly recommend that a coat of lime stop/limelock is applied to the finished plaster before painting commences.

As an alternative to Plastershield, a latex based exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 may be used. The paint system must be applied in accordance with the paint manufacturer's instructions.

Other paint systems are not covered by this specification sheet and Specialized Construction Products Ltd will not warrant the use or suitability of alternative paint systems over the surface of its plaster finishes.

The chosen paint system must have a Light Reflective Value (LRV) of no less than 25.

Limitations

DO NOT apply plaster when the ambient or surface temperature is below 4°C or above 30°C or will be in that range for the 24-hour period after application. When hot, dry, or windy conditions exist, moist curing and protection must be provided. Material that is allowed to freeze or material that dries too quickly may suffer irreparable damage.

DO NOT add any other materials to the plasters used with the system or deviate from the mixing or application procedures outlined in any of Specialized Construction Product's technical data sheets without written approval from Specialized Constructions Products Ltd.

DO NOT apply any plaster unless the substrate has been properly cleaned and prepared.

DO NOT add any more water than prescribed by the technical data sheet for the individual products.

DO NOT wet the wall prior to the application of any plaster material.

DO NOT reactivate any plaster with more water once it has begun to set.

DO NOT mix more plaster than you can use in 45 minutes

NOTE:
Failure to follow the manufacturer's written specifications could result in the following but not limited to spalling, cracking, peeling, chipping, delamination, discoloration, wash off, and overall system failure.

General

1. Use longer steel trowels rather than short ones. The longer trowel covers the area quicker and gives a flatter finish. A long trowel will stop workers from skimping on plaster, as they are unable to push the mesh back into a thin coat of plaster. This helps quality control.

2. Have plenty of plaster buckets and water buckets on the job. Keep a 3" paint brush and water bucket handy for finishing those narrow edges and corners.

3. When applying a stucco texture keep your hopper gun clean and adjusted and your compressor pumping out 90 to 100 PSI. Remember once or twice every day to clean out your air jet with a 1/8" drill bit. A piece of wire or nail will not do this job and is unacceptable.

4. When you are spraying, maintain your plaster mix consistency as you use the plaster. Add a little water when you feel the plaster has stiffened a little. This is critical for a good texture coat. Do not attempt this with plaster that is older than 30 minutes.

5. Organise your day to try and keep out of the hot summer sun particularly round the middle hours of the day.

6. Try and complete a full length of wall in one go, otherwise it can be difficult to disguise the "cold" joint where you restart the next day. If circumstances prevent you finishing a complete wall, try and stop under the middle of a window opening or something similar. Ensure that you leave a leading edge of mesh uncoated so that you can overlap the new drop of mesh the next day. Also scrape off any excess plaster to further reduce the chances of the "cold" joint showing.

7. The fibreglass mesh must not bridge over any construction joints.

8. There must be no horizontal surfaces of EZpanel wall cladding which will be subject to water ponding.

9. Ensure there is no possibility of water leaking in behind the coating due to poor sealing around projections, etc.

10. Any exposed top or bottom edges of sheets must be protected by UPVC beads or by continuing the plaster system over the edges of the sheets.

11. Carefully peel back masking tape so that the masked edge is left undisturbed. Remember, it is important not to leave this job till last. Pull off masking tape as soon as is practicable, preferably while the finish coat is still "green". This will enable you to clean all masked edges with a dry paintbrush and remove/knock off any larger dags of plaster texture.

12. Alkaline EZpanel plaster will mark aluminium joinery and "Colorsteel" roofing. Any overspray must be cleaned off immediately.

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Maintenance

Any paint film damage must be repaired as soon as possible to prevent water penetration and ensure that the high strength properties of the fibreglass mesh are maintained.

Any impact damaged areas must be thoroughly cleared of any loose material and repaired with a Tankit plaster. This will ensure a positive bond between the original plaster and the repaired area. Refinish and repaint within the following week.

The wall cladding system should be regularly cleaned, at least annually, by washing with clean water to remove dirt and to maintain the finish appearance. Grime may be removed with warm water and detergent.

Plastered walls should be recoated with an approved paint system at 5 to 8 yearly intervals or sooner if required to maintain watertightness. Regular checks, at least annually, must be made of the system to ensure that the weather resistant coating is maintained watertight, and that the sealant, flashings, and other joints continue to perform their function and do not allow water to penetrate. Failure to correctly maintain the system may void any long-term warranties offered with the system. Any accidental damage to the cladding must be repaired immediately using Specialized Construction Products materials.

Warranty

The recommendations, suggestions, statements and technical data provided by Specialized Construction Products Ltd are based on the best current knowledge available and are given for information purposes only without any responsibility for their use. It is expressly understood and agreed that the buyer's sole and exclusive remedy shall be the replacement of defective products, and under no circumstance, shall Specialized Construction Products Ltd be liable for incidental or consequential damages. Specialized Construction Products Ltd neither assumes, nor authorizes, any others to assume for it any liability with respect to furnishing of the product. Handling and use of the products are beyond the control of Specialized Construction Products Ltd; therefore, no warranty is made, expressed or implied, as to the results or on site quality that can be obtained from the use of the product. The long-term durability of the EZpanel system is dependent upon the correct preparation and application of all of its components in strict accordance with all the relevant written instructions and detail sheets. On-site application is beyond the control of Specialized Construction Products' and it cannot guarantee workmanship or the correct preparation and application of its products or systems. The licensed EZpanel contractor shall take the overall responsibility for on-site supervision, staff training, installation, and quality control.

System Guarantee Period

15 years from date of practical completion to plastering.

Workmanship Guarantee Period

5 years from date of practical completion to plastering.

Technical Assistance

Assistance and information is available by calling Specialized Construction Products Ltd on **(09) 414 4499** or by e-mail at **info@specialized.co.nz.**

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BC201209
CBI 5113
March 2007

GIB Aqualine®
Wet Area Systems

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

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GIB®

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GIB Aqualine® Wet Area Systems Specification and Construction Guide

- Residential and non-residential applications.
- Bathrooms, laundries, toilets and kitchens.

GIB Aqualine® Wet Area Systems, March 2007

Winstone Wallboards Ltd accepts no liability if the GIB Aqualine® Wet Area System is not designed and installed in strict accordance with instructions contained in this publication.

Use only the Current Specification

This publication may be superseded by a new publication. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Before proceeding, you should check that this is the current version of the publication. Simply call the GIB® Helpline on 0800 100 442 or visit www.gib.co.nz

Beware of Substitution

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

Customised Design Solutions

The systems detailed in this book should cover most common wet area situations. However, for projects where specific performance is necessary, GIB® Technical Services can assist you to develop customised solutions. Simply contact us through the GIB® Helpline on 0800 100 442.

This publication supersedes the following publication:

GIB Aqualine® Wet Area Systems, October 2002 (v2).

BRANZ Appraised
Appraisal No.427 [2007]

GIB Aqualine® Wet Area Systems, March 2007.

Reprinted May 2012

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Introduction

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THIS PUBLICATION

This publication is not intended as the definitive guide on wet area construction and wet area systems, but rather as a helpful guide to best practice around areas where there is intermittent water exposure and splash zones within residential and non-residential buildings – in particular, areas covered by the New Zealand Building Code (NZBC), Clause E3 Internal Moisture.

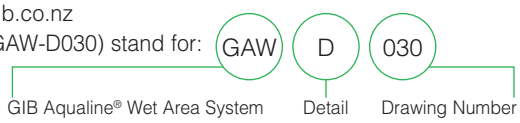
The information herein is designed to be helpful to designers, contractors and home-owners wishing to achieve a result that is easy to incorporate into modern design, simple and clear to construct, and that will satisfy the needs, requirements and expectations of both the NZBC and the end user.

Wet areas in the home often require relatively frequent and expensive renovation or repair, often because of the ingress of water to the structure of the building.

It is important to introduce materials and systems which have been specially designed to cope with the conditions that are common in wet areas, and to ensure they are installed correctly, using best practice, and are compatible to form a complete wet area system.

The code numbers shown with each "typical detail", e.g. GAW-D030, match the code numbers for drawings available as downloads on the GIB® website at www.gib.co.nz

The reference numbers (e.g. GAW-D030) stand for:



WHAT IS A WET AREA?

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Wet areas fall into two categories; these are well explained and documented in the NZBC, Clause E3.

1. Water splash areas – These are areas subject to intermittent splash of liquid water around sanitary fittings and appliances such as baths, vanities, laundry tubs, sinks, etc. These areas are required to have an impervious, easily cleaned surface.
2. Shower enclosures – These are areas subject to more frequent, larger quantities of water, and include shower enclosures and shower over bath areas. The NZBC E3/AS1 requires these areas to be impervious, and specifically excludes any paint and wallpaper finishes. Where ceramic tile or stone finishes are applied, E3/AS1 requires that they "shall be laid on a continuous impervious substrate or membrane".

The requirements of these wet areas are described on page 6 of this publication and in full in Clause E3 of the NZBC. Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management, which will require separate consideration. Ongoing maintenance of wet areas is also important to maximise the life of the wet area.

GIB AQUALINE®

Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or moisture.

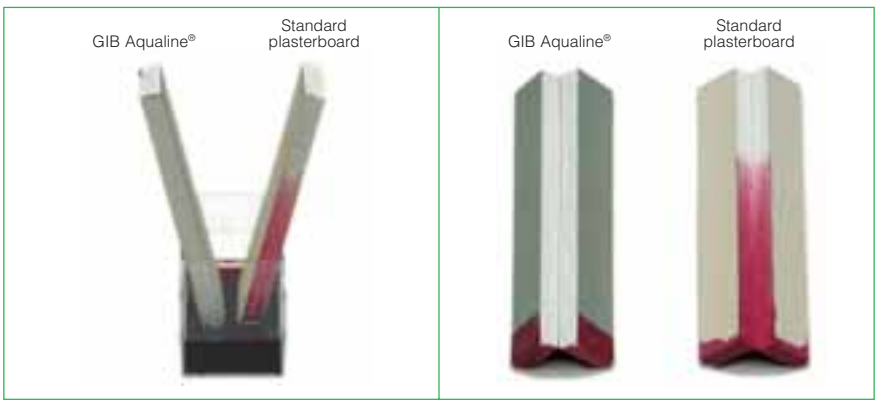
The NZBC does not call for water resistant linings in wet areas but it is highly desirable to incorporate lining materials which will maintain their integrity longer when exposed more frequently to water or steam and particularly to one-off events such as leakages or flooding of a room.

GIB Aqualine® is ideal in such situations because it features a water resistant wax polymer impregnated core.

Unlike other commonly used substrates, the GIB Aqualine® core not only resists penetration of water through the lining into the framing behind, but also resists water "wicking" up the core, a common cause of long-term damage where a water resistant lining has not been used.

GIB Aqualine® will maintain its integrity for extended periods, particularly where wicking over large areas can destroy the integrity of the interface between the lining and paint or wallpaper surfaces or between the lining and the tile adhesive.

The illustrations below graphically show the difference between GIB Aqualine® and standard plasterboard after a two-hour soak test in red dye.



Introduction/Design Considerations

GIB AQUALINE® *continued*

Where to Use GIB Aqualine®

Though not required by NZBC, it is highly desirable to include GIB Aqualine® in all areas at risk of water or moisture damage, in order to prolong the life expectancy of that space.

They include:

	WALLS	CEILINGS
BATHROOMS	✓	✓
SHOWERS	✓	✓
LAUNDRY	✓	✓
KITCHEN	✓	
TOILET	✓	

Benefits

- Water resistant and durable to help protect against water damage
- Proven substrate for paint, wallpaper, tiles, sheet vinyl and rigid sheet shower linings with installations in over 300,000 bathrooms in New Zealand
- Suitable for both residential and non-residential applications
- Dimensionally stable, will not buckle or warp, hence an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains fibreglass and other additives for strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB® Noise Control Systems (see Compliance with the NZBC, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details
- Green face paper for ease of recognition.

Sheet Dimensions and Weights

SHEET DIMENSIONS (ALL SHEETS 1200mm WIDE AND TE/TE)		MAXIMUM WEIGHT/m²
Thickness (mm)	**Length (mm)**	
10	2400, 2700, 3000, 3600	7.8kg
13	2400, 2700, 3000, 3600	10.2kg

Handling and Storage

- GIB Aqualine® must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB Aqualine® must be handled as a finishing material.

APPRAISAL

The document entitled *GIB Aqualine® Wet Area Systems* 2007 has been appraised by BRANZ, Appraisal Certificate, No. 427 (2007).

COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC)

Structure – Clause B1

The design and material specification for steel and timber framing used in GIB Aqualine® systems must be in accordance with the performance requirements of NZBC Clause B1 (Structure). See Bracing in Wet Areas on page 5.

Durability – Clause B2

When installed and maintained in accordance with this literature, GIB Aqualine® tiled or vinyl covered systems have a serviceable life of at least 15 years. They comply with the requirements of NZBC Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, showers over baths and splash-backs.

When used as a general wet area lining and maintained under normal dry internal conditions, GIB Aqualine® systems have a serviceable life of at least 50 years and comply with NZBC Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

Spread of Fire – Clause C3

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZBC Clause C3 (Spread of Fire). When GIB Aqualine® is substituted into fire rated systems in place of the equivalent thickness GIB Fyreline®, the Fire Resistance Rating (FRR) of that system will be maintained.

Design Considerations

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COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC) *continued*

Internal Moisture – Clause E3

When installed in accordance with this literature, tiled or vinyl covered GIB Aqualine® systems may be used in areas directly exposed to liquid water, such as showers, to provide an impervious and easily cleaned wall surface. These systems comply with the requirements of NZBC Clause E3 (Internal Moisture).

Hazardous Building Materials – Clause F2

At no stage during handling, installation, or serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZBC Clause F2 (Hazardous Building Materials). Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is recommended.

Ventilation – Clause G4

NZBC Clause G4 (Ventilation) requires buildings to have a means of collecting or otherwise removing steam generated from laundering, utensil washing, bathing or showering. To prolong the life of interior linings and surface finishes and to minimise the risk of moisture related problems such as condensation and mould growth, adequate heating and mechanical ventilation must be provided in kitchens, bathrooms and laundries.

Airborne and Impact Sound – Clause G6

GIB® Noise Control Systems can be used to provide ratings for Sound Transmission Class (STC) and Impact Insulation Class (IIC) in accordance with the requirements of NZBC Clause G6 (Airborne and Impact Sound). When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information contact the GIB® Helpline 0800 100 442.

LIMITATIONS

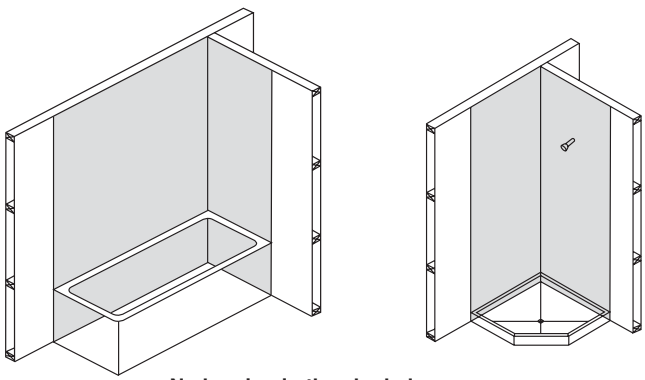
- GIB Aqualine® must not be used for bracing purposes in shower cubicles or above baths (see Bracing in Wet Areas below)
- Do not use GIB Aqualine® where it may be exposed for extended periods to humidities of 90% RH and above. Such areas include group shower or steam rooms as well as moisture and chlorine rich environments such as indoor swimming pools
- GIB Aqualine® must not be directly applied to solid plaster (gypsum or cement), wood based sheet linings or similar materials, masonry or concrete. GIB Aqualine® may only be applied to these materials where timber strapping or steel furring channels are installed
- GIB Aqualine® must not be installed over a vapour barrier or a wall acting as a vapour barrier
- Cracked or damaged sheets must never be used
- GIB Aqualine® must not be used in external applications
- GIB® plasterboard must not be exposed to temperatures in excess of 52°C for prolonged periods. Heat-generating devices may include halogen lighting, cooking elements, radiant heating, solid fuel exhausts and fire surrounds. Consult the appliance manufacturer for installation details.

BRACING IN WET AREAS

Bracing elements are required to have a durability of 50 years. GIB® 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® Bracing Systems can be used in water-splash areas as defined by NZBC Clause E3/AS1, provided these are maintained impervious for the life of the building.

GIB Aqualine® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB Braceline® Nails or GIB Braceline® screws at 100mm centres, using the GIB Braceline® corner fixing pattern.



No bracing in the shaded areas.

Design Considerations

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NEW ZEALAND BUILDING CODE

E3.3.4 requires impervious and easily cleaned surfaces to all surfaces adjacent to sanitary fixtures or laundering facilities.

E3.3.5 requires that surfaces of building elements likely to be splashed or contaminated in the course of the intended use of the building must also be impervious and easily cleaned.

E3.3.6 requires that surfaces of building elements likely to be splashed must be constructed in a way that prevents water from penetrating behind linings or into concealed spaces (e.g. wall cavities).

Walls in wet areas therefore need to be addressed according to whether they fall within the scope of one of the following descriptions:

1. Wall surface likely to be splashed
2. Shower walls. Although not a requirement of NZBC it is highly recommended that the wall surfaces within 150mm of the top edge of a bath, and the vertical faces immediately under the edge of a bath, are treated in the same way as for a shower wall.

WALL SURFACES IN AREAS LIKELY TO BE SPLASHED

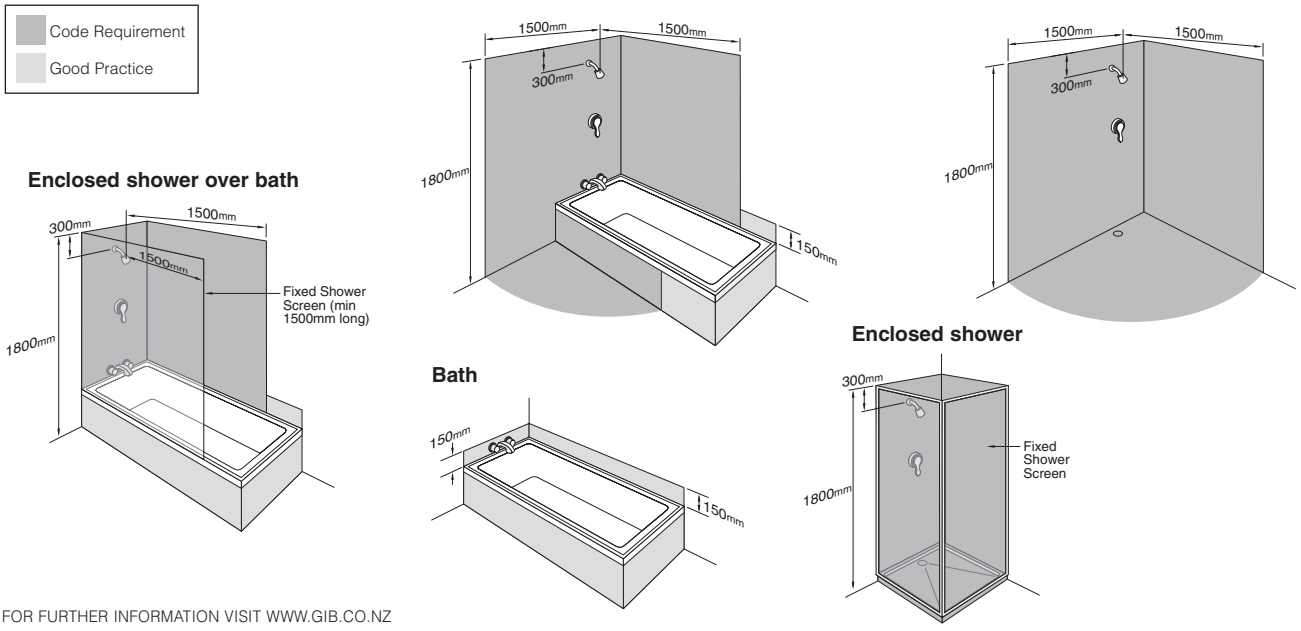
Suitable linings include:

a. Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints
b. Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use
c. Cement based solid plaster or concrete having a steel trowel or polished finish (semi-gloss or gloss paint must be used if a paint finish is required)
d. Cork tile or sheet sealed with waterproof applied coatings
e. Monolithic applied coatings having a polished, non-absorbent finish (e.g. terrazzo)
f. Sheet linings finished with vinyl coated wallpaper, or semi-gloss or gloss coating
g. Water resistant sheet linings finished with decorative high pressure laminate or factory applied polyurethane or resin
h. Modular or multiple lining units which are themselves *impervious* and easily cleaned, and are installed with *impervious* joints
i. Timber or timber-based products such as particleboard sealed with waterproof applied coatings.

NB: Floor surfaces and floor/wall junctions are required by E3 to be impervious.

SURFACES IN SHOWERS AND AROUND BATHS

Suitable linings include all of the above, but **NOT including items (d) and (f) from the above list.**
Note that a waterproof membrane complying with AS/NZS 4858: 2004 **MUST** be applied to all lining materials used under ceramic tiles in these areas.
The waterproof membrane must extend to a 1500mm horizontal radius from a shower rose unless the shower is contained within a fixed enclosure. A shower curtain does not constitute a fixed enclosure.
Particleboard manufacturers recommend that in wet areas, panels should be protected with a suitable wet area membrane or an integrally waterproof sheet material. Some local authorities call for this treatment on all timber based floors. Local requirements should be checked before proceeding.
Dark grey shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membranes prior to tiling. Light grey shaded areas represent good practice.



Design Considerations

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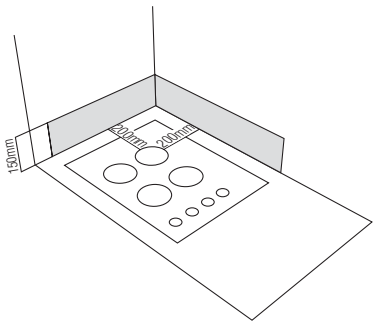
WALL SURFACES SURROUNDING COOKTOPS

The protection of combustible surfaces surrounding gas cooking appliances is covered by NZS 5261. Consult the current version of this standard to ensure compliance.

However, as a guide the following options are acceptable for wall surfaces within 200mm of the periphery of a gas element to a height of 150mm above the element for the full dimension (width and depth) of the cooktop surface area:

- 5mm ceramic tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the requirements of Clause 2.6.2.6 of NZS5261.



Because of the moisture generated by cooking, it is highly recommended that GIB Aqualine® is used in kitchen areas.

GIB® plasterboard products must not be exposed to temperatures in excess of 52°C for sustained periods. Check with the appliance manufacturer that this requirement will be met. However, it would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.

PENETRATIONS AND SEALANTS

As leaks and water ingress typically occur at junctions between building elements and at penetrations, it is essential that particular attention is given to these details at the time of installation. Lack of attention to detail can result in water damage that could remain undetected for a long time.

- Ensure that all cut-outs for pipe penetrations are made neatly, and slightly oversize, with a hole saw. These penetrations should be of a diameter no more than 12mm greater than that of the pipe
- Sealants should be of a mould inhibiting type and be neutral cure. Neutral cure silicones will generally meet these requirements
- Surfaces should be dry and free from dust before application, a minimum of a 4mm joint width provided and the depth should not exceed the width
- Gun a bead of silicone sealant to the full depth of the GIB Aqualine® in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the GIB Aqualine®
  - Between the upstand of preformed shower bases and the bottom edge of the lining
  - Where an impervious junction is required at the floor/wall line, carefully seal the gap between the bottom edge of the board and the finished floor. Leave a 5-10mm gap at the bottom of the GIB Aqualine® wall lining for this purpose, ensuring the gap is free from dirt and dust
- Do not locate shower heads or taps on fire rated or intertenancy walls. Should this be unavoidable then refer to the publication *Penetrations in GIB® Fire Rated Systems*. Always use tested and approved proprietary solutions.

WATERPROOF MEMBRANES

- A waterproof membrane must be applied to **all** lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation
- The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproof membrane over the lining and the jointed areas shown shaded on page 6
- Only in-situ waterproofing materials which are manufactured to AS/NZS 4858:2004 “Wet Area Membranes” are recommended and applied to manufacturer’s recommendations. Typically, these types of membranes are not suitable for paint and wallpaper finishes
- Waterproof membranes must be fully cured and dry prior to application of tiling adhesives
- Embed reinforcing mats in the membrane at all internal corners of the shower (including floor/wall junctions)
- Preformed sheet membranes are also available and may be more suitable where curing times or specialist skills are an issue
- The details shown in this technical literature are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane.

TILING

GIB Aqualine® is suitable as a substrate for tiling up to the following weights:

- 10mm GIB Aqualine® up to 20kg/m^2
- 13mm GIB Aqualine® up to 32kg/m^2.

Note: Most ceramic and porcelain tiles weigh less than 20kg/m^2.

For further information on tiling consult the BRANZ *Good Practice Guide – Tiling*.

Design Considerations

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FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS

- GIB Aqualine® is a suitable substrate for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures for the GIB Aqualine® substrate shall be as per page 10 or 11, except that the lining gap at the floor should be reduced to 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles (32 x 32 x 0.55mm) behind internal GIB Aqualine® corners is recommended for sheet vinyl applications in showers or shower over bath situations (see illustration page 14)
- The GIB Aqualine® lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph through even a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended for the wall finish in commercial or institutional bathrooms and showers
- In areas directly exposed to liquid water, all joints in flexible sheet vinyl must be heat welded
- Installation of the flexible vinyl must be carried out strictly in accordance with the specifications provided by the suppliers/manufacturers of the vinyl.

RIGID SHEET SHOWER LININGS

- The manufacturers/suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- **Do not preseal or paint** areas which are to be covered by the rigid shower linings
- The wall surface must be free of dust before installation of the lining
- Suppliers of rigid sheet acrylic shower linings recommend a minimum of 24 hours for the adhesive to cure fully prior to the shower being put into service
- Care must be taken to ensure that rooms are adequately ventilated and the adhesive is fully cured before the shower is used
- Consult the manufacturer/supplier of the shower lining for full installation details.

RENOVATIONS

Bathrooms, kitchens and laundries are the most renovated rooms in the house, partly due to fashion considerations and partly because of damage sustained by ingress of water and moisture within those spaces.
In most cases when renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them with GIB Aqualine®. This allows for a completely new start in the room and offers sound substrates for new surfaces such as tiling and painting, where otherwise flaking paint or damaged plasterboard may compromise good and sound finish or practice. At the very least re-lining will:

- Allow for inspection of framing where damage may have occurred and provide the opportunity to repair such damage
- Allow plumbing and electrics to be checked and altered or replaced where required
- Provide the opportunity to install thermal and acoustic insulation and water resistant linings where appropriate
- Make the job easier.

MAINTENANCE

Lack of maintenance is frequently the cause of premature and often very expensive failure of components and building elements within wet areas.
It is important to regularly inspect and repair any potential problem before it becomes a major problem and expensive to reinstate. Good maintenance should include:

- Ongoing ventilation. At the very least, good passive ventilation (e.g. window vents); but good active ventilation (e.g. extraction fans) of an appropriate size for the room is recommended
- Impervious coatings and surfaces should be checked for wear and damage and maintained and recoated before ingress of water to the substrate occurs
- Regular cleaning with appropriate cleaners so that build-up of matter, such as mould, is well controlled
- Sealants at junctions and penetrations should be checked for adhesion on a regular basis and replaced where adhesion failure to substrates occurs
- Where pipe leaks have become evident, however small, they should be repaired promptly and any area around such leaks dried out completely before any other repairs are carried out.

Non-residential and Apartments

MARCH 2007

High-rise and commercial wet areas can generally be divided into four separate categories:

HIGH-RISE APARTMENTS AND INTERTENANCY

Wet areas in apartment complexes are generally covered by Clause E3 of the NZBC and will have the same requirements as shown for residential applications. However, apartment buildings will also involve intertenancy walls requiring noise control and fire resistance.

Generally, noise control and fire resistance are the first consideration and then the water resistance is added to those systems.

For noise control, GIB Aqualine® can substitute for the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®.

For fire resistance, GIB Aqualine® can substitute for GIB Fyreline® of equivalent thickness.

In all cases the prescribed noise control or fire resistance system specifications must be followed completely as presented in the GIB® publications *GIB® Noise Control Systems* and *GIB® Fire Rated Systems*.

Refer to typical details on page 25.

The NZBC for intertenancy calls for special consideration to be given to preventing water from travelling from one tenancy to another. This calls for a waterproof membrane to all wet area floors with upstands to walls and the inclusion of floor wastes.

It is important to avoid penetrations such as taps, shower roses, etc. in intertenancy walls as this will compromise fire and noise ratings.

OFFICE, WORKPLACE AND SCHOOLS

These wet areas are generally no different in requirements to those shown in this publication or those of high-rise apartments, and are treated in the same manner.

As there is often a higher impact requirement in commercial applications, 13mm GIB Aqualine® is the minimum thickness recommended.

These areas are often finished in sheet vinyl or ceramic tiles and GIB Aqualine® is an ideal substrate, particularly in the case of sheet vinyl where a high quality finish is required to minimise telegraphing of imperfections in the substrate.

HEALTHCARE AND HOSPITALS

This industry will generally have special requirements for wet areas. GIB Aqualine® will generally satisfy specific design needs in healthcare facilities and in particular is an ideal substrate for the preferred finish of sheet vinyl.

PUBLIC AMENITIES AND SPORTS CLUBS

Public amenities and sports clubs often have a high demand for impact resistance, therefore 13mm GIB Aqualine® should be used, and suitable impact resistant wall coverings considered, such as heavy duty sheet vinyl or ceramic tiles over waterproof membrane to 1200mm high.

Also full consideration should be given to the usage of the amenity and whether high pressure or chemical cleaners will be used or if the amenity may be subject to vandalism.

Because of extreme humidity and presence of chemicals, GIB Aqualine® is not suitable for enclosed swimming pool areas.

Contact the GIB® Helpline on 0800 100 442 for further assistance.

Non-tiled Walls – Timber Framing

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If bracing, noise control or fire rating considerations exist, consult the relevant GIB® technical publication, e.g. *GIB® Fire Rated Systems, GIB® Noise Control Systems, GIB® Bracing Systems*, for the appropriate information.

Wall Framing

Framing dimensions must comply with the requirements of NZS 3604:1999.

- The moisture content of timber framing shall be 18% or less at the time of lining
- Studs shall be spaced at 600mm centres maximum for both 10mm and 13mm GIB® plasterboard
- Nogs to be evenly spaced with a maximum spacing of 1350mm. Alternatively, nogs may be staggered 150mm maximum either side of a horizontal joint line
- Nogs are not required behind horizontal joints except in shower situations or specific fire or noise control systems.

Fasteners

- 10mm GIB Aqualine® – minimum 25mm x 6g GIB® Grabber® High Thread Drywall Screws or 30mm x 2.8mm GIB® Nails
- 13mm GIB Aqualine® – minimum 32mm x 6g GIB® Grabber® High Thread Drywall Screws or 30mm x 2.8mm GIB® Nails.

Fastener Centres

- 300mm centres to top and bottom plates and to perimeter studs
- Single fasteners to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges
- Daubs of GIBFix® adhesive at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed unless forming part of the perimeter of a bracing element.

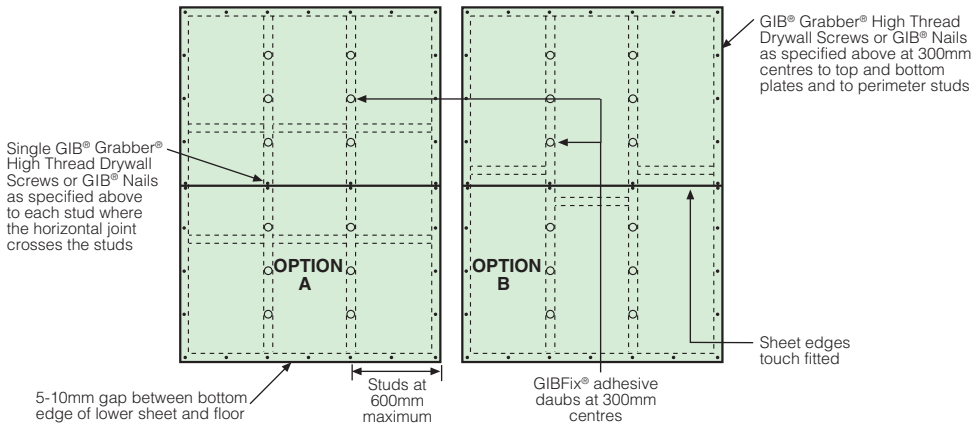
Lining

- Install the sheets leaving a 5-10mm gap at the floor line to allow for movement of the framing members and to allow for cleaning dirt and rubbish before sealing
- Sheets to be touch fitted.

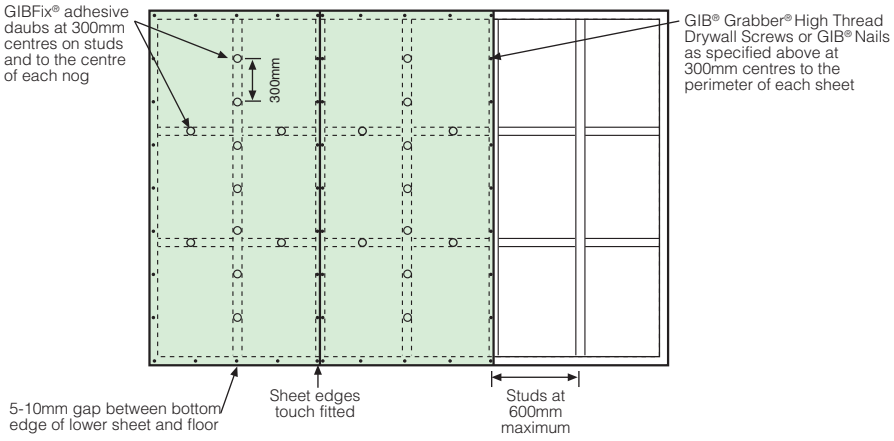
Jointing

- Jointing shall be carried out in accordance with the instructions in the *GIB® Site Guide*; GIB® AquaMix is recommended for the first two coats.

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



Non-tiled Walls – Steel Framing

MARCH 2007

The minimum sheet thickness for fixing on light gauge steel framing is 13mm GIB® plasterboard.
Steel framing for residential construction is by specific design.
If noise control or fire rating considerations exist, consult the relevant GIB® technical publication (e.g. *GIB® Fire Rated Systems or GIB® Noise Control Systems)* for the appropriate information.

Wall Framing

- Steel stud dimensions to be minimum 63 x 34 x 0.55mm nominal with a 6mm return
- Steel channel dimensions to be minimum 63 x 30 x 0.55mm nominal
- Studs shall be spaced at 600mm centres maximum
- Ensure that the studs are placed with the open side facing in the same direction (see *GIB® Site Guide*).

Fasteners

- 25mm x 6g GIB® Grabber® Self Tapping Drywall Screws.

Fastener Centres

- 300mm centres to top and bottom channels and to end studs
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges
- Daubs of GIBFix® All-Bond adhesive OR screws at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed.

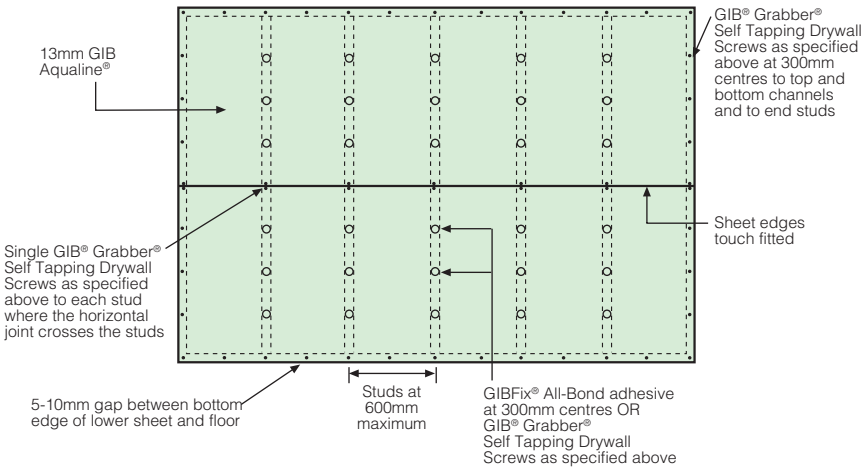
Lining

- Lay the sheets, leaving a 5-10mm gap at the floor line.
  Note: If friction fitted steel studs have been used, sheets must be fitted hard to the floor. Ensure floor is cured and dry
- Sheets to be touch fitted.

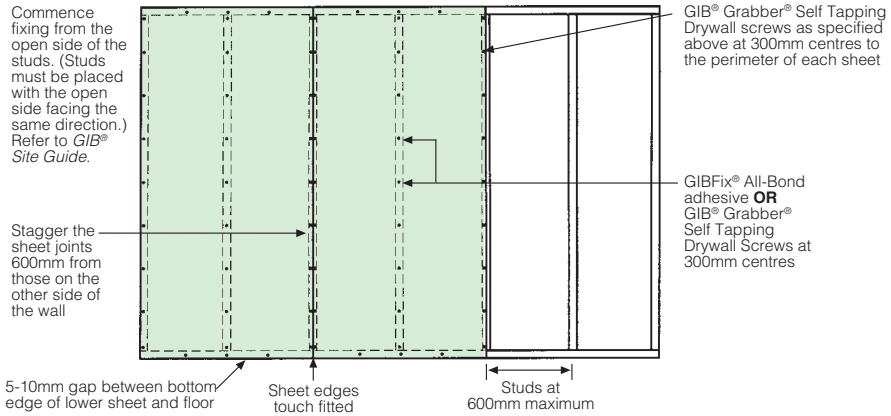
Jointing

- Jointing shall be carried out in accordance with the instructions in the *GIB® Site Guide*. GIB® AquaMix is recommended for the first two coats.

Fastening and Jointing the Linings – Horizontal Fixing



Fastening and Jointing the Linings – Vertical Fixing



Tiled Walls

MARCH 2007

Important: See page 6 and 7 for waterproof membrane requirements.

Wall Framing

Framing dimensions and spacing must comply with the requirements of NZS 3604:1999 or relevant NZ Standard.

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum 32 x 32 x 0.55mm galvanised metal angle. Each side of the angle shall be fastened to the framing with 30mm galvanised clouts at 300mm centres
- Steel stud systems do not generally require nogs except as below:
  - Adjacent to each pipe penetration and behind sink and tub flashings
  - Between all studs above bath flanges and preformed shower bases
- For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require either vertical fixing of the GIB Aqualine® or the installation of some additional nogs.

Fasteners

- For 10mm GIB Aqualine® use minimum 25mm x 6g GIB® Grabber® Drywall Screws
- For 13mm GIB Aqualine® use minimum 32mm x 6g GIB® Grabber® Drywall Screws.

Fastener Centres

- GIB® Grabber® Drywall Screws at 100mm centres to perimeter of wall and to all intermediate studs
- Adhesive is not to be used in place of mechanical fastenings.

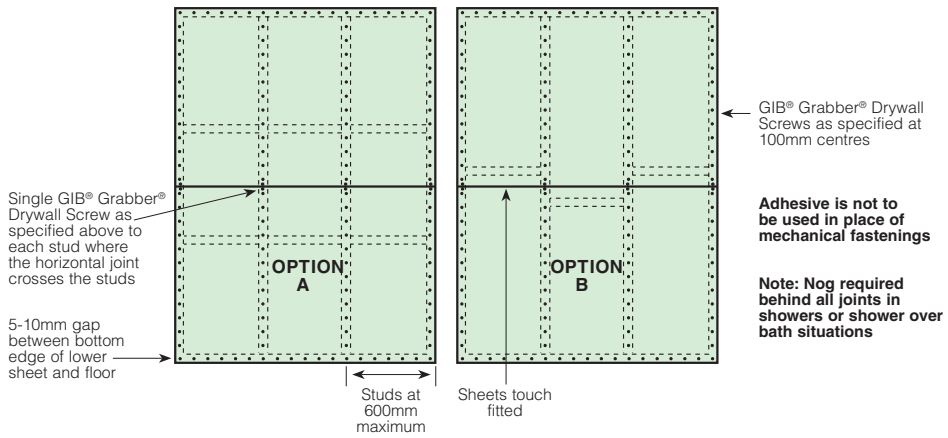
Lining

- 10mm or 13mm GIB Aqualine® is suitable for use on timber framing and for tile weights up to 20kg/m²
- 13mm GIB Aqualine® must be used for tile weights between 20 and 32kg/m² and when light steel framing has been used
- GIB Aqualine® may be fixed vertically or horizontally
- Provide a 5-10mm gap at the wall/floor junction
- Provide a 5-10mm gap between the bottom edge of the GIB Aqualine® and any bath rim or preformed shower base to allow for placement of sealant
- GIB Aqualine® sheets shall be touch fitted
- Where the framing or fastener centres required for tiled areas are closer than those specified for GIB® Fire Rated and GIB® Noise Control Systems, the tiling specification shall prevail. Where relevant, check that fastener lengths comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems.

Jointing

- Jointing shall be carried out in accordance with instructions in the *GIB® Site Guide*
- Water resistant GIB® AquaMix is recommended for the first two coats
- No top coat is required.

Fastening the Linings – Horizontal Fixing in Tiled Areas



Note:

GIB Aqualine® is suitable for tiling to full height of walls, but if a wall is to be partially tiled (i.e. half high), only the area of wall under the tiles needs to be fixed as above. The remainder of the wall may be fixed as for non-tiled area (see page 10 & 11).

Ceilings

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Ceiling Framing

Framing dimensions and spacing must comply with the requirements of NZS 3604:1999 or relevant NZ Standard.
If bracing, noise control, fire rating considerations exist consult the relevant GIB® publication for appropriate information.

Fasteners

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping Drywall screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber High Thread Drywall screws.

Adhesives

- Steel battens – GIBFix® All-Bond
- Timber battens – GIBFix® Wood Bond (not suitable for LOSP treated timber).

Fasteners Centres

- Single screws to the edges and centre of the sheets across each batten
- Screws to be 12mm from sheet edges
- Daubs of adhesive at 200mm centres between the screws
- Do not place adhesive at sheet edges or under fasteners, this may lead to screw or nail pops.

Lining

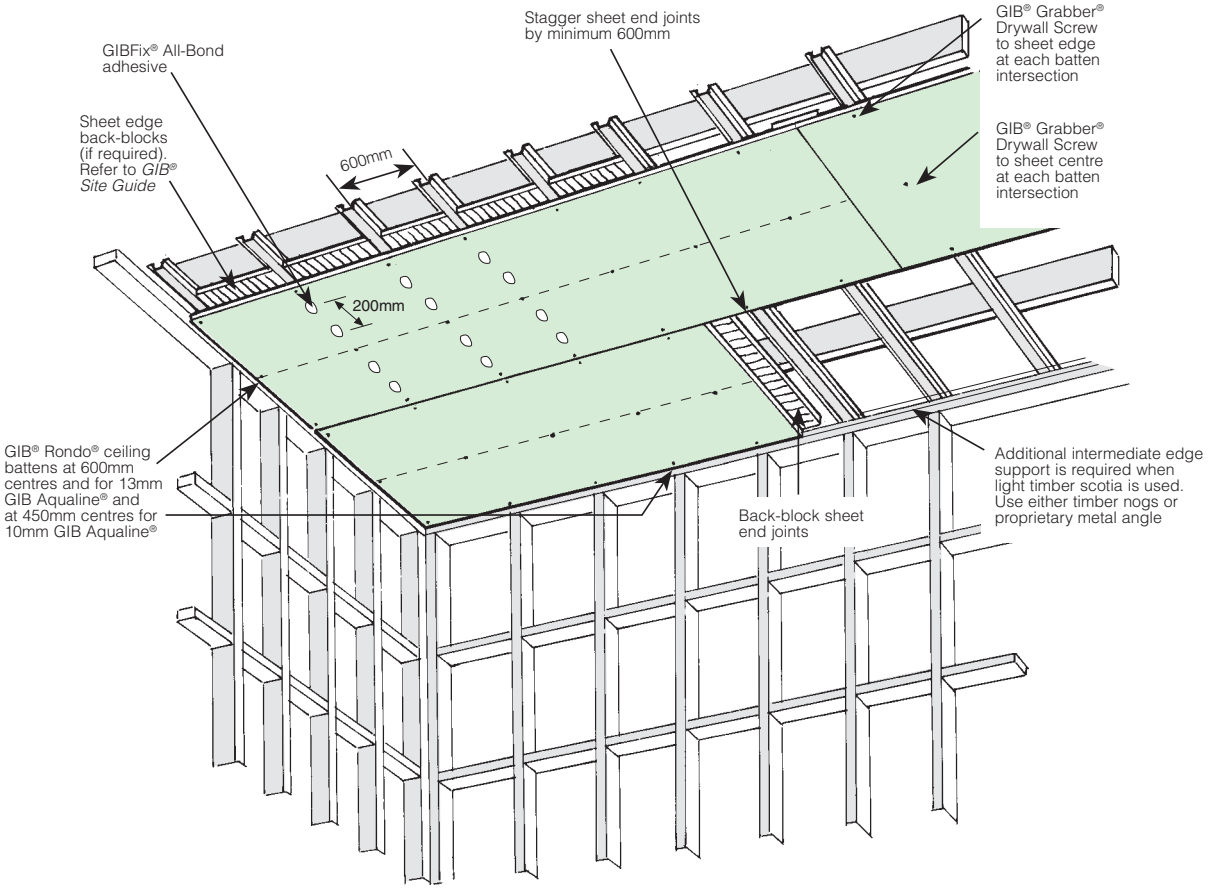
- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements.

Batten Spacings

- 13mm GIB Aqualine® plasterboard – 600mm centres max
- 10mm GIB Aqualine® plasterboard – 450mm centres max.

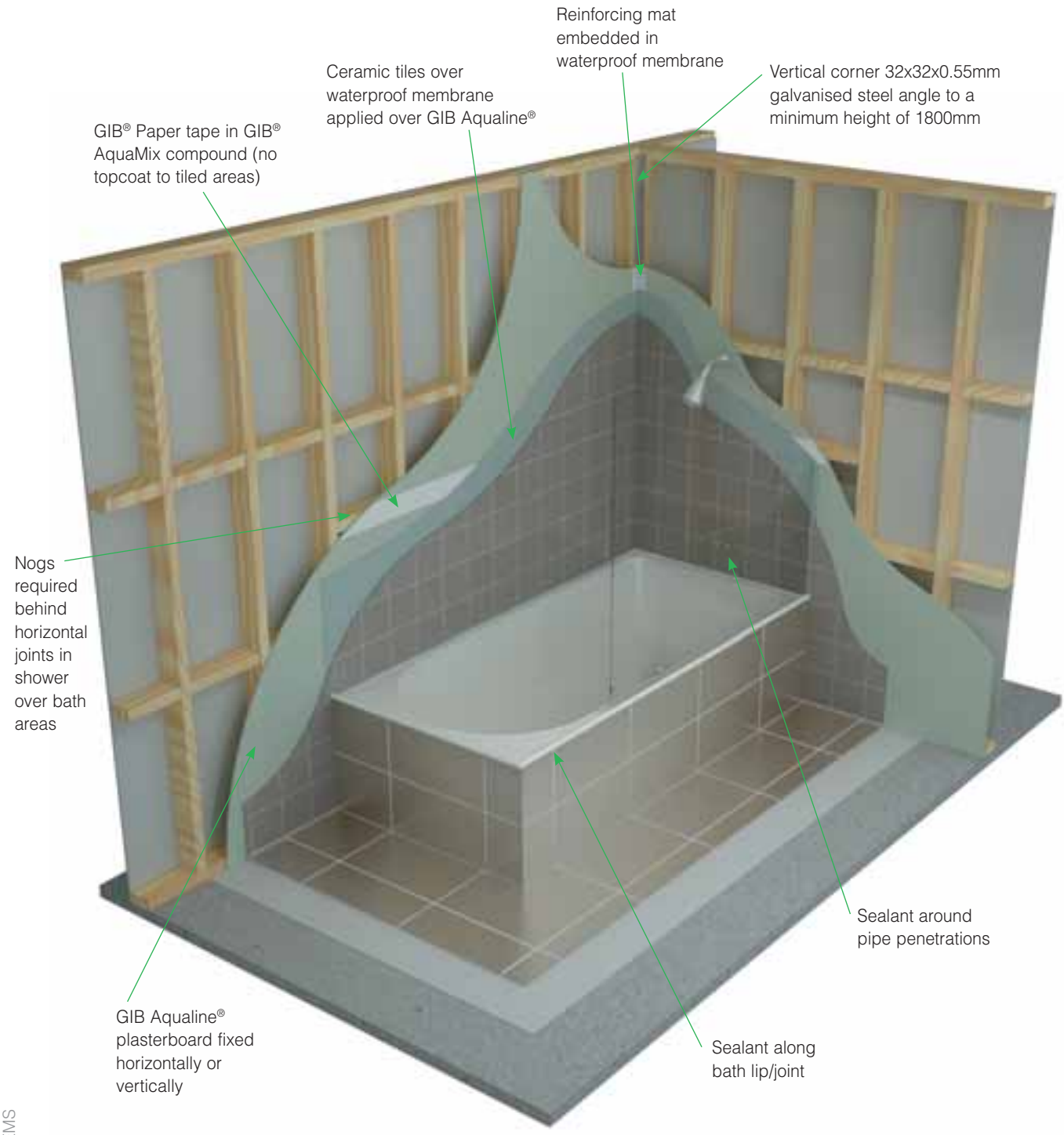
Jointing

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the *GIB® Site Guide*. Water resistant GIB® AquaMix is recommended for the first two coats.
- Do not fix tiles to GIB® plasterboard ceilings.



Shower Over Bath – Tiled Walls

MARCH 2007



Run a bead of silicone sealant around the mixer unit on the tiles extending below the bottom of the pipe aperture.

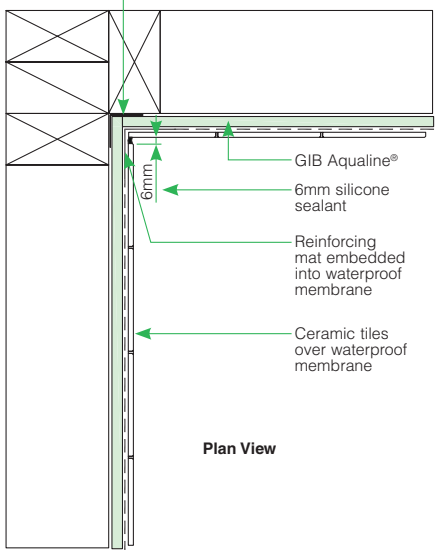
For typical details, see the following pages.

GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Shower Over Bath – Tiled Walls

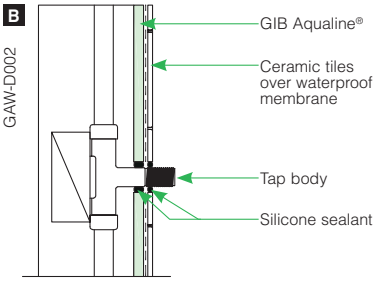
MARCH 2007

A GAW-D001



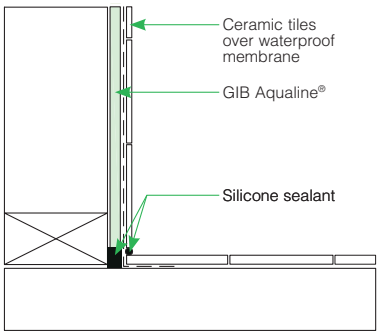
Plan View

B GAW-D002

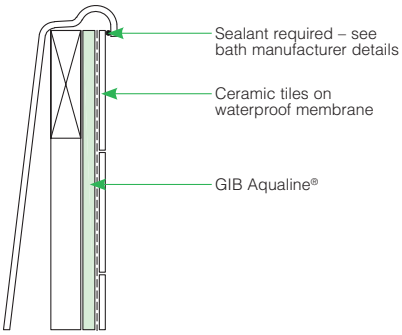


Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

C GAW-D003



D GAW-D004



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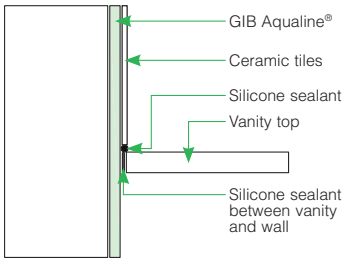

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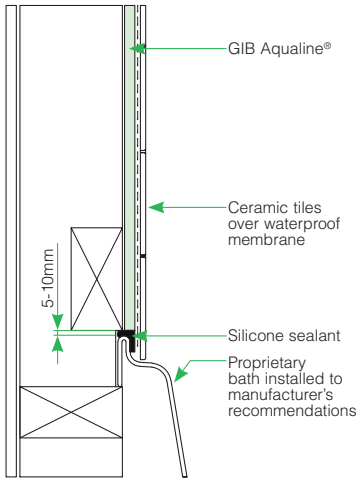

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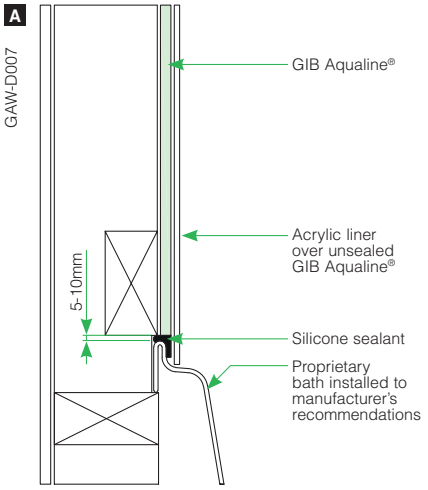
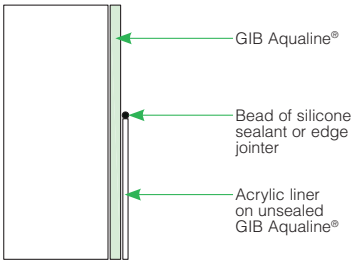
Shower Over Bath – Acrylic Liner

MARCH 2007

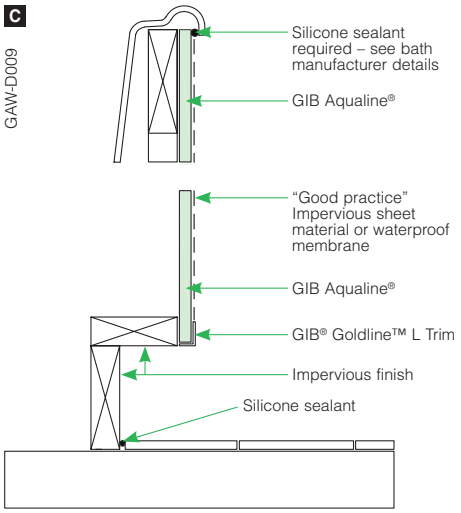
A GAW-D007



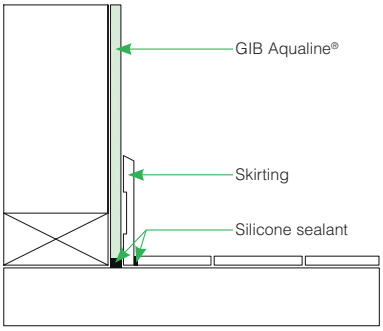
B GAW-D008



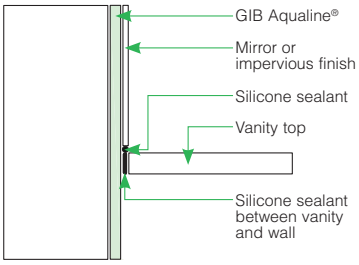
C GAW-D009



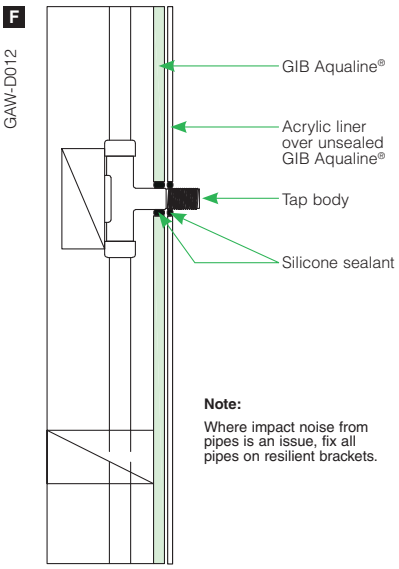
D GAW-D010



E GAW-D011



F GAW-D012



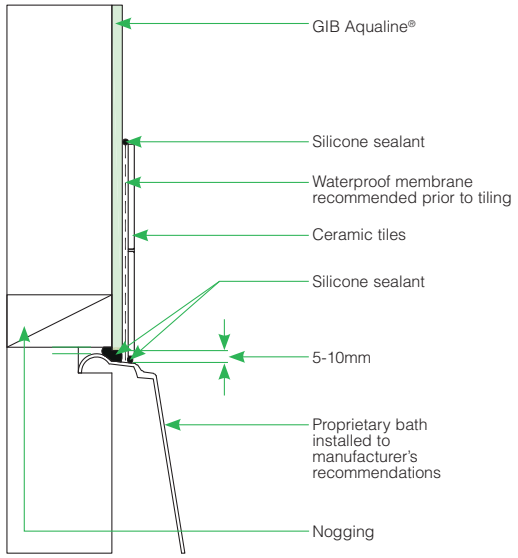
Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

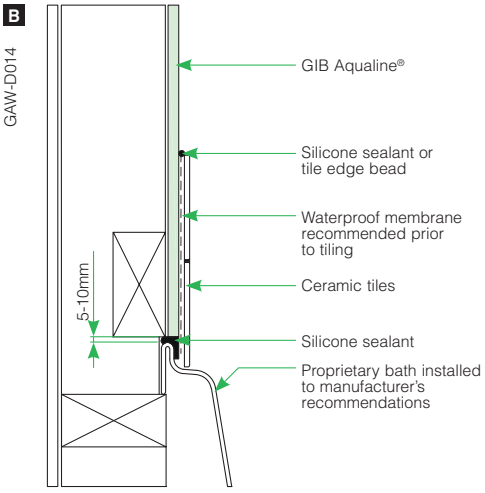
Bath – Tiled Upstand

MARCH 2007

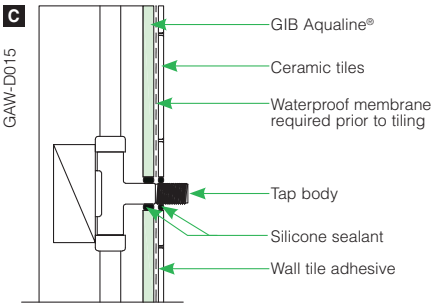
A GAW-D013



B GAW-D014

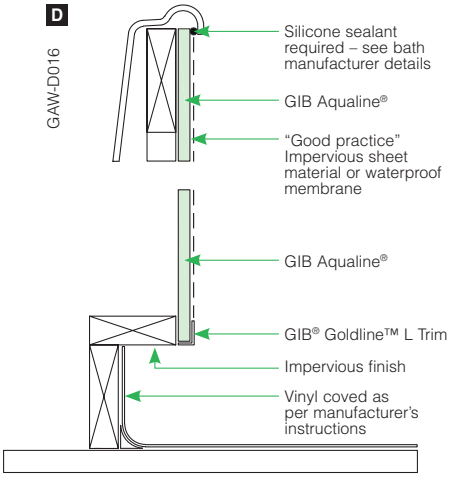


C GAW-D015

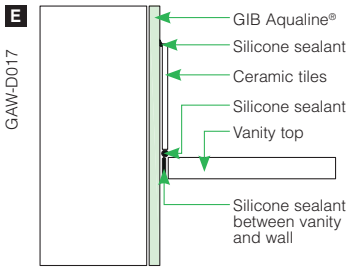


Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

D GAW-D016



E GAW-D017



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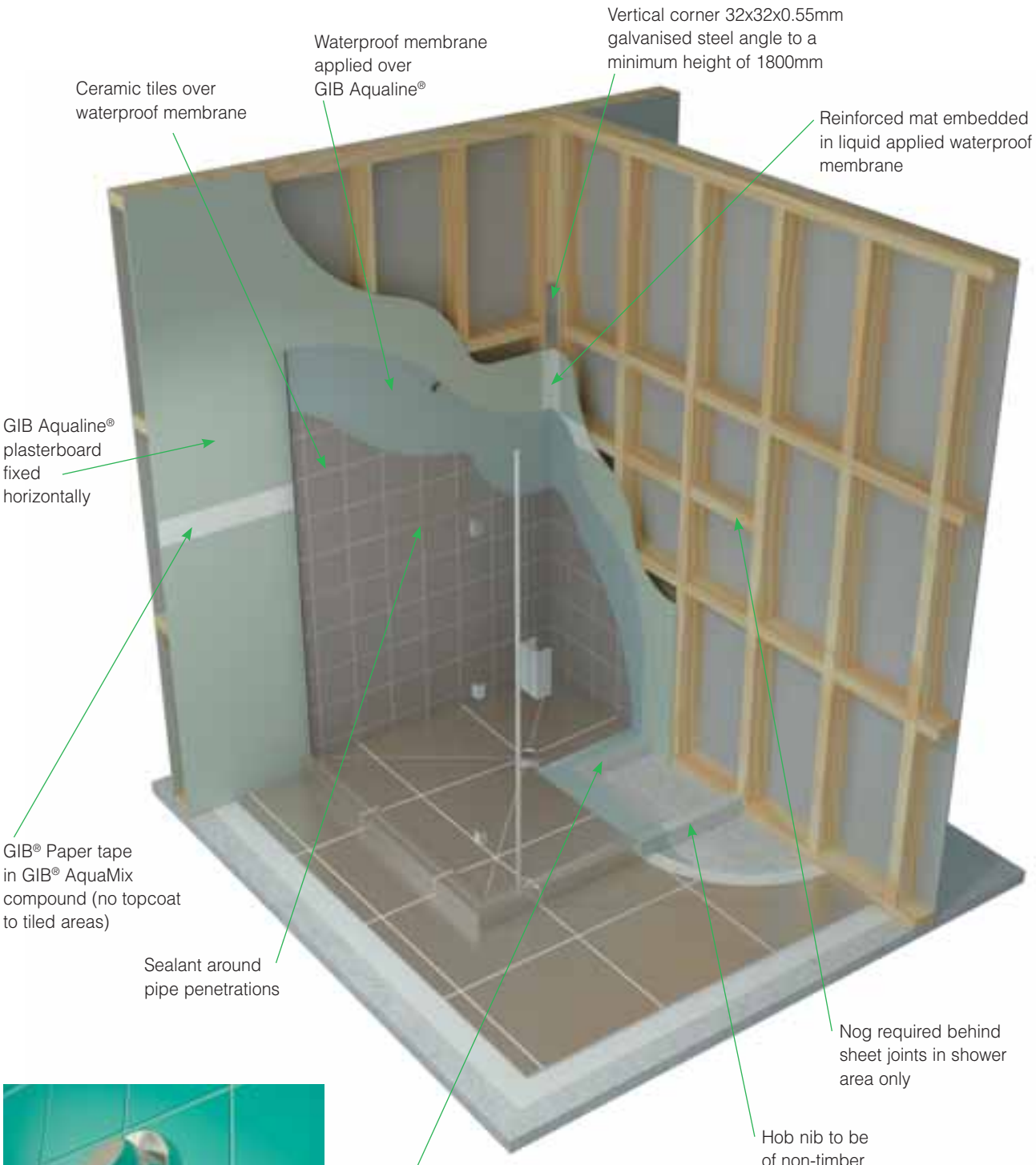
Shower – Tiled Walls and Base

MARCH 2007



Run a bead of silicone sealant around the mixer unit on the tiles extending below the bottom of the pipe aperture.

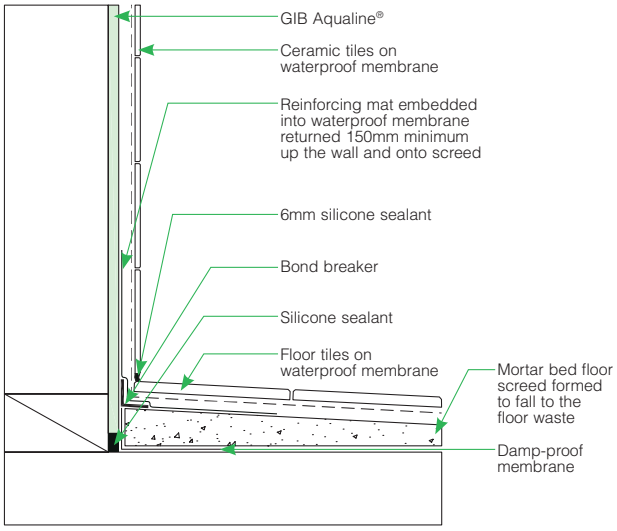
For typical details, see the following pages.

GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

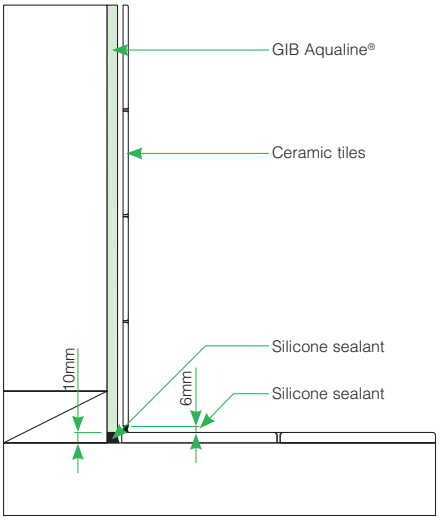
Shower – Tiled Walls and Base

MARCH 2007

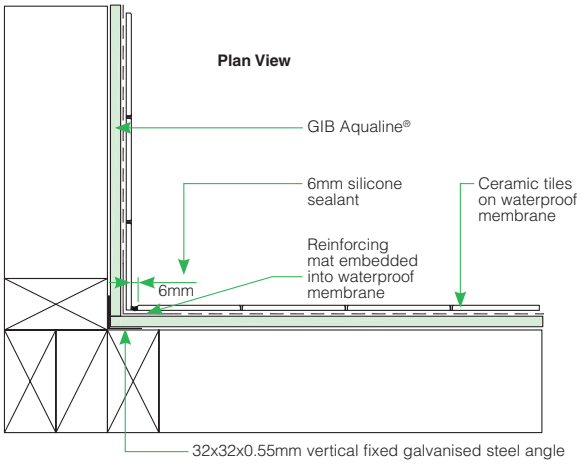
A GAW-D018



B GAW-D019



C GAW-D020



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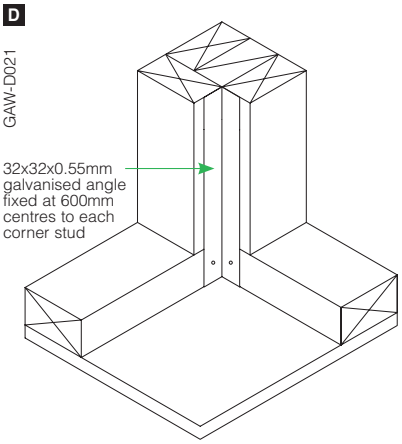
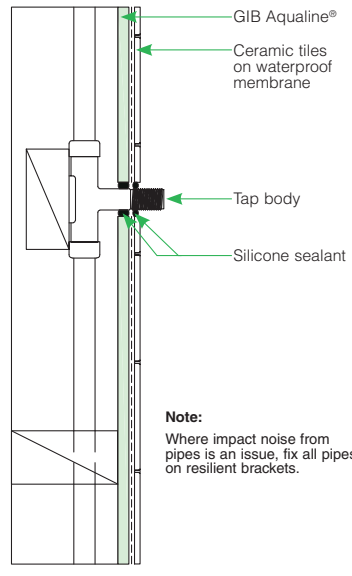


E GAW-D022



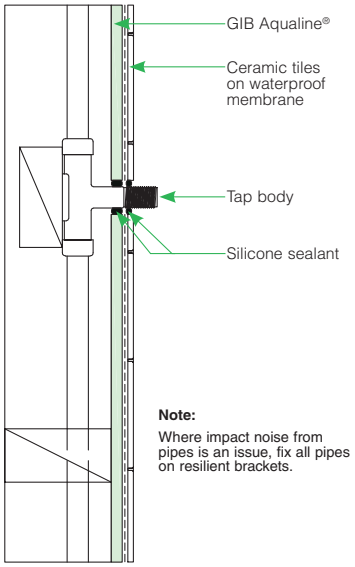
Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Shower – Tiled Walls and Acrylic Base

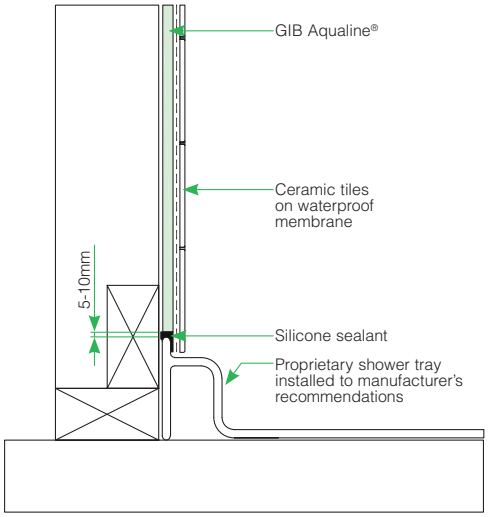
MARCH 2007

A GAW-D023



Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

B GAW-D024



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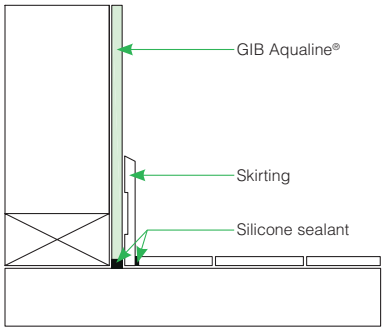

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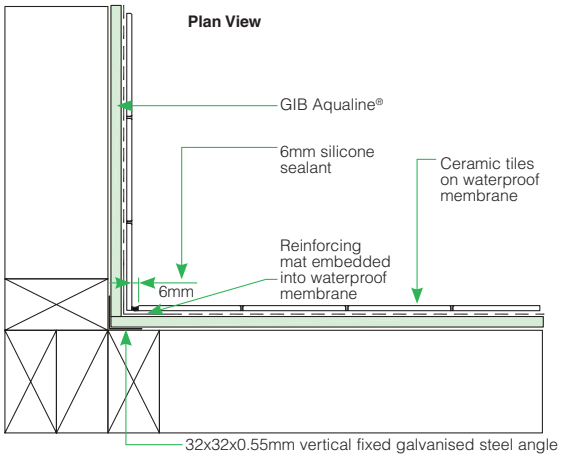
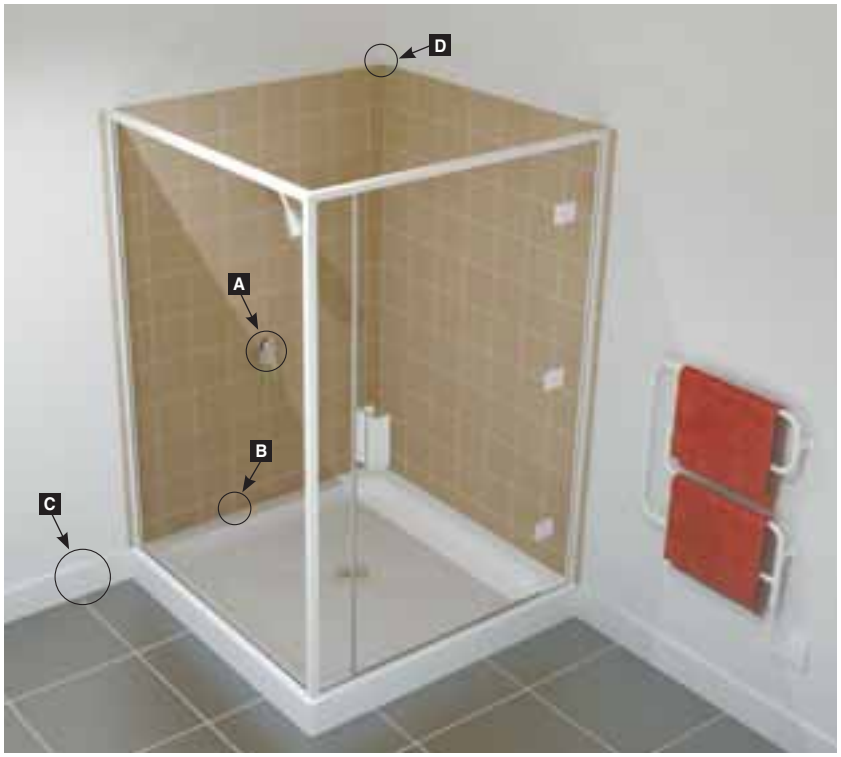




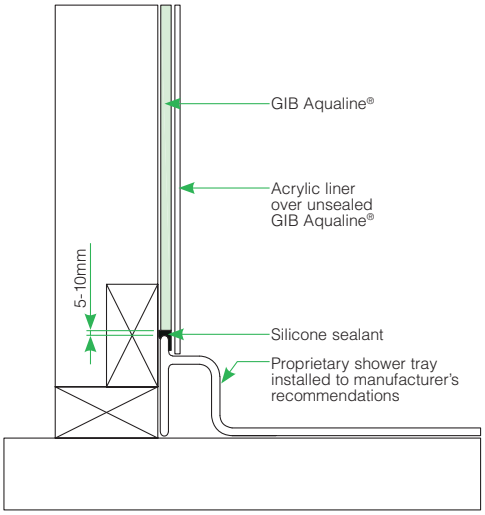
GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Shower – Acrylic Liner and Base

MARCH 2007

A

GAW-D027



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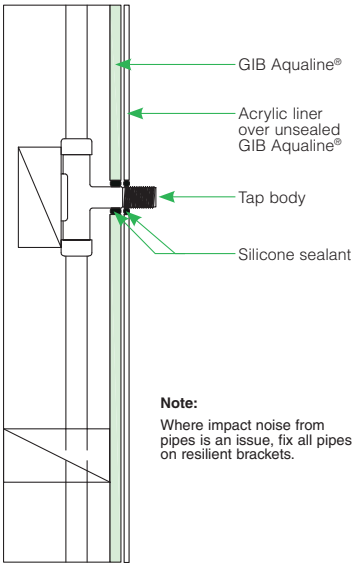
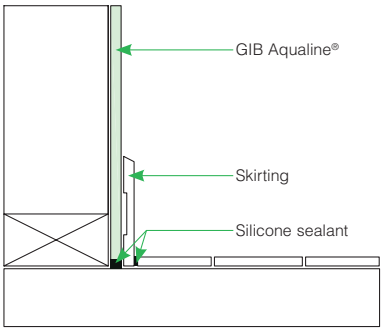


Note:
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

C

GAW-D029



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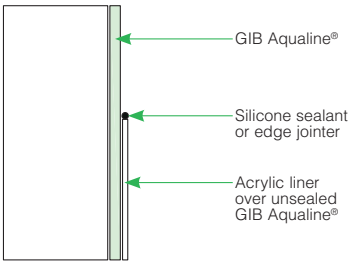


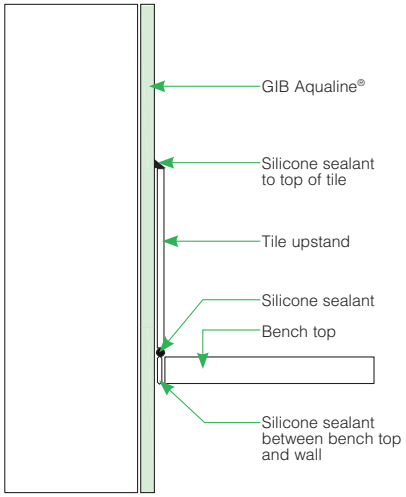
GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Kitchen and Laundry

MARCH 2007

A

GAW-D031



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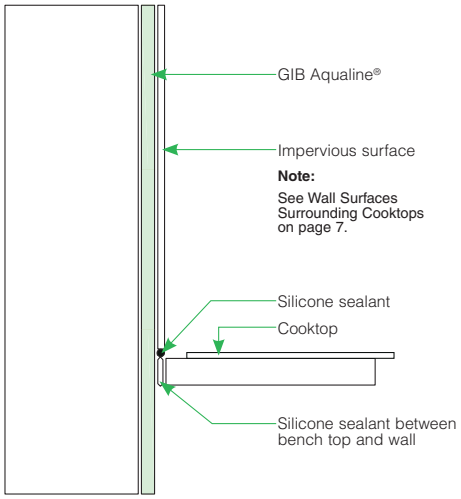

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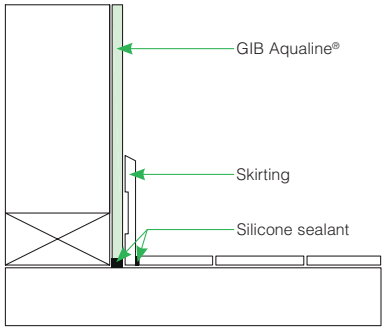


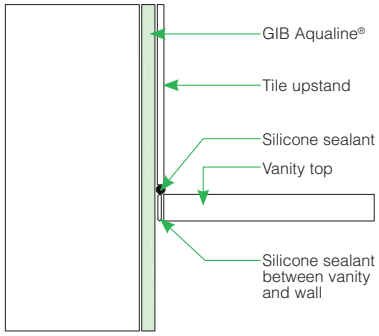
GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Office, Workplace or School Bathroom

MARCH 2007

A

GAW-D034



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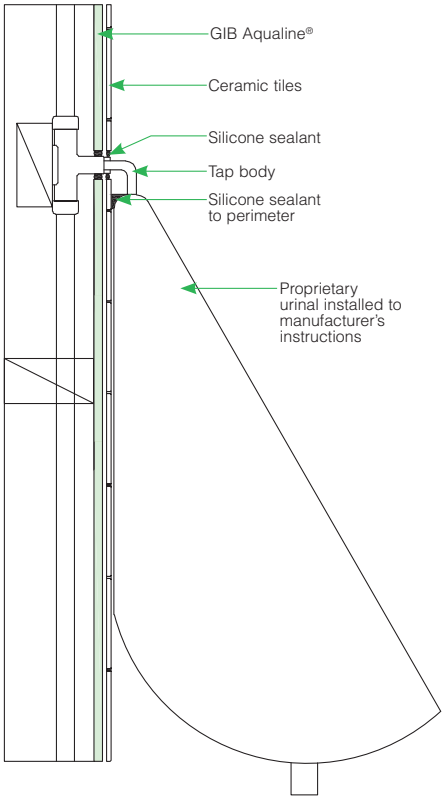
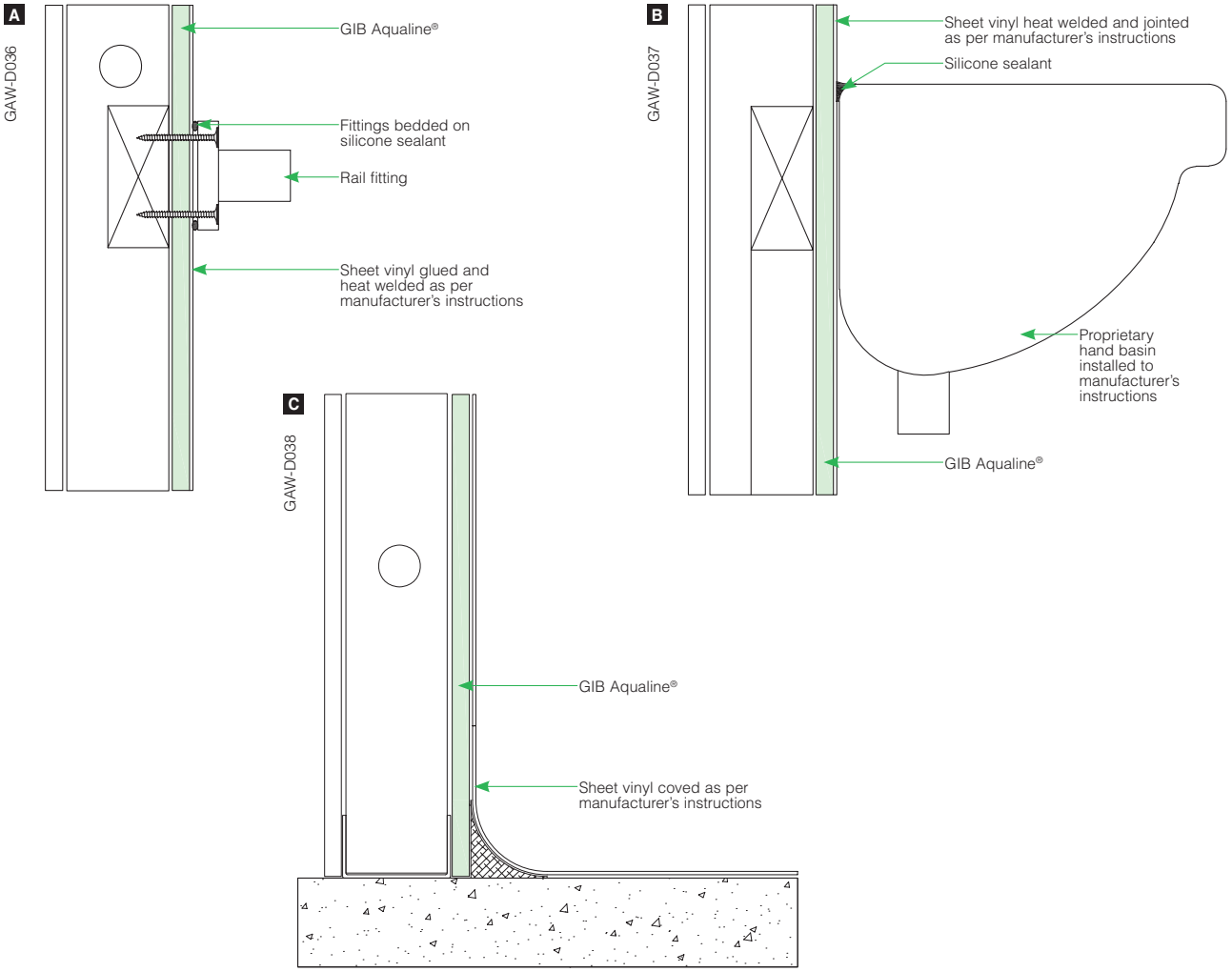


GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Healthcare and Hospital Bathroom

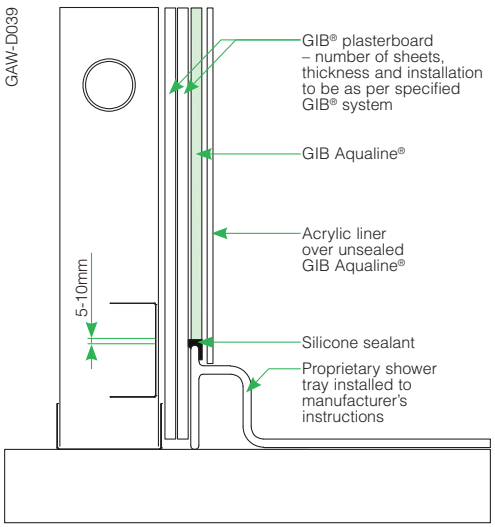
MARCH 2007



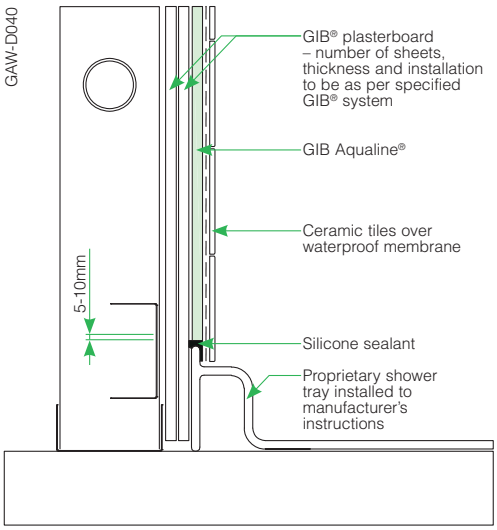
Fire Rated and Noise Control

MARCH 2007

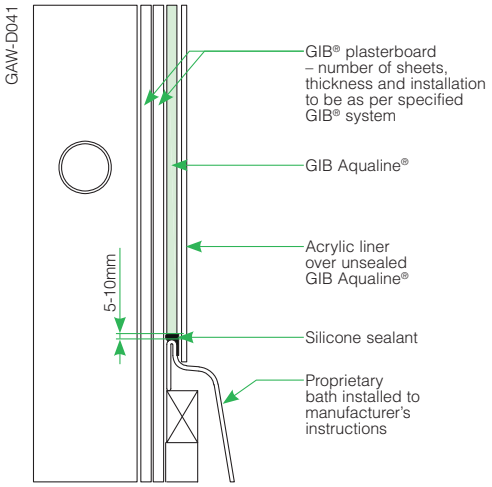
Shower – Acrylic Liner



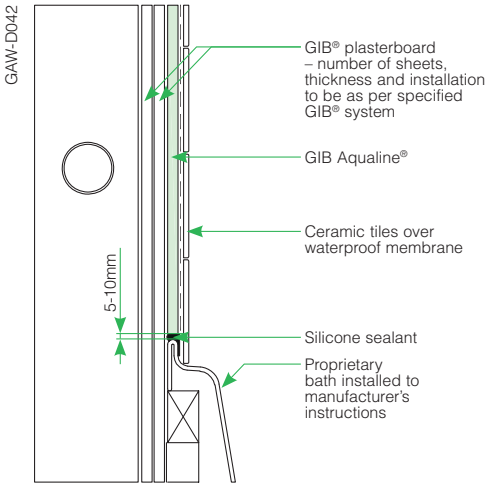
Shower – Tiled Walls



Shower Over Bath – Acrylic Liner



Shower Over Bath – Tiled Walls



GIB Aqualine® Fire Resistance and Noise Control Performance

When GIB Aqualine® is substituted into GIB® Fire Rated systems in place of the equivalent thickness GIB Fyreline®, the Fire Resistance Rating (FRR) of that system will be maintained.

When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information contact the GIB® Helpline on 0800 100 442.

Specification and Installation Checklist

MARCH 2007

Contract ID	
Site Address	
Client Name	
Designer	
Builder	
Plasterboard Installer	
Plasterboard Supplier	
Tiler	
Shower Installer	

DESIGNER	YES	NO	CHECKED BY	DATE
GIB Aqualine® specified for wet areas and appropriate details included on plans?				
Are tiled areas clearly shown on plans?				
Is area requiring waterproof membrane clearly shown on plan?				
Is the waterproof membrane required to be installed by a licensed applicator? If so, is this noted on the documentation?				
No bracing behind shower or bath?				
BUILDER	**YES**	**NO**	**CHECKED BY**	**DATE**
Galvanised steel angle installed to the internal corners of tiled shower?				
All sheet joints in showers to be made on solid timber. This may require some additional dwangs for horizontal board installation.				
PLASTERBOARD INSTALLER	**YES**	**NO**	**CHECKED BY**	**DATE**
10mm GIB Aqualine® for tiles up to 20kg per m^2?				
13mm GIB Aqualine® for tiles up to 32kg per m^2?				
GIB Aqualine® mechanically fastened at 100mm centres when tiles are to be installed?				
All junctions between GIB Aqualine® and walls, floors, baths, showers and other elements are correctly sealed with appropriate sealant?				
Pipe penetrations sealed?				
PLASTERBOARD STOPPER	**YES**	**NO**	**CHECKED BY**	**DATE**
Air drying compound (e.g. GIB ProMix® or GIB Plus 4®) not to be used on areas to be tiled.				
Recommended that GIB® AquaMix is used in wet areas.				
TILER	**YES**	**NO**	**CHECKED BY**	**DATE**
Waterproof membrane applied to shower areas prior to tiling?				
SHOWER INSTALLER	**YES**	**NO**	**CHECKED BY**	**DATE**
GIB Aqualine® walls must not be sealed or painted under where acrylic linings are to be installed.				
Ensure GIB Aqualine® is free from dust before installation of acrylic liners.				
Sealant applied to top edge of acrylic shower linings?				
BUILDER/PLUMBER	**YES**	**NO**	**CHECKED BY**	**DATE**
Sealant applied under penetration face covers?				

ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed)

Single component undertile waterproofing membrane

Low VOC content – meets Green Building Council of Australia Green Star IEQ-13 requirements

Fast drying one part acrylic membrane

Class III membrane, conforms to the requirements of AS4858:2004 Wet Area Membranes

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

ARDEX Australia Pty Ltd
20 Powers Road
Seven Hills NSW 2147
Ph: (02) 9851 9199
Fax: (02) 9674 5621
Email: techinfo@ardexaustralia.com
Internet: www.ardex.com

ARDEX New Zealand Ltd
32 Lane St, Woolston
Christchurch, New Zealand
Ph: (03) 373 6900
Fax: (03) 384 9779
Email: techinfo@ardexaustralia.com
Internet: www.ardex.com

ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 001 (Superflex Premixed) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. ARDEX WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

ARDEX WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying ARDEX WPM 001 can be tiled over in 48 hours in non critical areas*.
- Fibre reinforced: Excellent strength, eliminates need for reinforcing mat.
- Flexible: Accommodates normal building movement class 3 membrane as per AS 4858: 2004 Wet Area Membranes.
- Advanced acrylic: Will not re-emulsify once cured.
- Designed for tiling – Fully compatible with ARDEX tile adhesive systems.
- Water based, safe to use, low odour and easy cleaning.
- Conforms to the requirements of Australian Standards 4858: 2004 Wet Area Membranes.

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance levels

Commercial and residential.

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces

Walls and floors.

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX HydrEpoxy WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX HydrEpoxy WPM 300 as above.
Fibre cement	Wet area grade fibre cement.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded), marine grade or other wet area grade only. Special preparation is required – contact ARDEX. Not recommended for external use (refer ARDEX).
Particleboard	Wet area grade, internal use only (special preparation is required – contact ARDEX). Not recommended for external use (refer ARDEX).
Permanent Immersion	In conditions of permanent immersion, it is recommended that ARDEX WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be ARDEX WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

TABLE 1

	Thickness per coat		Total dry film thickness (2 coats)	Theoretical coverage		Per unit
	Dry film	Wet film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m²	7.5m²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m²	15m²	20kg(15L) unit

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5–15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES

Recoat time

1–2 hours at (23°C / 50% RH) between first and second coats. Alternatively, if a woven cloth reinforcement mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. ARDEX WPM 001 is totally dry in 48 hours at 23°C / 50% RH, but can take up to 72 hours at 10°C / 50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. ARDEX WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX HydrEpoxy WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 001.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 001 is non-hazardous and non dangerous. In case of skin contact, flush with running water. In case of irritation seek medical advice. If swallowed, immediately give a glass of water.

Additional information is listed in the Material Safety Data Sheet.

QUALITY PRODUCT

ARDEX WPM 001 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

APPLICATION

Apply ARDEX WPM 001 by brush or roller. A medium nap (12–15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and lightly finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25–40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0mm per coat depending on product and application (Refer Table 1).

Critical areas:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian Standards 3740 – 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall and floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber), and that the top of the hob does not slope outwards.
5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS 3740 and the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 100mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Plastic (eg. PVC) fittings should be primed with a solvent based plumbers primer. Prime metal surfaces with a suitable metal primer.
14. Apply the membrane 1800mm up the walls or 80mm above the height of the shower rose within the shower recess.
15. Install the shower screen to inside edge of the hob.

Fig.1 – Shower recess – Critical areas

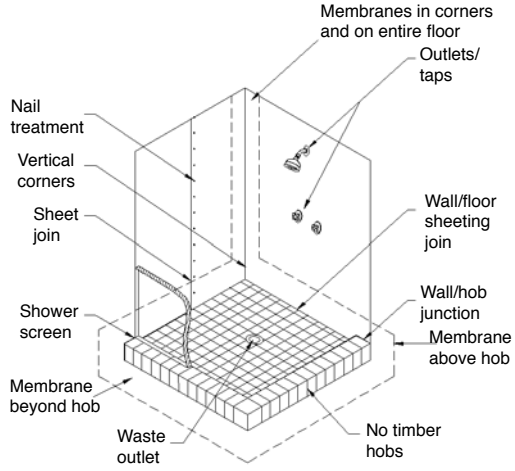
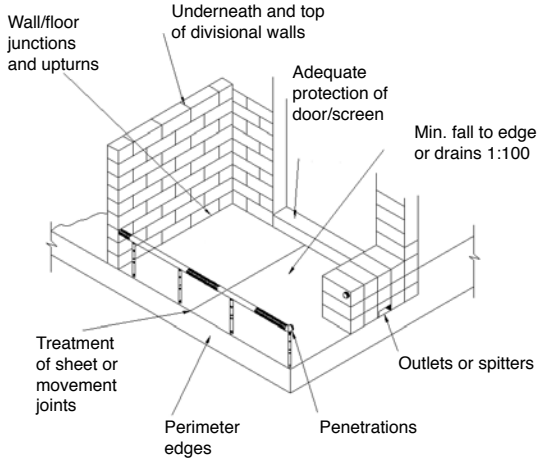


Fig.2 – Balcony – Critical areas



BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door.
3. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
4. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
5. Apply the membrane as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
6. Where possible, apply the membrane prior to building divisional walls.
7. Apply the membrane to the entire balcony floor and at least 100mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
8. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
9. Apply the membrane down over the front edge of the balcony onto the drip rail.
10. Carefully seal any gaps around balcony penetrations with a neutral cure silicone prior to applying the membrane.
11. Apply the membrane down into outlets and drains, ensuring excess material is removed.
12. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2 metre (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 water based primer by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the ARDEX WPM 001 membrane. This will take around 20–30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 water based primer and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack and along the length of the crack.

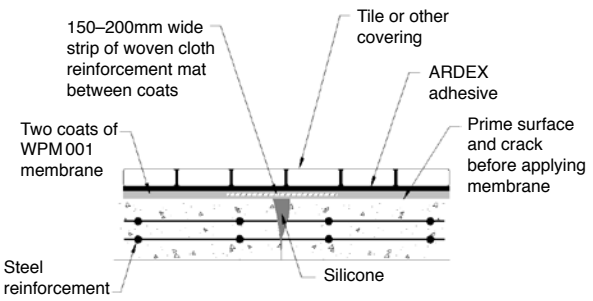
Cracks 2–6mm:

(Refer Fig.3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

Contact your local ARDEX representative.

Fig.3 – Crack treatments



ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

MOVEMENT/CONSTRUCTION JOINTS

Movement joints (<6mm)

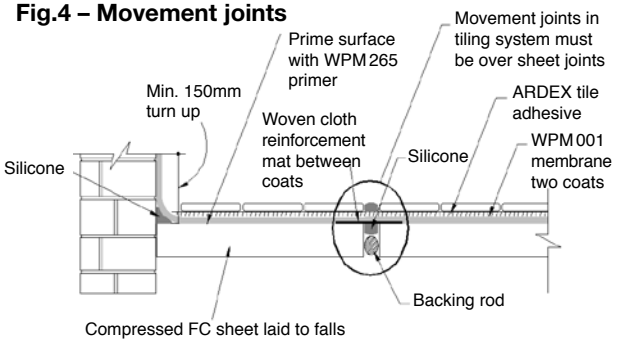
Use same procedure as in crack preparation.

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

Fig.4 – Movement joints



Corners and coving areas

After priming with ARDEX WPM 265 water based primer and allowing it to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of ARDEX WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with ARDEX WPM 265 water based primer and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX Deckweb woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 001 should be applied to at least 150mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 001 to floors.

Walls

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with ARDEX WPM 265 water based primer and allowing to dry, apply two coats of ARDEX WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

Prime the surface with ARDEX WPM 265 water based primer and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1–2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone sealant. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

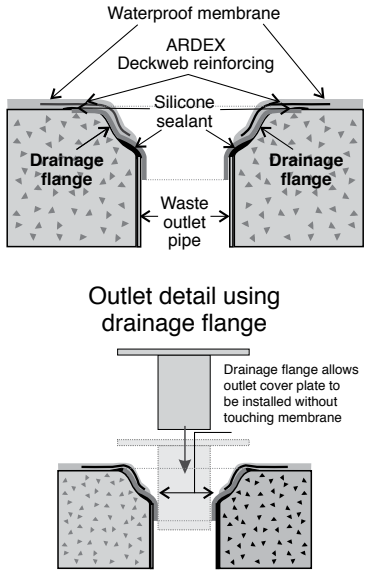
Waste outlet

Prime the surface with ARDEX WPM 265 water based primer and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Plastic (eg. PVC) fittings should be primed with a solvent based plumbers primer. Prime metal surfaces with a suitable metal primer.

Apply ARDEX WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30 mm. Place ARDEX Deckweb woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig.5)

Fig.5 – Waste outlet



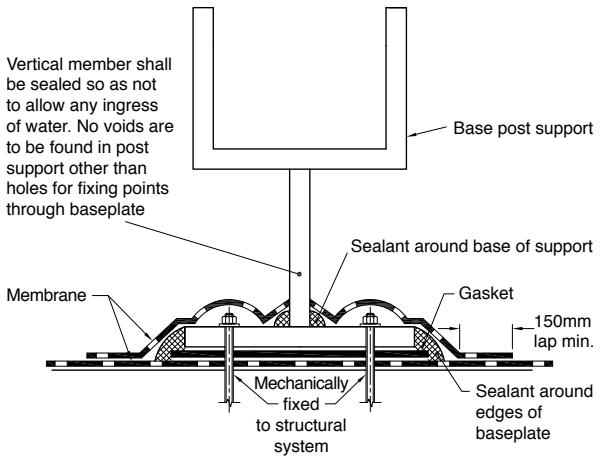
Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 12mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Fig.6 – Post membrane installation



Tiling systems

It is advisable to conduct a flood test of the waterproofed area once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

TECHNICAL DATA

ARDEX WPM 001 (Superflex Premixed)
Characteristics of liquid

Form and colour	Blue viscous paste
Type	Single part
Specific gravity	Approx. 1.3kg/litre
pH of liquid	8.5
Tensile strength 7 days dry AS1145	1.04 MPa
Full cure	1.92 MPa
Elongation at break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

VOC content	18g/L

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H).

DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable Australian Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program.

Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations.

The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.

ARDEX Australia Pty Ltd

Technical Services Toll Free: 1800 224 070

New South Wales	Ph (02) 9851 9100	Fax (02) 9838 7970
Queensland	Ph (07) 3817 6000	Fax (07) 3881 3188
Victoria/Tasmania	Ph (03) 8339 3100	Fax (03) 9308 9332
South Australia	Ph (08) 8406 2500	Fax (08) 8345 3207
Western Australia	Ph (08) 9256 8600	Fax (08) 9455 1227

ARDEX New Zealand Ltd

Technical Services Toll Free: 0800 227 339

Auckland	Ph (09) 580 0005	Fax (09) 579 9963
Wellington	Ph (04) 568 5949	Fax (04) 568 6376
Christchurch	Ph (03) 373 6900	Fax (03) 384 9779

October 2010

Single timber frame wall

Specification number	Linings	Thickness	Layers Side 1	Layers Side 2	STC
GST102	GIB® Standard Plasterboard	10mm	1	1	39
GST103			1	2	42
GST104			2	2	44
GST132		13mm	1	1	40
GST133			1	2	43
GST134			2	2	46
GNT102	GIB Braceline®/GIB Noiseline®	10mm	1	1	41
GNT103			1	2	44
GNT104			2	2	46
GNT132		13mm	1	1	41
GNT133			1	2	46
GNT134			2	2	48

FRAMING

Framing to comply with all relevant sections and clauses of the New Zealand Building Code. Minimum stud size 70 x 45mm.

Warning: The STC performance figures listed in the table above are based on studs spaced at 600mm centres. Reducing stud centres to less than 600mm will significantly lower the STC performance of these systems.

SOUND CONTROL INFILL

Pink® Batts® R2.2 (90mm) glass wool insulation installed between the studs and nogs.

WALL LINING

GIB® plasterboard as prescribed in the tables above. Joints of the outer layer are generally offset 600mm from those of the inner layer. The outer layer may be fixed horizontally over vertical inner layer.

Full height sheets are used where possible. Where sheet end butt joints are unavoidable they must be formed over nogs with those of the outer layer offset from those of the inner layer. Sheet joints are touch fitted.

Where a Fire Resistance Rating (FRR) is required, refer to the GIB® Fire Rated Systems Manual for special fastener lengths and centres requirements.

ACOUSTIC SEALANT

A bead of GIB Soundseal® acoustic sealant is required around the perimeter of the framing (on the single layer side) and around the perimeter of the inner lining on the other side. The linings are then bedded onto the bead.

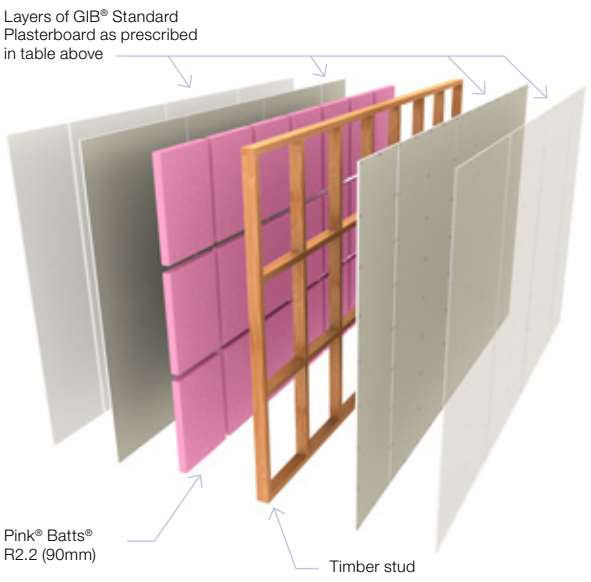
FASTENING THE LINING

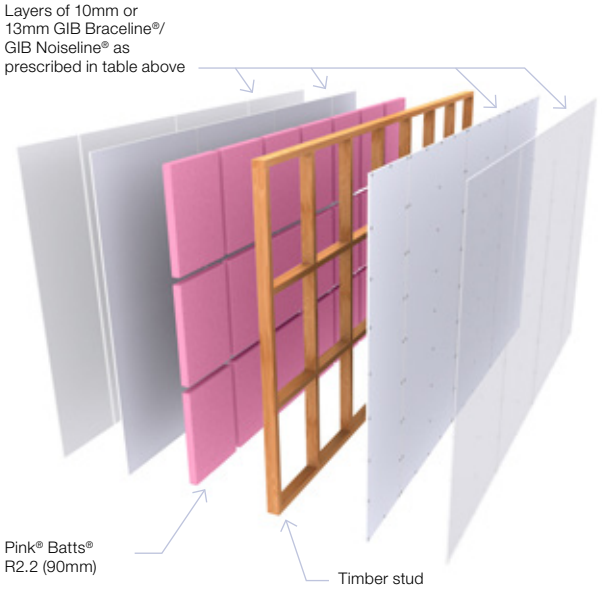
Fasten the linings in accordance with the GIB® Site Guide. If an FRR is required refer to the relevant specification sheet in the GIB® Fire Rated Systems Manual for the correct fastener type and layout.

JOINTING

Inner layer: Unstopped.

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





CONSENT ISSUED BC201209 - Page 575 of 689

James Hardie

Eaves & Soffits

Installation Manual

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

AUGUST 2017 | NEW ZEALAND

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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™
Fax 0800 808 988
literaturefeedback@jameshardie.co.nz

1 Introduction

James Hardie have a wide range of soffit linings and pre-finished soffit linings that enable you to create the look you want.

Cool, wide soffits and verandahs have, over the years, been a feature which specifiers have used to provide shade from the hot summer sun and to give UV protection to exterior paintwork and interior fabrics.

Today's high energy costs demand that all avenues be explored to develop cost-efficient ways for keeping our homes cool. One of these methods — tried and proven — is the use of wide soffits, verandahs and covered outdoor living areas. James Hardie products are resistant to fire and damage from moisture and rotting when installed and maintained as directed.

James Hardie HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining are not suitable for use as a cladding.

1.1

HardieSoffit™ | SOFFIT LINING

HardieSoffit™ Linings are 4.5mm thick and are specifically manufactured for the narrow soffit around the perimeter of the house or building. Standard widths of 450mm, 600mm and 750mm are available.

- HardieSoffit Linings have an unsanded finish suitable for semi-gloss acrylics or lightly textured semi-gloss or high-gloss coatings. Smooth high-gloss coatings must be avoided as some surface undulations may be visible in critical light.
- HardieSoffit Linings can be nail-fixed to timber or mechanically fixed to a steel frame.
- HardieSoffit Linings can be uPVC jointed or the joints can be left expressed.

1.2

HardieFlex™ | EAVES LINING

HardieFlex™ Eaves Lining are 4.5mm in thickness and are available in wider widths for use in wider soffits, ceilings and verandahs. They are complementary to the HardieSoffit Lining and are fixed and jointed in a similar way.

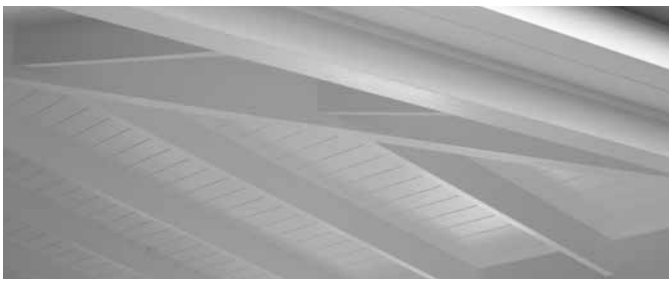
- HardieFlex Eaves Lining has an unsanded finish suitable for semi-gloss acrylics or lightly textured coatings. Smooth high-gloss coatings must be avoided as some surface undulations may be visible in critical light.
- HardieFlex Sheet 6mm, can also be used in eaves application for extra rigidity on larger spanning eaves.
- When higher impact or wind resistance is required, 6mm thick HardieFlex Sheet is used.

1.3

Eclipsa™ | EAVES LINING

Eclipsa™ Eaves Lining is a 4.5mm thick, pre-finished acrylic eave providing innovative style and enduring performance.

- Easy to install, saving both time and money.
- A slipsheet minimises surface marks on paint during transportation and installation.



1.4

HardieGroove™ SOFFIT LINING

HardieGroove™ Soffit Lining has the charm of traditional tongue and groove timber panelling, but has all the qualities of a modern James Hardie fibre cement product. It's perfect for enhancing design lines on modern buildings or renovating old villas and bungalows.

- HardieGroove Soffit Lining comes with a half groove length ways along the edge of the sheet to achieve concealed joints.

1.5

Villaboard™ SOFFIT LINING

Villaboard™ Soffit Linings are 6mm and 9mm in thickness to suit both residential and commercial applications. The recessed edges are suitable for flush jointing to give a smooth flush finish. Ideal for larger sized soffits.

- The sheets are fully sanded to give a smoother face surface.
- Two long sheet edges are supplied with a recessed finish and site-cut edges can be readily ground on site. Other combinations are also available. Refer Table 2, page 5.
- Square-edge sheets are also available. These sheets can be used for the alternative expressed, sealant-filled or uPVC joint finish.

This manual covers the use of HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining, and Villaboard Soffit Lining in external eave and soffit applications. Further technical literature relating to these products and internal linings are available from James Hardie in the following manuals:

- HardieFlex Sheet Technical Specification.
- Villaboard Lining Installation Manual.
- HardieGroove Lining Installation Manual.
- Fire and Acoustic Design Manual.

The specifier or other responsible party for the project must ensure the information and details in this manual are appropriate for the intended application and specific design and detailing is undertaken for areas which fall outside the scope of this document.

MAKE SURE YOUR INFORMATION IS UP TO DATE

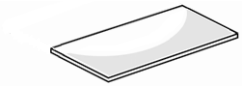
When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.6 PRODUCT DESCRIPTION

Table 1

HardieSoffit Lining Sheet Sizes

Square–cut edge for use with jointers

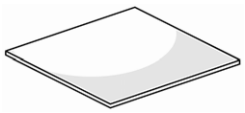


Length (mm)	Mass (kg/m²)	Width 1200mm		
		450	600	750
4.5mm thickness	6.5			
2400		401948	401947	401946

Table 2

HardieFlex Eaves Lining Sheet Sizes

Square-cut edge for use with jointers

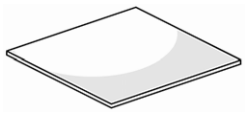


Width (mm)	Mass (kg/m²)	Length (mm)			
		1800	2400	2700	3000
4.5mm thickness	6.5				
900			400194		
1200		400190	400187	400185	400183

Table 3

Eclipsa Eaves Lining Sheet Sizes

Pre-finished square-cut edge sheet for use with jointers

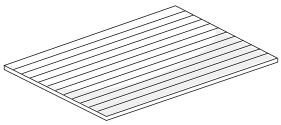


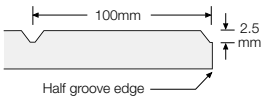
Length (mm)	Mass (kg/m²)	Width (mm)	
		600	1200
4.5mm thickness	6.6		
2400		404807	404808

Table 4

HardieGroove Soffit Lining Sheet Sizes

Half groove length ways to achieve concealed joints





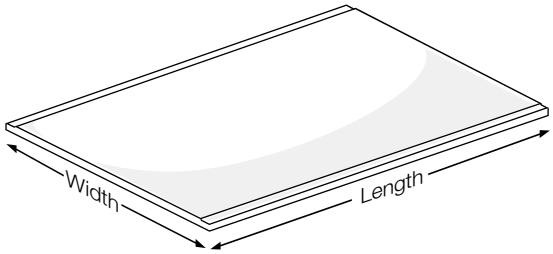
Length (mm)	Mass (kg/m²)	Width (mm)
		1200
7.5mm thickness	10.4	
2400		400246
2700		400245

Table 5

Villaboard Soffit Lining Sheet Sizes

Smooth recessed edge for flush jointing.
Square-cut edge also available for use with jointers.

Villaboard Lining 6mm has no chamfer on square edge sheet.
Villaboard Lining 9mm has small chamfer on square edge sheet.



Length (mm)	Mass (kg/m²)	Width 1200mm		
		Edge Finish		
		4 rec/ edges	2 rec/ edges (long)	Square edges
6mm thickness	8.6			
2400		400432	400429	400444
2700			400428	
3000			400427	400442
9mm thickness	12.4			
2400		400439	400436	400445
2700			400435	
3000			400434	400059

1.7 ACCESSORIES

Table 6

HardieFlex™ Eaves Lining And HardieSoffit™ Lining — Accessories / Tools Supplied by James Hardie					
Accessories	**Description**	**Product Code**	**Accessories**	**Description**	**Product Code**
	Soffit 4.5mm PVC 2-way Jointer 2400mm long, uPVC / White	300915		**Hardiejointer 5mm** uPVC / White 2400mm long 750mm long 600mm long 450mm long	 300729 300921 300920 300919
	6mm Hardiejointer uPVC/Bone colour 2400mm long 3000mm long	 300730 300734		**HardieFlex 5mm Capping Mould** 2400mm long, uPVC / White	300538
	6mm Capping Mould uPVC/Bone colour 2400mm long 3000mm long	 300539 300540		**Scotia Mould (base and cap)** 2400mm long, uPVC / White	300916
	Fastfix Fasteners 38 x 12mm, Nylon / White	300632		**Inseal 3259** 1.5mm thick 50mm wide x 50m long, Black compressible foam	300767
	HardieKnife™ Scoring tool for easy cutting.	305926			

Table 7

Eclipsa Eaves Lining — Accessories / Tools Supplied by James Hardie					
Accessories	**Description**	**Product Code**	**Accessories**	**Description**	**Product Code**
	Hardiejointer 5mm uPVC 2400mm long 750mm long 600mm long 450mm long	 300729 300921 300920 300919		**Soffit 4.5mm PVC 2-way Jointer** 2400mm long, uPVC / White	300915
	Soffit Scotia Mould (base and cap) 2400mm long, uPVC / White	300916		**HardieFlex Capping Mould 5mm** 2400mm long, uPVC / White	300538
	Fastfix Fasteners 38 x 12mm, Nylon / White	300632		**Inseal 3259** 1.5mm thick 50mm wide x 50m long, Black compressible foam	300767
	Eclipsa Eaves Lining Touch-up Paint 15ml	Free Ask James Hardie on 0800 808 868		**HardieKnife™** Scoring tool for easy cutting.	305926

Table 8

HardieGroove Soffit Lining — Accessories / Tools Supplied by James Hardie					
Accessories	**Description**	**Product Code**	**Accessories**	**Description**	**Product Code**
	Soffit Scotia Mould (base and cap) 2400mm long, uPVC / white	300916		**Inseal 3259** 1.5mm thick 50mm wide x 50m long, black compressible foam	300767
	HardieBlade Saw Blade Ø184mm poly crystalline diamond blade, for fast, clean cutting of James Hardie fibre cement.	300660		**James Hardie Base Coat** Base compound for filling over screws. 4kg Pail 15kg Bag	 304490 304491
	HardieDrive Screw s/s 316 30mm x 7g. 100 per jar For fastening to timber frames.	300928		**Villadrive Screw 6g x 30mm** For fastening to timber frames. 100/jar 5kg Box Collated/ 1000	 300992 300993 300994
	HardieKnife™ Scoring tool for easy cutting.	305926			

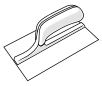
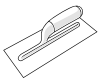
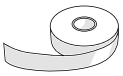
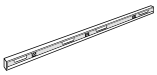
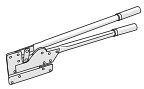
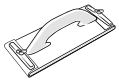
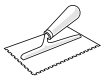
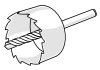
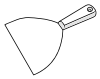
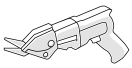
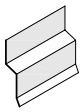
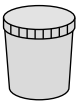
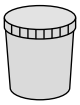
Table 9

Villaboard® Soffit Lining — Accessories / Tools Supplied by James Hardie					
Accessories	**Description**	**Product Code**	**Accessories**	**Description**	**Product Code**
	Soffit Scotia Mould (base and cap) 2400mm long, uPVC / White	300916		**Inseal 3259** 1.5mm thick 50mm wide x 50m long, Black compressible foam	300767
	Hardiejointer 6mm uPVC / Bone colour 2400mm long 3000mm long	 300730 300734		**9mm Hardiejointer** uPVC / Bone colour 3000mm long	300736
	HardieFlex Capping Mould 6mm uPVC / Bone colour 2400mm long 3000mm long	 300539 300540		**Control Joint** 2700mm long, uPVC / White	300978
	Corner Angle uPVC 3000mm long	300669		**James Hardie Top Coat** Topping compound for flush finished jointing. 3kg Pail 15kg Pail	 304492 304493
	James Hardie Base Coat Base compound for flush finished jointing. 4kg Pail 15kg Bag	 304490 304491		**HardieBlade Saw Blade** Ø184mm poly crystalline diamond blade, for fast, clean cutting of James Hardie fibre cement.	300660
	HardieDrive Screw s/s 316 30mm x 7g 100 per jar For fastening to timber frames.	300928		**Villadrive Screw 6g x 30mm** For fastening to timber frames. 100/jar 5kg Box Collated/1000	 300992 300993 300994
	FibreZip® Screws Self drilling rib head screw Box 1000	303840		**HardieKnife™** Scoring tool for easy cutting.	305926

Table 10

Components Not Supplied by James Hardie

James Hardie recommends the following products for use in conjunction with its eaves and soffit linings. James Hardie does not supply these products. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description	Accessories	Description
	HardieFlex Nail 40 x 2.8mm galvanised or stainless steel nails.		**Second Coat Trowel 200mm** For installing second coats on set joints on Villaboard Lining.
	Rondo P35 Control joint used in movement joints.		**Finishing Coat Trowel** For installing top coats on set joints on Villaboard Lining.
	**Perforated Paper Tape** Joint reinforcing tape.		**Corner Tool** For setting of internal corners on Villaboard Lining.
	**Level/straight Edge** For checking straightness of frame.		**Hawk** To assist in the application of finishing compounds especially with the use of trowels.
	**Hand Guillotine** Guillotine for cutting fibre cement.		**Hand Sander** For sanding set joints on Villaboard Lining.
	Collated Screw Gun		**Notched Trowel** For applying tile adhesive to face of Villaboard Lining.
	**Hole Saw**		**Broadknife 150mm** For setting of joints on Villaboard Lining.
	**Electric shear/Fibreshear** For cutting Villaboard Soffit Lining, HardieGroove Soffit Lining, HardieSoffit Lining, HardieFlex Eaves Lining.		**Flashing to Table 20 'E2/AS1'** Flashing fabricator
	Flashing Tape Proprietary tape to adhere to building wrap. Tyvek, Protecto wrap or similar		**Flexible Joint Sealant** Tube Sikaflex MS or similar
	Masking Tape 3M Scotch™ Blue 2090 - I8E 70006576972 or Sellotape 5855 Long Life		**Paperback Corners** 'Goldline' corner moulds
	Polyurethane Tape		**Adhesive Sealant** Sikaflex-11FC by Sika Seal N Flex-1 by Bostik
	**Acrylic Paint** Dulux X10 or similar brand		**Waterproofing Admixture** Multiplast Resin by Plaster Systems. Used in diluted form over Villaboard Lining sheet edges to control moisture suction before flush stopping.

2 Safe working practices

STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALINE SILICA

Crystalline Silica
What is it? Why and when is it a health hazard?

Crystalline Silica is

- Commonly known as sand or quartz
- Found in many building products e.g. concrete, bricks, grout, wallboard, ceramic tiles, and all fibre cement materials

Why is Crystalline Silica a health hazard?

- Silica can be breathed deep into the lungs when present in the air as a very fine (respirable) dust
- Exposure to silica dust without taking the appropriate safety measures to minimise the amount being breathed in, can lead to a potentially fatal lung disease – silicosis – and has also been linked with other diseases including cancer. Some studies suggest that smoking may increase these risks.
- The most hazardous dust is the dust you cannot see!

When is Crystalline Silica a health hazard?

- It's dangerous to health if safety protocols to control dust are not followed when cutting, drilling or rebating a product containing crystalline silica.
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board).

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS AND INSTALLATION INSTRUCTIONS WHEN WORKING WITH JAMES HARDIE PRODUCTS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

AVOID BREATHING IN CRYSTALLINE SILICA DUST!

Safe working practices

- NEVER use a power saw indoors or in a poorly ventilated area
- NEVER dry sweep
- ALWAYS use M Class extractor unit as a minimum and always hose down with water/wet wipe for clean up
- NEVER use grinders
- ALWAYS use a circular sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance.
- ALWAYS follow tool manufacturers' safety recommendations
- ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- ALWAYS wear an approved properly-fitted, approved dust mask (P1 or P2) or respirator

Use one of the following methods based on the required cutting rate:

BEST

- HardieKnife™
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and M Class extractor unit.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade

Working outdoors

- Make sure you work in a well ventilated area
- Position cutting station so wind will blow dust away from yourself and others in the working area
- Cut products with either a HardieKnife or fibre cement shears or, when not feasible, use a HardieBlade™ Saw Blade (or equivalent) and a dust-reducing circular saw attached to a M Class extractor unit
- When sawing, sanding, rebating, drilling or machining fibre cement products, always:
  - Wear your P1 or P2 mask (correctly fitted in accordance with manufacturers' instructions) and when others are close by, ask them to do the same
  - If you are not clean shaven, then use a powered air respirator with a loose fitting head top.
  - Wear safety glasses
  - Wear hearing protection
  - When others are close by, ask them to do the same.

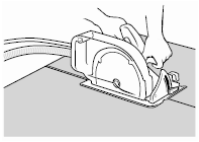
Working indoors

- Never cut using a circular saw indoors
- Position cutting station in a well ventilated area
- Cut ONLY using a HardieKnife, hand guillotine or fibreshears (manual, electric or pneumatic)
- Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class extractor unit

IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

Working Instructions

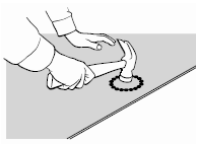
- Refer to Recommended Safe Working Practices before starting any cutting or machining of product.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.

Hole-Forming



For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a 'pilot' hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.

For irregular holes:

- Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.
- Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

STORAGE & DELIVERY

Keeping products and people safe

Off loading

- James Hardie products should be off-loaded carefully by hand or by forklift.
- James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite.

Storage

James Hardie products should be stored:

- in their original packaging
- under cover where possible or otherwise protected with a waterproof covering to keep products dry
- off the ground – either on a pallet or adequately supported on timber or other spacers
- flat so as to minimise bending

James Hardie products must not be stored:

- directly on the ground
- in the open air exposed to the elements

JAMES HARDIE IS NOT RESPONSIBLE FOR DAMAGE DUE TO IMPROPER STORAGE AND HANDLING.

TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

- Do not lift planked products flat and in the middle
- Carry the products on the edge
- If only one person is carrying the product, hold it in the middle and spread arms apart to better support the product
- If two people are carrying the plank, hold it near each end and on edge
- Exercise care when handling weatherboard products to avoid damaging the edges/corners

Sheet products

- Carry with two people
- Hold near each end and on edge
- Exercise care when handling sheet products to avoid damaging the edges/corners

3 Framing

3.1 TIMBER FRAME

Timber framing must be in accordance with NZS 3604 Timber Frame Buildings.

Specific design to NZS 3603 and AS/NZS 1170 can also be undertaken providing that:

- the framing centres do not exceed those given in this specification
- the framing member widths conform to this specification.

Also refer to the Approved Document for NZBC Clause B2 'Durability' and NZS 3602 (Timber and Wood-Based Products for use in Buildings) regarding timber treatment requirements and allowable moisture contents in timber for various components of the building. Also refer to the framing manufacturer's literature for further guidance on the use of treated timber.

3.2 STEEL FRAME

The figures in this brochure are drawn for timber framing. However, steel framing and furring channels can also be used.

All metal framing centres are to be the same as specified for timber frame in this manual.

Steel framing members must be fabricated from light-gauge sheet steel 0.55mm thick minimum to 1.6mm maximum. If heavier sections are used difficulties may be experienced in fixing the self-drilling, self-tapping fasteners. Refer to specific details for the minimum flange width requirements.

Sheets must not be fixed directly to drawn steel or hot-rolled steel sections. These must first be battened out with ex 50mm-thick (40mm minimum) timber battens or light-gauge metal furring channels.

Screw-fix 6mm or thicker sheets only.

Screw fixings can be finished flush or sunk a maximum of 0.5mm below the sheet surface ready for filling.

NOTE: The fasteners must not be over driven as will reduce the holding capaciity of the sheet.

3.3 FRAMING SET-OUT

For the framing set-out of up to 600mm-wide soffit refer to Figure 1.

For the framing set-out of 601mm to 1200mm wide soffits refer to Figure 2.

3.3.1 Pre-finished steel fascia/gutters

When pre-finished steel fascia/gutters are used the soffit edge must be supported 4mm minimum into fascia recess, similar to Figure 10.

Ribbon board to be continuous for product fixing.

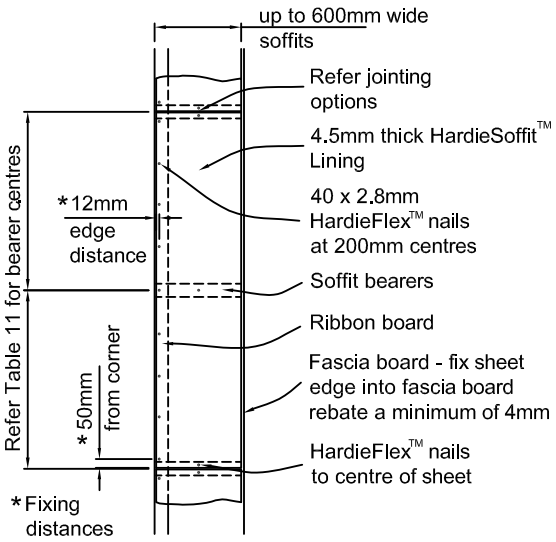
NOTE: Because of the limited fascia groove available with some metal fascias a supporting ribbon board will be required with fixings at 300mm centres maximum. Pre-finished soffits can distort due to surface tension when adequate edge support is not provided.

Table 11

Eaves Lining Framing Centres		
Eaves And Soffit Width (mm)	**Wind Zone**	**Max. Soffit Bearer Centres (mm)**
Up to 450	L, M	1200
	H, VH	900
451 - 600	L, M	1200
	H, VH	600
601 - 1200	L, M, H, VH	600
Various	EH*	600

*HardieFlex Sheet 6mm or Villaboard Lining 6mm must be used in EH Wind Zone with soffit bearers maximum 600mm centres.

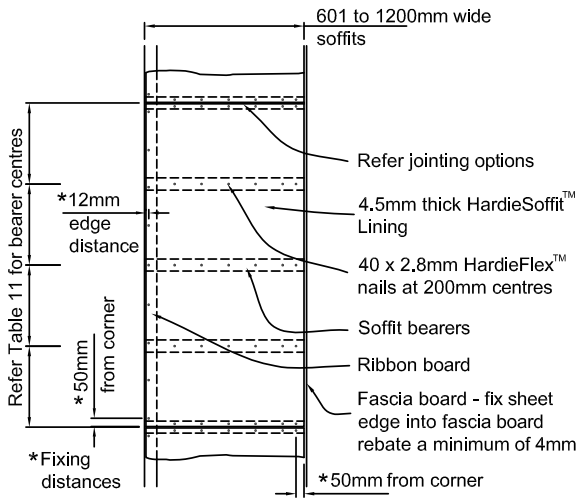
Figure 1: Eaves and soffit up to 600mm



Notes

1. HardieFlex™ nails are the usual fixing method for HardieSoffit™ Lining. The fastfix method can also be used as an alternative.
2. When fastfix fastenings are used refer to Table 7 and Figure 8 and 9.

Figure 2: Eaves and soffits 601mm to 1200mm



1. HardieFlex™ nails are the usual fixing method for HardieSoffit™ Lining. The fastfix method can also be used as an alternative.
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NOTE: Because of the limited fascia groove available with some metal fascias a supporting ribbon board will be required with fixings at 300mm centres maximum. Pre-finished soffits can distort due to surface tension when adequate edge support is not provided.

3.4 BATTEN REQUIREMENTS

Battens are required when sheets are fixed over:

- Gypsum board exceeding 20mm in thickness
- Softboard, polystyrene or similar
- Concrete, masonry block or brick.

Timber battening is to be a minimum of 35mm deep x 40mm wide to achieve adequate sheet nail penetration.

Steel battens must be minimum 0.55mm thick, 23mm deep and have a bearing surface of 38mm min. Battens must be galvanised to meet the durability requirements of the New Zealand Building Code (NZBC) and fixed to manufacturer's specifications. All battening centres and sheet fixing is to be strictly in accordance with the framing and fixing required by this manual. Care must be taken to ensure the battens are packed and aligned to give a true even surface for the sheets to be fixed. Check the face of the battens with a long straight-edge before fixing sheets.

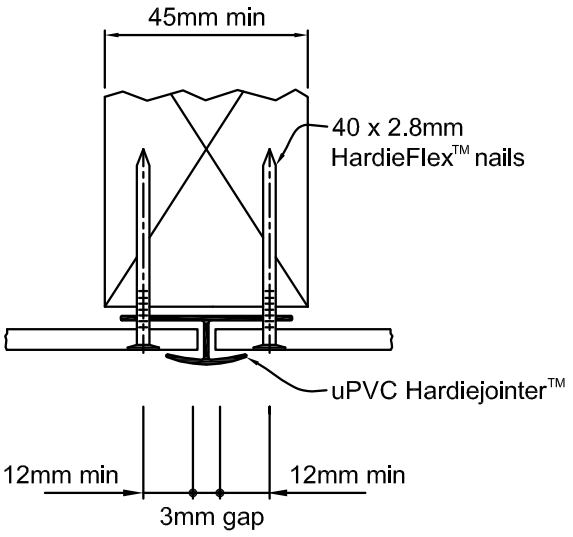
3.5 SKILLION ROOF DESIGN

When installing soffit linings direct to the under side of skillion roof framing, ensure that sufficient ventilation has been provided within the roof space. The temperatures within these smaller roof spaces can reach very high levels in certain conditions and this can cause cracking in flush stopped joints due to excessive movement in roof framing. Therefore the framing in skillion soffits and ceilings need a specific engineering design consideration.

General design guide for a narrow strip of flash stopped soffits is to provide a control joint at 4.8m centres.

General design guide for large flash stopped soffits is to provide control joints at 4.8m x 3.6m in either direction when fixing to this type of framing.

Figure 3: uPVC Hardiejointer detail



4 Jointing options

- All soffit lining sheet edges must be supported by framing and/or a fascia board.

HARDIESOFFIT LINING

- Refer to Figure 3 for uPVC Hardiejointer detail
- Refer to Figure 5 for express joint detail
- Refer to Figure 9 for two-way uPVC jointer

HARDIEFLEX EAVES LINING

- Refer to Figure 3 for uPVC Hardiejointer detail
- Refer to Figure 4 for butt joint detail
- Refer to Figure 5 for express joint detail
- Refer to Figure 9 for two-way uPVC jointer

ECLIPSA EAVES LINING

- Refer to Figure 3 for uPVC Hardiejointer detail
- Refer to Figure 8 for Fastfix Fasteners fixing detail. Use a 6mm diameter masonry drill bit to drill a hole and fix fasteners
- Refer to Figure 9 for Two-way uPVC Jointer

HARDIEGROOVE SOFFIT LINING

- Sheets have half groove along the long edges for butt jointing
- Sheets to have chamfer formed on site along the short edge for butt jointing

VILLABOARD SOFFIT LINING

- Refer to Figure 6 for flush joint details. Refer to Section 5.5 for flush jointing
- Refer to Figure 3 for uPVC Hardiejointer detail
- Refer to Figure 4 for butt joint detail
- Refer to Figure 5 for express joint detail
- Refer to Figure 7 for sealant joint detail

Figure 4: Butt joint detail

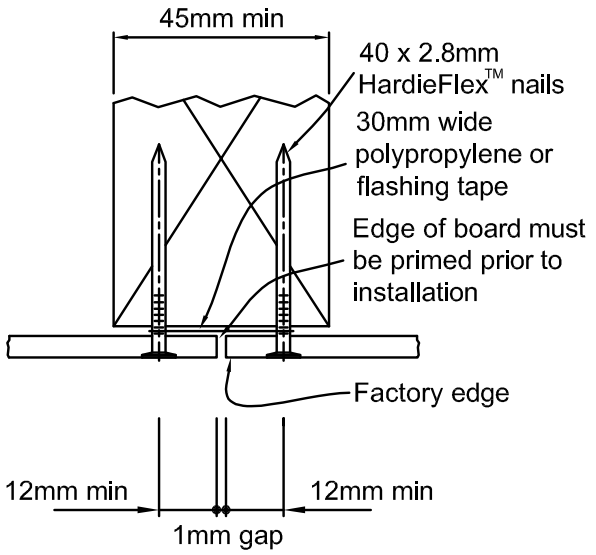


Figure 5: Expressed joint detail

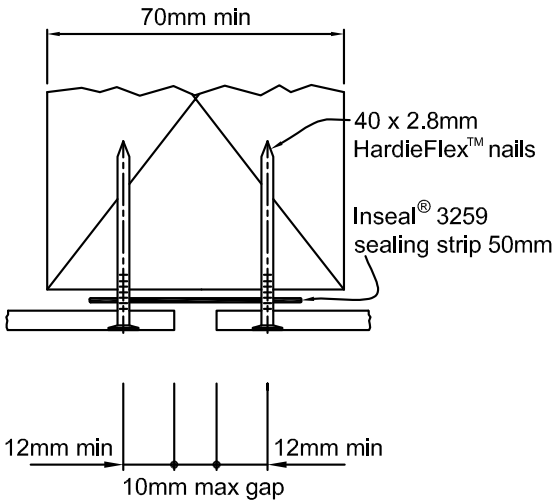


Figure 6: Vertical flush joint setout

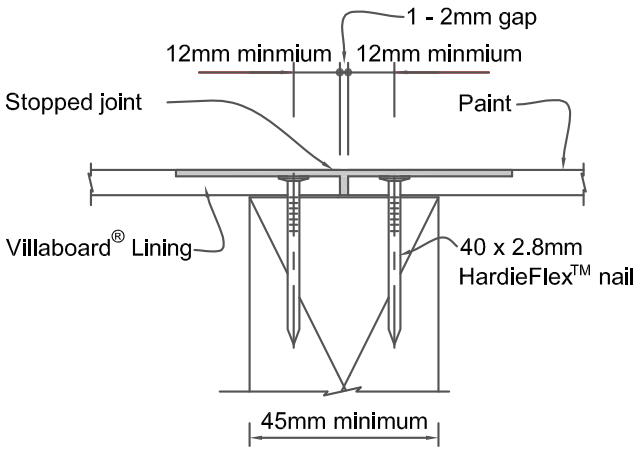


Figure 7: Sealant joint detail

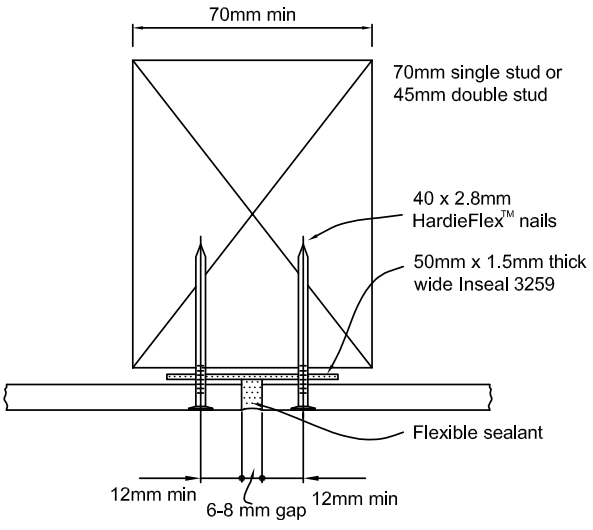
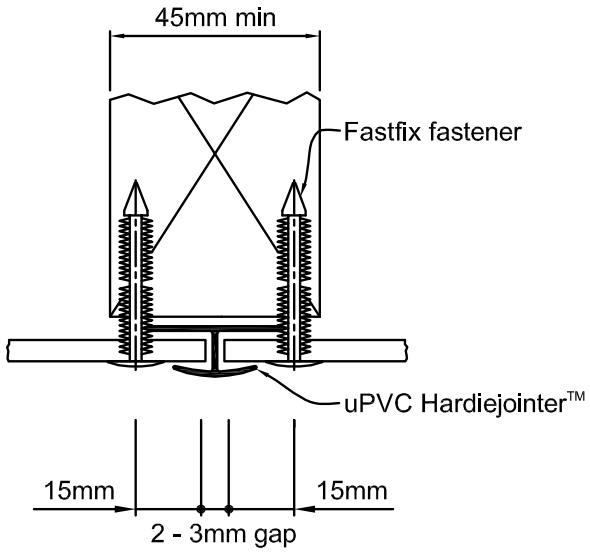
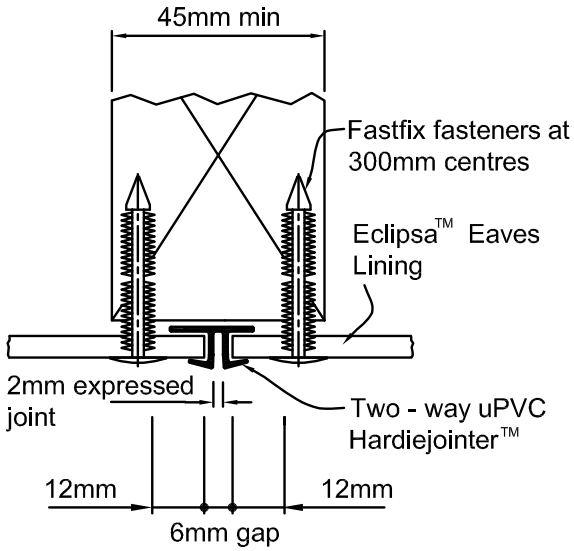


Figure 8: Fastfix fastener fixing detail



Note: Use a 6mm drill bit for drilling holes in sheet for fixing Fastfix fasteners.

Figure 9: Two-way uPVC jointer



Note: Use a 6mm drill bit for drilling holes in sheet for fixing Fastfix fasteners.

Figure 10: Cladding detail with scotia mould

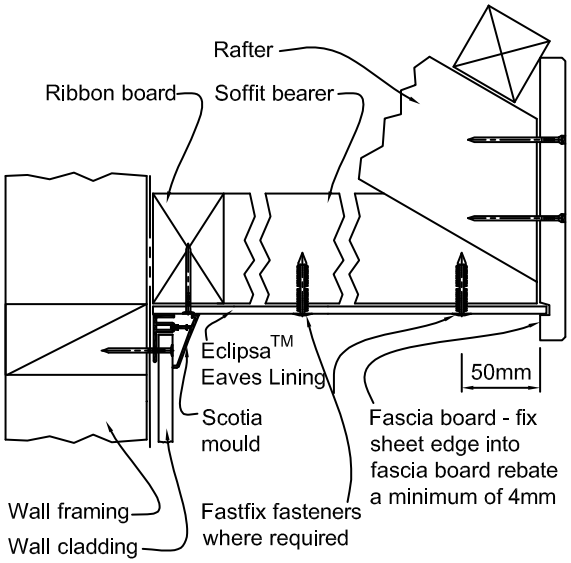
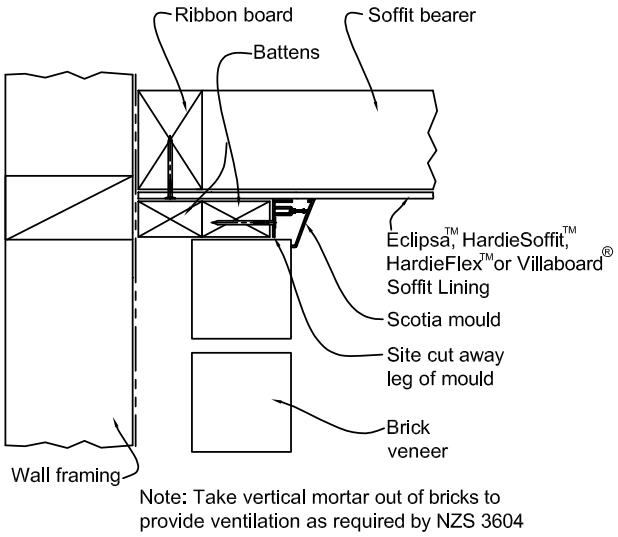


Figure 11: Brick veneer detail with scotia mould



Note: Take vertical mortar out of bricks to provide ventilation as required by NZS 3604

5 Installation

This installation manual covers the use of James Hardie Eaves and Soffits for buildings within the scope of NZS 3604. For all other buildings specific engineering design is required.

5.1 GENERAL

Refer to Table 11 and Figure 1 and 2 regarding nail fixing centres, for framing and types of fasteners.

The eaves/soffits must be sealed against claddings to minimise moisture ingress behind the claddings. The roof must have been installed before installing the soffits linings. Where the soffits are sloping upwards away from the wall, a mechanical flashing must be provided in the soffit to wall junction. The flashing is fixed under soffit lining and laps over the face of cladding by 35mm minimum Refer to Figure 27 - Figure 30.

5.1.1 Drip Edge

All soffit linings must either be installed with a grooved fascia, refer Figure 10, or with exterior cladding which forms a drip edge below the soffit lining by 15mm minimum. Soffit linings are generally fitted into the recess formed in fascia board to form the drip edge.

5.1.2 Structural Ceiling Diaphragms

HardieFlex Eaves Lining and Villaboard Soffit Lining are suitable for use in structural ceiling diaphragms as per NZS 3604. Refer to the James Hardie Bracing Design Manual.

5.1.3 Curved Applications

HardieFlex Eaves Lining and Villaboard Soffit Lining can be used for curved applications.

The minimum bending radii are shown below.

Table 12

Curved Soffit/Ceiling Minimum Bending Radii	
	Along length (mm)
9mm Villaboard Lining	3000
6mm Villaboard Lining	1800
HardieFlex Eaves Lining	1800
HardieSoffit Lining	1800

NOTE: The bending radii given above require no pre-wetting of the sheet. Mechanical fix at 200mm centres maximum to entire framing.

To maintain the smoothness of the curve, ceiling battens are generally required at spacings as shown below.

Table 13

Curved Lining — Soffit Batten Spacing	
Range of Radii (mm)	**Soffit batten spacing (mm)**
1800 to 3000	300
Above 3001	400

5.1.4 FIRE RATED SOFFITS

For full details refer to the James Hardie Fire and Acoustic Design Manual or Ask James Hardie on 0800 808 868.

5.2 FASTENER DURABILITY

Fasteners used in external applications must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing's material to be used in relation to the exposure conditions and are summarised in Table 14.

Table 14

Exposure conditions and nail selection prescribed by NZS 3604		
Zone / Nail Material		
Zone D*	Zone C outside sea spray zone and Zone B and geothermal hot spots	Bracing — All zones
Grade 316 Stainless	Hot-dipped galvanised or 316 stainless	Grade 316 Stainless

* (Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made)

When using screws to fix into steel framing a minimum class-3 coated screw must be used.

5.3 HARDIESOFFIT LINING

For framing and fixing schedules refer to Section 3.

All sheet edges are to be supported by framing or a fascia board. Fixings are to be at 200mm centres to all framing (refer Figures 1 and 2).

HardieSoffit Lining up to a max. width of 600mm can be jointed up to a maximum 150mm off the ceiling/soffit batten when using uPVC jointers.

NOTES

1. Use of 6mm thick sheets will minimise the deflection and enhance the impact resistance.
2. Sheets can be jointed as per Section 4.
3. Do not screw fix 4.5mm thick sheets.

5.4 HARDIEFLEX EAVES LINING

For framing and fixing schedules refer to Section 3.

All sheet edges are to be supported by framing or a fascia board. Fixings are to be at 200mm centres to all framing (refer Figures 1 and 2).

NOTES

1. Use of 6mm thick sheets will minimise the deflection and enhance the impact resistance.
2. Sheets can be jointed as per Section 4.
3. Do not screw fix 4.5mm thick sheets.

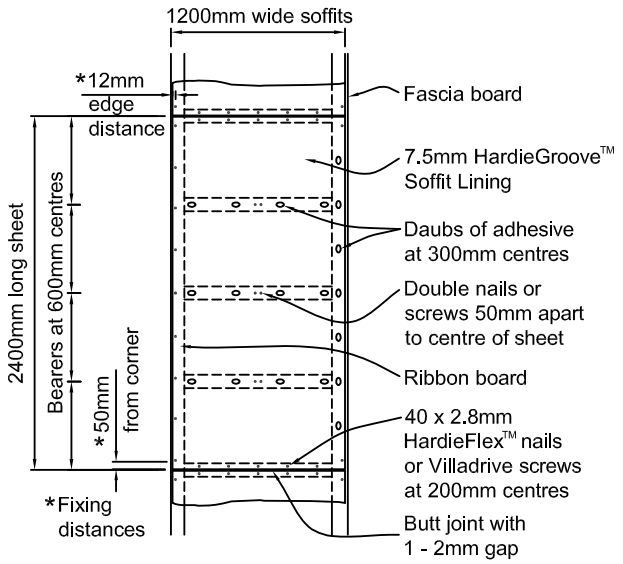
5.5 HARDIEGROOVE SOFFIT LINING FIXING METHOD

For framing and fixing schedules refer to Section 3.

The recommended fixing methods are combined nail and adhesive or screw and adhesive. (Refer Figure 12).

To achieve a concealed joint, butt the long edges together (half grooved). (Refer Figure 13).

Figure 12: Nail or screw and adhesive fixing



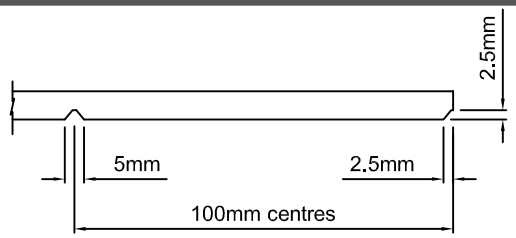
NOTES

1. Do not place nails or screws within 100mm of the adhesive daubs.
2. Fix with either HardieFlex nails 40 x 2.8mm (galvanised or 316 stainless steel), Villadrive wood screws or HardieDrive stainless steel 30mm x 7g wood screws.
3. Use only stainless steel fixings in sea spray zones.
4. When butt jointing short ends of HardieGroove Lining in ceiling/soffit applications, the short edges must be cut square and have chamfer formed.

Nails must be finished flush with the sheet surface. Screw heads can be finished 0.5mm below the sheet surface and stopped.

In steel framing the fasteners should be driven as close as possible to the stud corners to avoid deflection of the stud flange

Figure 13: Sheet edge and groove detail



Note: Sheets are grooved along the length of the sheet.

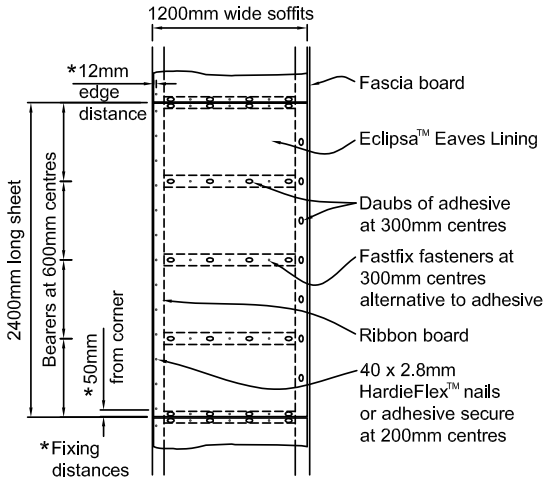
5.5.1 Finishing

Once the sheets are in place, fill over all driven fixings with James Hardie Base Coat to the required level of finish.

5.6 ECLIPSA EAVES LINING

- Eclipsa Eaves Lining are to be supported by bearers and fasteners at the maximum spacings specified for the 4.5mm sheets in Section 3, Table 11 and Figures 3, 8 and 9 of this manual
- To fix larger soffit, ceiling or verandah applications provide a perimeter frame to all sheet edges and intermediate nogging at the centres shown in Table 11.
- Fix the Eclipsa Eaves Lining into the fascia board groove then nail into the ribbon board at 300mm centres with 40 x 2.8mm HardieFlex nails. Ensure nails will be hidden by the scotia mould or timber scotia (refer Figures 10, 11 and 14).
- Use a 6mm-diameter masonry bit to drill holes and fix Fastfix fasteners (refer Figures 8 and 9).
- Eclipsa Eaves Lining up to a maximum 600mm width can be jointed up to a maximum 150mm off the ceiling/soffit batten when using uPVC jointers.

Figure 14: Fastfix fastener and adhesive fixing



5.6.1 Fastfix fasteners

Fastfix fasteners (38mm long) can be used as an alternative fixing for prefinished soffit and ceiling systems in conjunction with adhesives. Drill a 6mm-diameter hole through the sheet and framing to insert the Fastfix fastener. In timber the hole must be 40mm deep.

5.6.2 Masking Tape

The recommended masking tape for use with Eclipsa Eaves Lining is 3M Scotch Blue I8E 2090 or Sellotape 5855 longlife. This tape can only be left on the Eclipsa Eaves Lining for maximum 7 days, otherwise tape removal may cause paint loss.

5.7 VILLABOARD SOFFIT LINING (SOFFITS UP TO 1200mm)

Villaboard Lining 6mm-thick is used when a smooth sanded sheet is required to achieve a painted flush finish.

Refer to the framing fixing schedule Section 3 Table 11, Figures 1 and 2, and finishing schedules on Section 6.

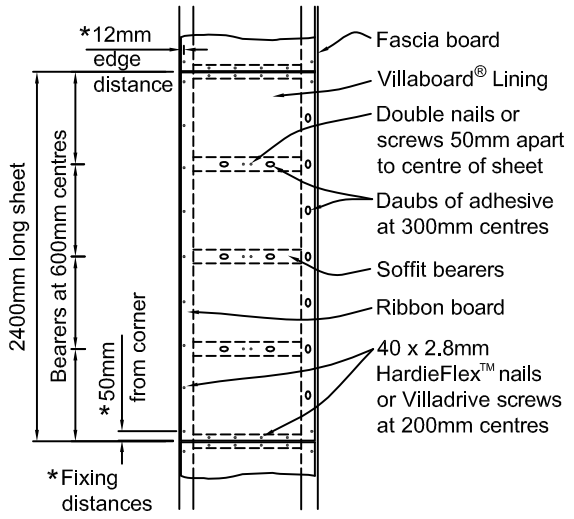
Refer to the flush jointing procedures, Section 6.

Fix with either HardieFlex nails 40 x 2.8mm (galvanised or 316 stainless steel), Villadrive sood screws or HardieDrive stainless steel 30mm x 7g wood screws

Screws finished 0.5mm below surface,

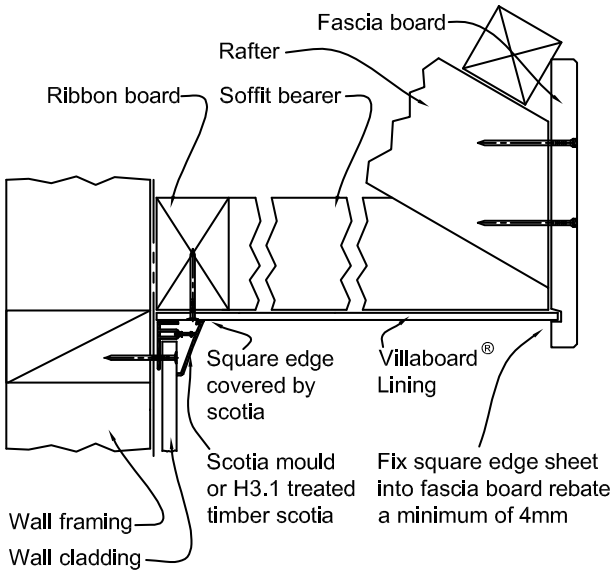
Nails finished flush with surface.

Figure 15: Nail/screw and adhesive fixed soffit



- Alternatively sheets can be fixed with nails / screws only at 200mm centres at sheet edges and 250mm centres at intermediate framing

Figure 16: Soffit cross section



5.7.1 Control Joints

Control joints are required in long runs of Villaboard Lining soffits/ ceilings to accommodate structural movement. Control joints must also be provided where the soffits change in direction, change in level, where there is a construction joint in framing or where the soffits continue into passage ways etc. See Table 15 for maximum control joint spacing and Figure 17 for a typical control joint detail.

5.7.2 Jointing Options

Villaboard Soffit Lining is suitable for:

- Flush-jointed narrow strip soffits around a building
- Flush-jointed ceilings over verandahs, porches and entryways to residential and small-scale commercial buildings
- Expressed, uPVC-jointed and sealant-filled joint ceilings where a smooth surface finish is required
- All edges to be supported by the framing.

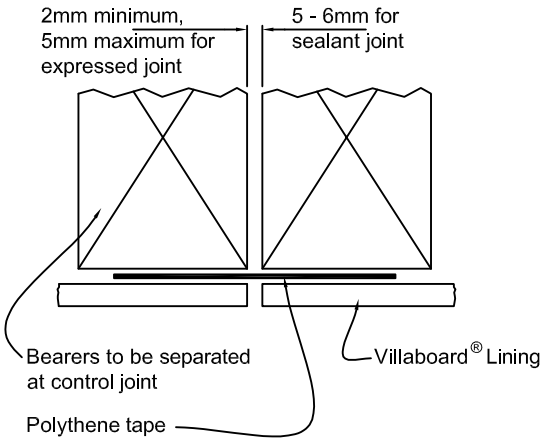
Table 15

Maximum spacing for control joints (m)		
	STEEL FRAMING	**TIMBER FRAMING**
General	4.8	7.2

5.7.3 Narrow-Strip Flush-Jointed Soffits And Ceilings

In these applications sheets must be jointed on the framing as shown in Figures 1 and 2. Control joints, as shown in Figure 17, must be located at a distance as specified in Table 15. Sheets must not be fixed to the bottom cord of roof trusses.

Figure 17: Control joint



NOTE
Refer Section 5.7.3 for skillion roof design.

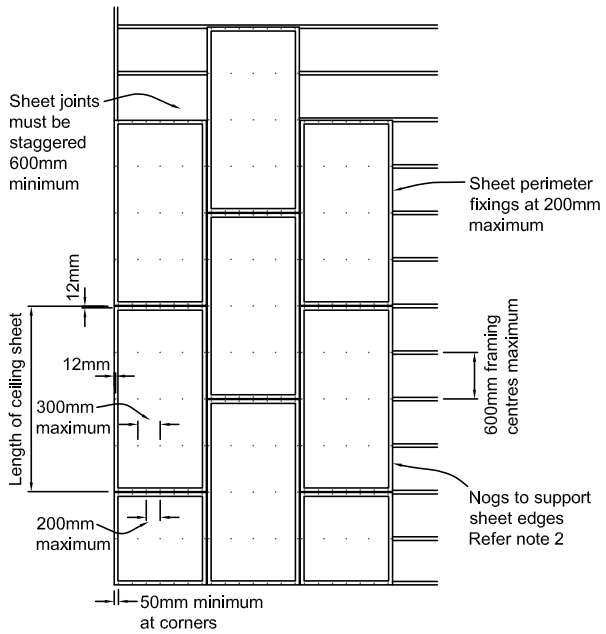
5.8 VILLABOARD SOFFIT AND CEILING LINING (LARGE AREAS)

For standard commercial soffits and ceilings, framing must be at 600mm maximum centres and 6mm thick Villaboard Soffit Lining can be used. For high-impact areas, heavy-use commercial areas, and high-wind areas, framing at 600mm maximum centres and 9mm thick Villaboard Soffit Lining should be used. Sheets must not be fixed to the bottom cord of roof trusses. Timber or steel ceiling battens must be fixed to the underside of the roof truss. Sheets must be laid in an offset pattern so that adjacent end joints do not coincide. Timber ceiling battens must comply with the requirements of NZS 3604 or the specific engineering design. Steel ceiling battens must be a minimum of 37mm wide x 23mm deep x 0.55mm thick and have a bearing surface of 37mm minimum. Battens must be galvanised steel (275 g/m2 zinc coating), have a suitable coating to meet the durability requirements and be fixed to the manufacturer's specifications. Refer to the flush-jointing and finishing procedures on Section 6.

For specific engineering design projects consideration must be given to framing deflections expected due to loadings and appropriate selection of sheet jointing method must be made.

NOTE
1. It is recommended that flush stopping of joints is suitable when using recessed edge Villaboard Lining.
2. When nogs not installed for perimeter support, the unsupported sheet edges across the framing must be supported by back blocking using a 300 – 400mm wide Villaboard Lining strip adhered to rear face and centred between the framing.

Figure 18: Ceiling layout



5.8.1 Control Joints

The ceilings must be divided into bays not exceeding 7.2 x 4.8m. To permit movement, control joints must be formed at the perimeter of each bay (refer Figures 19, 20, 21 and 22) and at the junction of large ceilings with narrow passage strips or where there is a change in direction (also refer Figures 20 and 21). Each bay must be independent of adjacent bays and the surrounding building structure. When the ceilings or soffits contain sloping areas then control joint centres must be reduced to coincide with the slope change lines (refer Figure 22). Framing members (to which the sheet is fixed) must not continue across this control joint. Sheets shall be fixed across the ceiling joists or ceiling battens (refer Figures 24 and 25). Figures 20 and 21 show control joints with the battens running in the same direction as the sheet joint. When these ceilings are wider than one sheet width the sheets can be fixed to the framing provided the control joints are placed to limit the bay size to 7.2m x 4.8m maximum.

Figure 19: Control joint layout

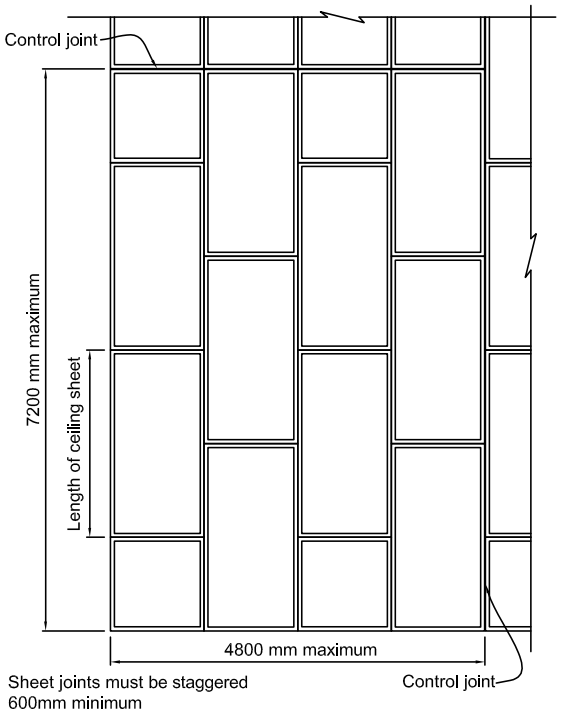


Figure 20: Steel ceiling batten control joint detail

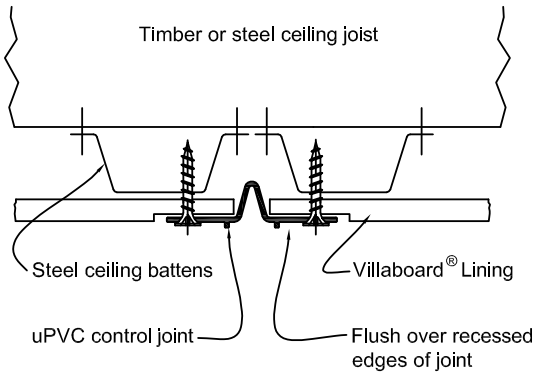


Figure 21: Timber control joint detail

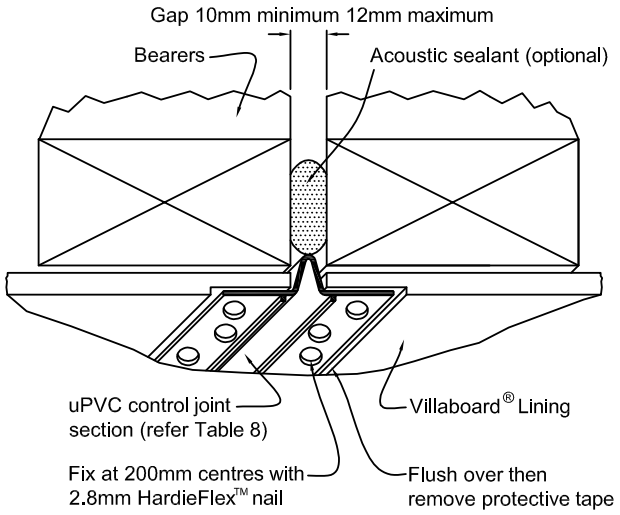
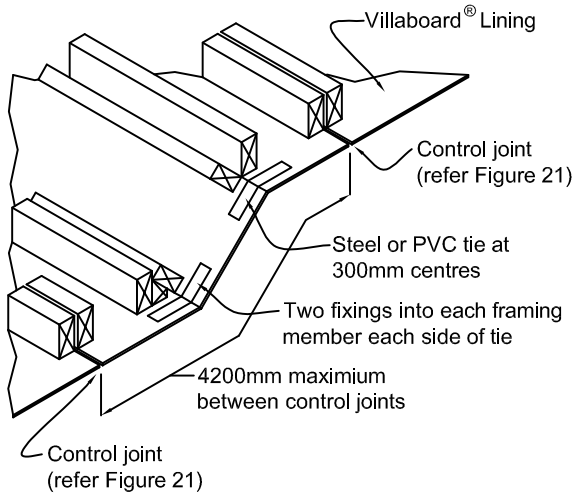
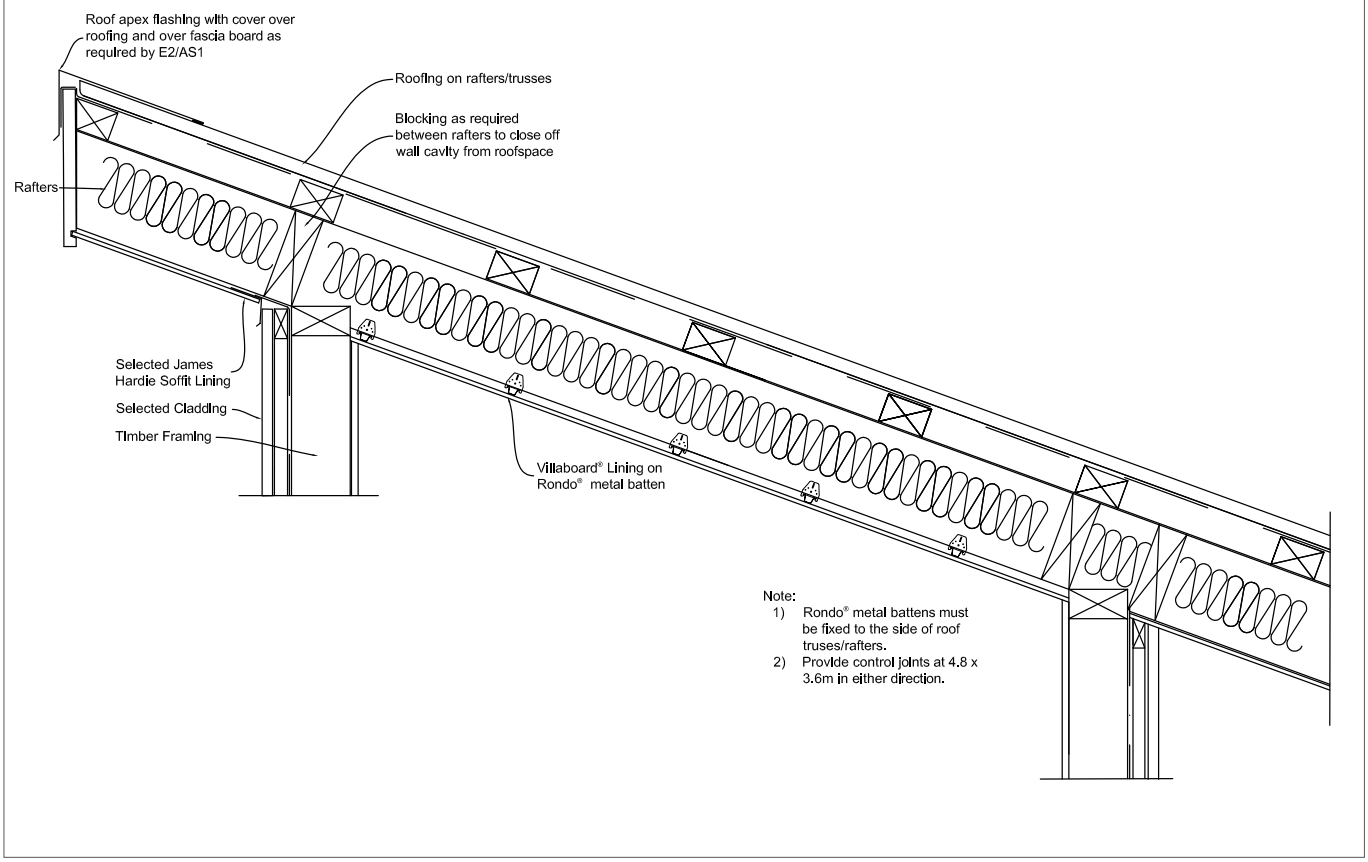


Figure 22: Directional changes to soffits and ceilings — control joint



Note: Tie fixings to be 40 x 2.8mm HardieFlex™ nails.

Figure 23: Skillion Roof/Ceiling



5.8.2 Skillion Roof Design

When installing soffit linings direct to skillion roof framing ensure that sufficient ventilation has been provided within the roof space. The temperatures within these smaller roof spaces can reach very high levels in certain conditions and this can cause cracking in flush stopped joints due to excessive movement in framing. Therefore the framing in skillion soffits and ceiling need a static engineering design consideration. General design guide is to provide control joints at 4.8m x 3.6m in either direction when fixing to this type of framing.

5.8.3 Fixing Option One

A smooth surface finish is obtained by minimising the visible sheet fixings. For painted finishes the combined nail or screw and adhesive method gives this superior finish (refer Figure 24). Fix at 200mm centres down each sheet end with edge fixings in each joist or batten. Double-fix in the centre of each joist or batten. Do not place nails or screws within 100mm of adhesive daubs. Daubs of wallboard adhesive 25mm diameter and 15mm thick must be applied to the intermediate joists or battens at 250mm centres (refer Figure 24). When nogs are not installed for perimeter support, the unsupported edges between ceiling joists or battens must be supported with back blocking using a 300-400mm wide Villaboard Lining strip adhered to rear face and centred between framing.

NOTES

1. All surfaces to receive adhesive must be clean, free of dust, oil etc.
2. Ensure daubs of adhesive never coincide with permanent fastener points, as adhesive shrinkage may cause fastener head protrusion.

Figure 24: Nail or screw and adhesive fixing

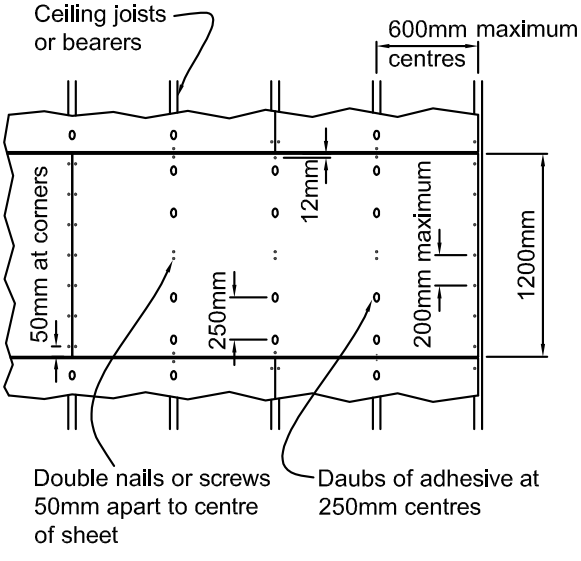


Figure 25: Nail or screw

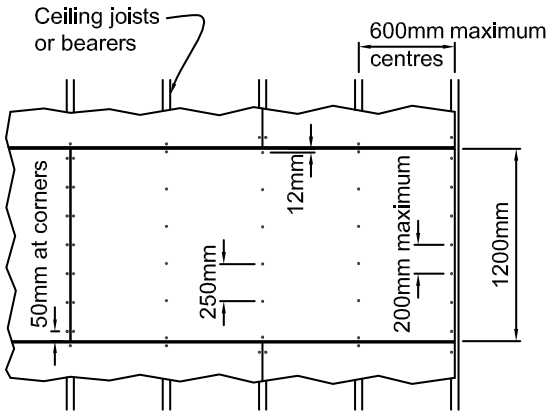
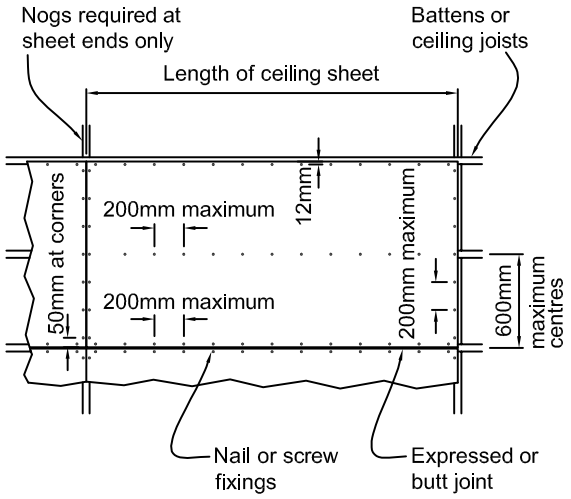


Figure 26: Nail or screw along ceiling joist (expressed or butt joints)



5.8.4 Fixing Option Two

For an alternative nail or screw-fixing method, fasteners are to be driven along the sheet perimeter at 200mm centres and along intermediate ceiling battens at 250mm centres (refer Figure 25).

When nogs are not installed for perimeter support, the unsupported edges between ceiling joists or battens must be supported with back blocking using a 300-400mm wide Villaboard Lining strip adhered to rear face and centred across ceiling joists.

5.8.5 Column Or Wall Abutments

Soffit sheeting must be free to move independently from the building element it abuts with. This is critical for flush-jointed sheeting, otherwise cracking at the joint may occur.

5.8.6 Square-Edge Villaboard Lining Ceilings And Soffits

Square-edge Villaboard Lining is used for butt-joint; expressed-joint or uPVC-jointed ceilings.

5.9 TITAN FACADE PANEL

May be used as soffit with expressed joint when installed as per Figure 5 and fixings as per Villaboard Soffit Lining.

5.10 INTERNAL SWIMMING POOL APPLICATION

For fixing Villaboard Lining and HardieGroove Lining in internal swimming pool areas;

- The sheets must be back and edge sealed before installation.
- When fixing Villaboard Lining to the ceiling under a skillion roof, roof ventilation must be considered to minimise thermal movement and sheet joint cracking.
- All Villaboard Lining recessed sheet joints must be stopped.
- Alternatively, when using square edge Villaboard Lining, the sheet joint must be butted over an Inseal 3259 tape with an appropriate flexible sealant in the 1mm joint.
- All HardieGroove Lining joints must have continuous bead of sealant applied to edge of sheet before butting together.

Only stainless steel fasteners must be used.

- Full perimeter fixing required.
- In addition, it is recommended that H3.1 treated timber ceiling battens are used to resist decay due to higher condensation levels present in this area.

5.11 SPECIAL DETAILS

Figure 27: Sloping soffit and direct fixed flatsheet cladding

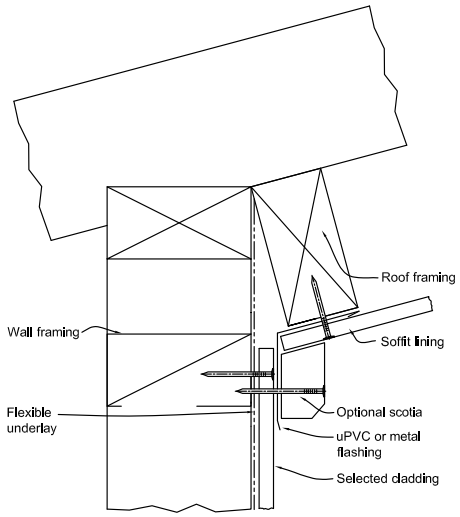


Figure 28: Sloping soffit and cavity fixed flatsheet cladding

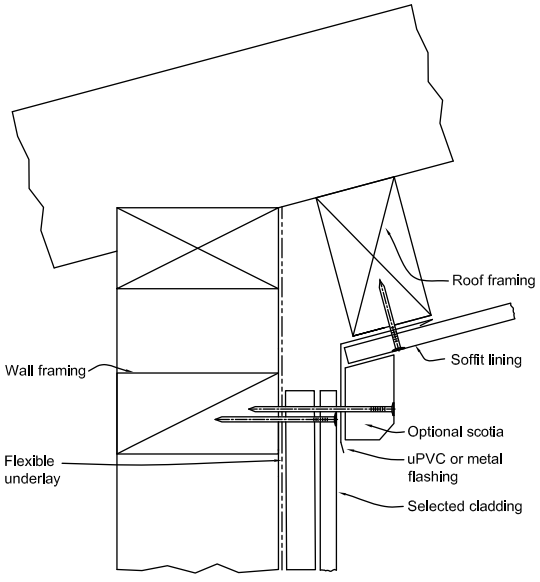


Figure 29: Sloping soffit and direct fixed weatherboard cladding

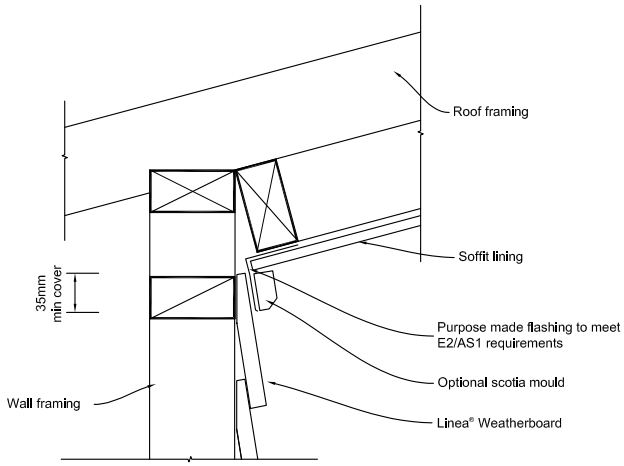
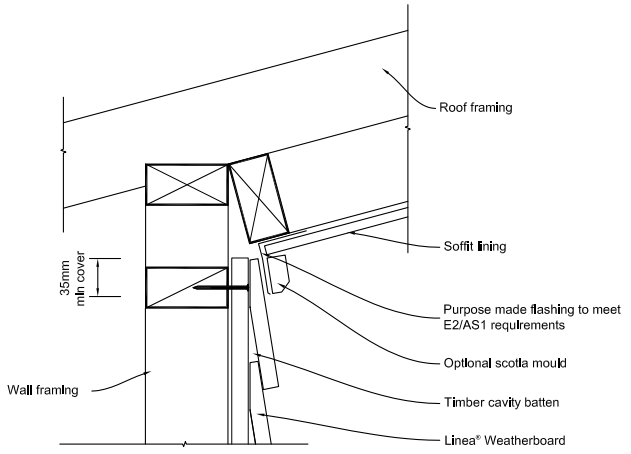


Figure 30: Sloping soffit and cavity fixed weatherboard cladding



6 Villaboard Joint Stopping

FOR VILLABOARD LINING

6.1 GENERAL

Villaboard Soffit Lining is finished with paint complying with parts 7, 8, 9 and 10 of AS 3730. The application and maintenance must be in accordance with the manufacturer's specifications.

NOTE: Before flush stopping sheet edges must be sealed with Multiplast resin, water proofing admixture or other similar products.

6.2 GLANCING LIGHT

In some instances, due to glancing light, set joints may be noticeable in Villaboard Lining walls, especially where paint finishes have a high gloss level. Work closely with your builder or designer to minimise this.

Artificial lighting needs to be considered in relation to soffits.

Where glancing light is an issue its effect can be lessened by:

- Artificial light shading devices.
- The use of light coloured, matt finish paints.

6.3 LEVEL OF FINISHES

Different levels of finishes are typically specified for different applications. Higher levels of finishes are used to address the glancing light issues with painted Villaboard Soffit Lining referred to above. A description of the various levels of finishes and the jointing/coating requirements can be found in Table 16.

Table 16

Levels of Finishes

Level of finish	Definition*	Typical jointing/setting	Finish
0	This level of finish may be useful in temporary construction.	No stopping, taping, finishing or accessories are required. The work is confined to gluing or screwing/nailing sheets in place.	For use in areas where finishing and stopping is not considered necessary.
1	For use in plenum areas above ceilings, in areas where the work would generally be concealed, or in building service corridors and other areas not normally open to public view.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape.	Surface free from excess jointing compound. Tool marks and ridges are generally acceptable.
2	For use in warehouse, storage or other areas where surface appearance is not of primary concern.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape and James Hardie Top Coat.	Minor tool marks and ridges are generally acceptable.
3	For use in areas which are to receive heavy or medium texture (spray or hand applied) finishes or where heavy wall paper coverings are to be applied as the final decoration. This level of finish is not generally suitable where smooth painted surfaces or light to medium wall coverings are specified.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape and James Hardie Top Coat.	This level of finish must be sufficiently smooth to accept heavy vinyl, tiles or textured coatings without blemishes.
4	This is generally the accepted level of finish for domestic construction. It is used where light textures or wall coverings and smooth textured finishes and satin/flat/low sheen paints are illuminated by noncritical lighting.	Refer to flush jointing recommendations on page 24. All joints and corner joints will have tape embedded in James Hardie Base Coat applied over all joints, angles, fastener heads and accessories. This application is applicable to recessed edge sheets only. The use of square edge sheets will require a high build application and coating finish.	For use where light-texture coatings or wallpaper or other lightweight wall coverings are to be applied. For painted finishes in non-critical lighting areas flat and low-sheen textured paints are to be applied. Gloss and semi-gloss paints are not generally suitable over this level of finish as any minor blemish will show under critical light. The weight, texture and sheen level or wall coverings applied over this level of finish must be carefully evaluated. Joints and fasteners must be adequately concealed if the wall-covering material is lightweight, contains limited pattern, has a gloss finish, or any combination of these features is present. Unbacked vinyl wall coverings are not suitable over this level of finish.
5	This level of finish is for use where gloss or semi-gloss paints are specified or where critical lighting conditions occur on satin, flat or low sheet paints.	Refer to page 23 steps 1–4 for jointing. Final James Hardie Base Coat application should be feathered out to approximately 200mm + each side of the joint. Then a full skim coat of James Hardie Top Coat must be applied over entire sheet surface in order to achieve a uniform finish. This application is applicable to recessed edge sheets only. The use of square edge sheets will require a high build application and coating finish.	This level of finish is for use where gloss, semigloss, low-sheen or non-textured paints are specified or where critical lighting conditions occur.

*Reference: AS/NZS 2589.1: 'Gypsum lining in residential and light commercial construction — Application and finishing. Part 1: Gypsum plasterboard'

6.4 PAINT FINISHES

Prior to application of paint finishes, remove any residual sanding dust and ensure the surface is suitable for paint application.

Always follow the paint manufacturer's recommendations for paint suitability, mixing and application.

NOTES

1. Use of a 'sealer coat' or 'preparation undercoat' is recommended.
2. Do not tile ceilings.

6.5 VILLABOARD SOFFIT LINING JOINTING AND STOPPING

Villaboard Soffit Lining joints are set with James Hardie jointing compounds reinforced with perforated paper tape. Recessed edge sheet joints require joint setting by using the jointing products outlined. The performance of joints is the responsibility of the installer, as this is governed by the installation practices and the standard of workmanship applied. However, James Hardie considers that the recommendations provided in Table 16 describe best practice to reduce the risk of joint cracking or other problems. There are various factors that can affect the performance of jointing compounds on edge recessed fibre cement substrates. These factors include the framing, movement, installation quality, vibrations, moisture, humidity, temperature, etc. To achieve satisfactory joint performance these factors need to be carefully considered and understood by the installer and designer when positioning joints and selecting jointing compounds. Furthermore, it is important that the jointing compound used has the physical attributes required to perform considering these factors. James Hardie compounds have been specifically developed for use with Villaboard Soffit Lining.

In addition, provision for movement needs to be made by the installation of control joints. Refer to clasue 5.7.1.

COMPOUND COVERAGE

1kg of Base Coat will provide approximately 5 lm of standard joints.

1kg of Top Coat will provide approximately 5.6 lm of standard joints.

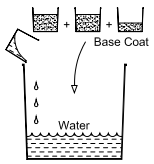
NOTE

Follow the mixing instructions carefully when mixing James Hardie Base Coat and Top Coat.

MIXING INSTRUCTIONS

Table 17

James Hardie Base Coat Mixing Instructions

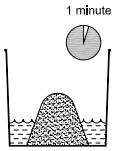


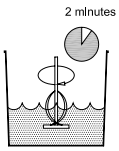
Step 1

First, add 1 part of clean water into bucket.

Then add 2½ parts James Hardie Base Coat powder

Allow to soak for 1 minute.



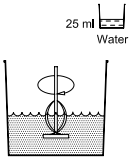


Step 2

Mix for 1½ – 2 minutes using paint mixer or equivalent. (approximately 2500-3000rpm)

James Hardie Base Coat is NOT like the plaster based compounds. Initial mixing will indicate a dry mix and further mixing **WITHOUT** further addition of water will deliver the ideal workable paste.

Warning: Inadequate or over mixing can lead to poor workability and can cause performance issues. **Do not hand mix.**



Step 3

The mix at this stage should be consistently smooth.

Based on the environmental conditions (i.e. temperature and humidity) you may add maximum of 25ml of water per 1Kg of base coat powder in the mix at this stage to adjust workability. Mix it well.

(Note: Adding excess water than the recommendation may delay the drying of base coat and may cause joint cracking due to excessive shrinkage.)

Mix should be glossy and smooth. There should be no lumps in the mix.

Important Notes:

1. Do not apply James Hardie Base Coat in temperatures above 40° C or below 5° C.
2. Allow the compounds to dry before applying the next coat. The drying time will vary between 12 to 24 hours depending upon the weather conditions.
3. Site cut and site recessed sheet edges must be sealed with an acrylic sealer e.g. Dulux Acraprime 501/1, Dulux 1 Step or similar product.
4. In corners, use James Hardie uPVC internal/external corner mould primed with Dulux Primerlock or similar. A 'GIB® Goldline™ Platinum' corner mould can also be used.
5. Use only perforated paper tapes in straight joints.
6. It is recommended that one (1) base coat bag is mixed in three (3) portions.
7. Before stopping the sheet edges, Multiplast Resin or a similar product in diluted form must be applied over the sheet edges. Mix the resin as per the manufacturers recommendations.

Product Life:

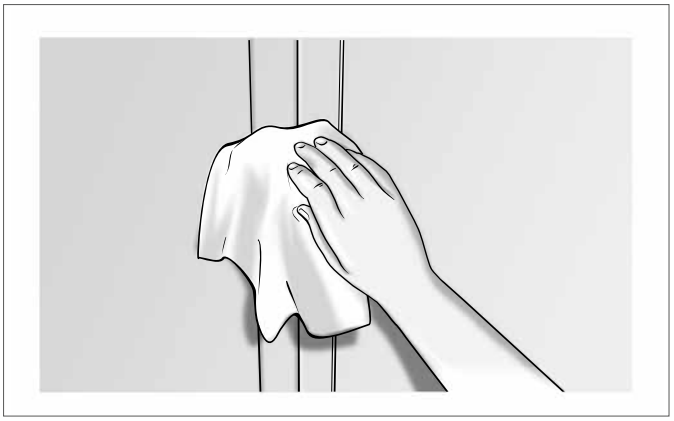
James Hardie Base Coat has a shelf life of 12 months in unopened bags when stored in a cool dry place.

James Hardie Base Coat has a bag life of 1 month if opened bags are resealed and stored in a cool dry place.

6.6 SET JOINTS

Step 1 — Preparation

Ensure that the recesses are clean and free of dust and contaminants. Sheet edges must be sealed with Multiplast resin, water proofing admixture or other similar products. If working conditions are hot and dry, dampen the area around the joint prior to working.

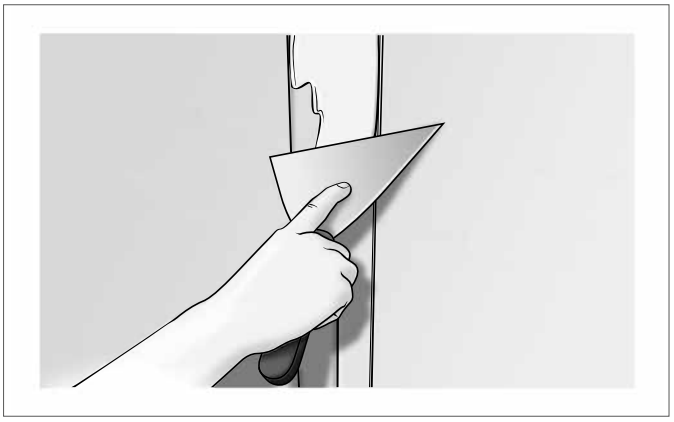


NOTE

The jointing method shown below provides a Level 4 finish. For more information about this and other finishes refer to page 21.

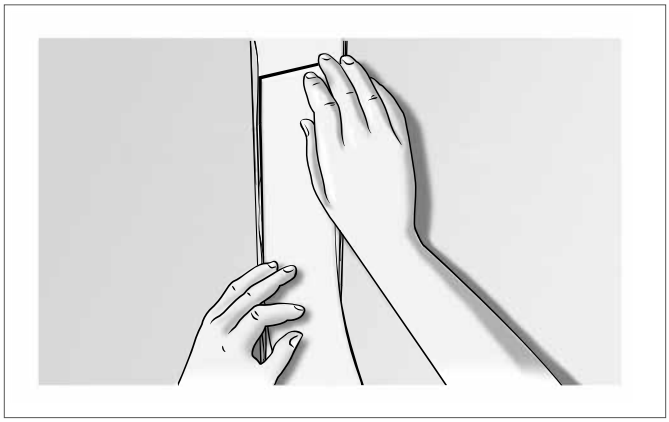
Step 2 — First Coat

Apply James Hardie Base Coat to fill the recess with a 150mm broad knife.



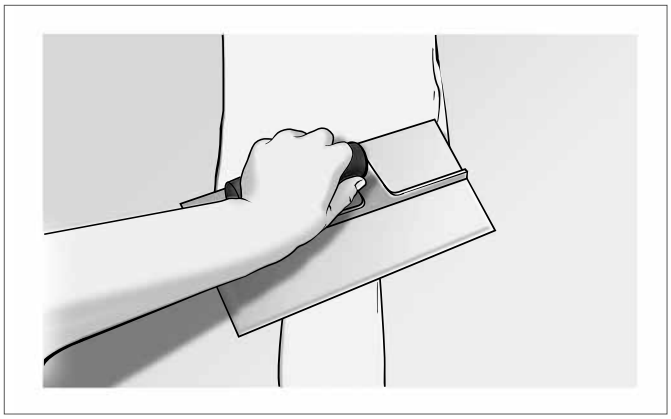
Step 3 — Embed Tape

Firmly embed the perforated paper tape centrally into the joint using a 50mm broad knife. Ensure that there are no voids under the tape and remove excess compounds.



Step 4 — Thin Layer

Immediately cover tape with a thin layer of James Hardie Base Coat applied with a 150mm broadknife.

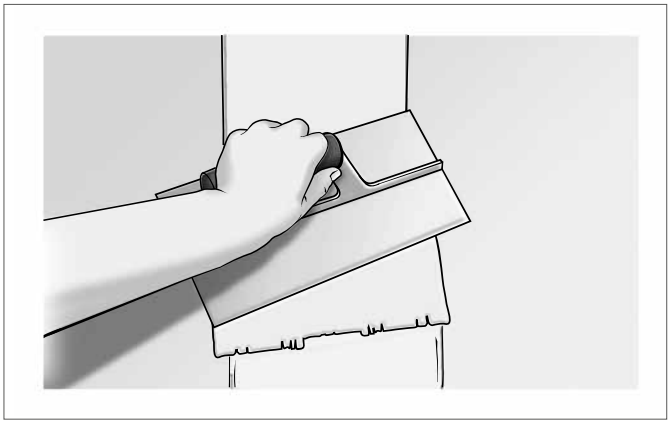


NOTE

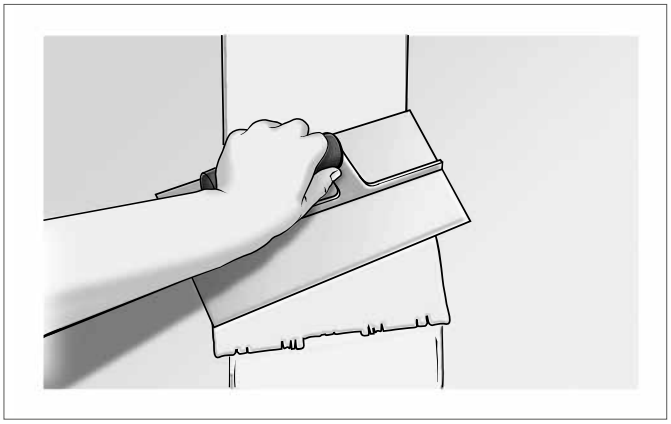
Steps 5, 6 and 7 are only required for paint and wall paper finish.

7 Finishing

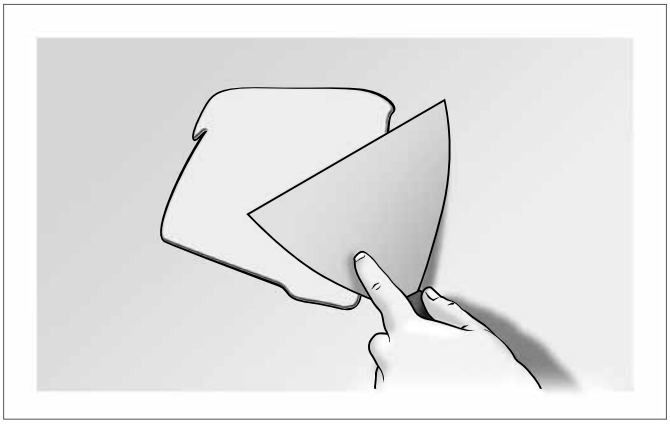
Step 5 — Second Coat
When the first coat is fully dry, use a 200mm wide second coat trowel to apply the James Hardie Base Coat. Apply this coat approximately 180mm wide, laid down over the recess and feather the edges.



Step 6 — Finishing Coat
Ensure the second coat is fully dry. Using a finishing trowel, apply a coat of James Hardie Top Coat 280mm wide centrally over the joint and feather out the edges. Allow to dry fully before sanding. Sand with a 180 grit sand paper to achieve a smooth finish for painting.



Step 7 — Fastener Heads
Apply a finishing coat of James Hardie Base Coat to fastener heads, feathering out the edges. Allow to fully dry before sanding.



7.1 PAINTING

HardieSoffit Lining, HardieFlex Eaves Lining, Villaboard Soffit Lining and HardieGroove Soffit Lining sheets are to have a minimum of two coats of acrylic paint applied after fixing in order to meet the requirements of the NZBC. All sheets must be coated within 3 months of installation.

Use quality 100% acrylic paints. Economy paints are not recommended because generally they are less well bound, less moisture resistant and more prone to mould growth.

In all cases the manufacturer's specification for the selected paint must be followed. Note that some paints require an undercoat before applying finish coats.

Damp, shady situations, proximity to bush, agricultural paddocks or seaspray environments may induce an extra tendency to mould growth. Use mould-inhibiting and alkaline-resistant undercoats and consult the paint manufacturer for details of maximum mould-resistant paints.

Before painting, remove any surface grime or other contaminants and ensure the HardieSoffit Lining, HardieFlex Eaves Lining, Villaboard Soffit Lining and HardieGroove Soffit Lining is dry. Paint must not be applied when the air temperature is below 10˚C.

When using uPVC moulds avoid dark colours (paints must have light reflection of 40% or more) as excessive movement may cause buckling of the uPVC when exposed to direct sunlight.

Enamel-based paints can be used, utilising a three-coat system.

For full details apply to the selected paint manufacturer before commencing the work.

8 Product information

8.1 GENERAL

HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining are a cellulose fibre reinforced cement building product. The basic composition is Portland cement, ground sand, cellulose fibre and water.

HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Sheets').

James Hardie New Zealand Limited is an ISO 9001 'Telarc' certified manufacturer. HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining are classified Type A, Category 3 in accordance with AS/NZS 2908.2 'Cellulose-Cement Products'.

For Safety Data Sheets (SDS) visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

8.2 DURABILITY

Resistance to moisture/rotting

HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat rain (Clause 6.5)
- Water permeability (Clause 8.2.2)
- Warm water (Clause 8.2.4)
- Soak dry (Clause 8.2.5)

8.3 FINISHES

HardieSoffit Lining, HardieFlex Eaves Lining, Eclipsa Eaves Lining, HardieGroove Soffit Lining and Villaboard Soffit Lining must be paint finished within 90 days of their installation. Refer to the paint manufacturer for paint suitability, mixing and application.

8.4 GROUP NUMBER CLASSIFICATION

HardieGroove Lining and Villaboard Lining have a 'Group Number' classification of 1 – S as per the requirements of Clause C of the NZBC.

9 Maintenance

It is the responsibility of the specifier to determine normal maintenance requirements for eaves and soffits to comply with NZBC Acceptable Solution B2/AS1. The extent and nature of maintenance will depend on the geographical location and exposure of the building. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*,
- Pre-painted soffits, such as Eclipsa Soffit Lining, when used in harsh costal environments, the soffit must be washed down using a hose and soft brush minimum once every four months in addition to the other maintenance requirements*,
- Re-applying exterior protective finishes**,
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants,
- Cleaning out gutters, blocked pipes and overflows as required,
- Pruning back vegetation close to or touching the building.

* Do not use a water blaster to wash down the soffits.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

Product Warranty

Eaves & Soffits

All James Hardie eaves and soffit linings come with a 15 year product warranty. Pre-finished products such as Eclipsa Eaves Lining come with a 10 year coating warranty and 15 year warranty on the base sheet. All accessories supplied by James Hardie are warranted for a period of 15 years. For full warranty details visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) in each products warranty under "Conditions of Warranty". James Hardie has tested the performance of the HardieSoffit™ Lining, HardieFlex™ Eaves Lining, Eclipsa™ Eaves Lining, HardieGroove™ Lining and Villaboard™ Soffit Lining, and when installed in accordance with the HardieSoffit™ Lining, HardieFlex™ Eaves Lining, Eclipsa™ Eaves Lining, HardieGroove™ Lining and Villaboard™ Soffit Lining installation manual, in accordance with the standards and verification methods required by the New Zealand Building Code (NZBC) and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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James Hardie

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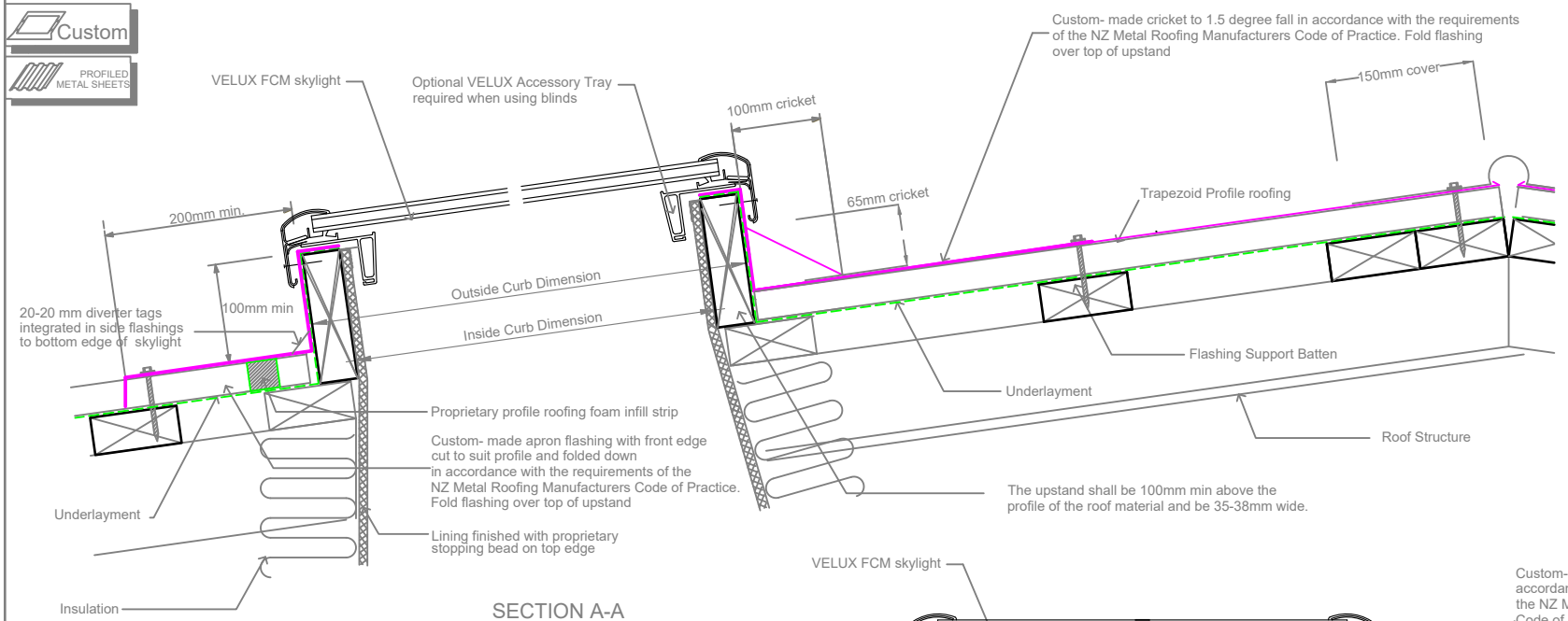
FCM

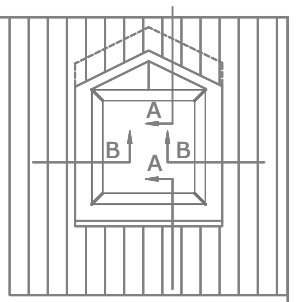
Custom

PROFILED METAL SHEETS

THIS DETAIL APPLIES TO METAL TRAPEZOID AND TROUGH ROOF PROFILES WITH ROOFPITCHES BETWEEN 3 AND 60 DEGREES.



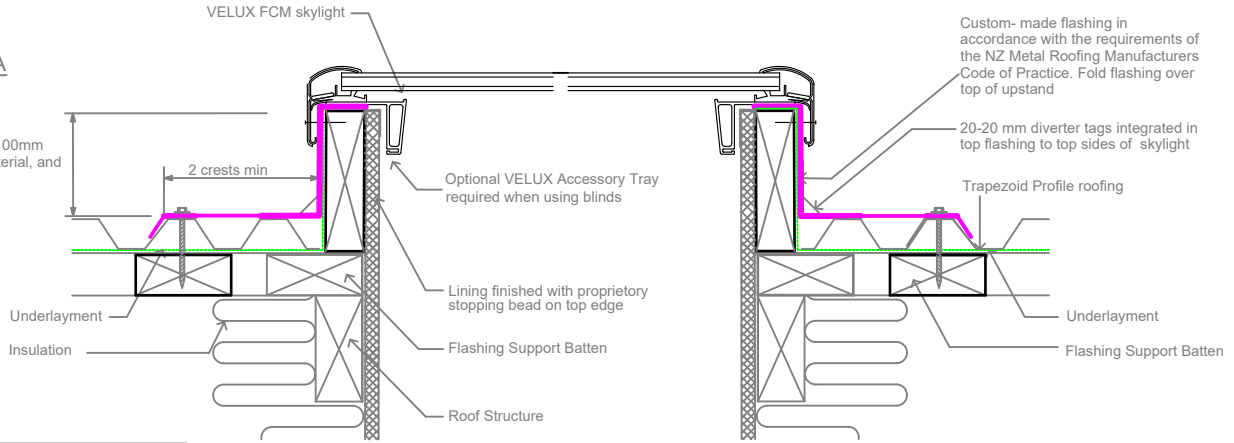
SECTION A-A



ELEVATION

Custom-made flashing in accordance with New Zealand Metal Roofing Manufacturers Code of Practice. Ensure all flashings meet the requirements for your projects' location.

Please note:
Below 15 degrees:- Any condensation that forms on the glass due to high humidity may drip



SECTION B-B

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

BRANZ APPRAISED CUSTOM WATER-SHED FLASHING

No cricket or diverter required when skylight is less than 600mm wide, and catchment less than 40 sqm.

Custom flashings must be designed to meet the requirements set out in the latest version of the New Zealand Metal Roof and Wall Cladding Code of Practice, and shall be manufactured and installed by a specialist flashing contractor to the latest trade practices.

The flashing and installation must be guaranteed against weathertightness by the specialist flashing contractor.

Insulation material meeting the requirements of NZBC/H1 is required in the cavities of the lightwell structure.

VELUX Sky-Product Management

NEW ZEALAND LTD.
0800 650 445

	Name	Date
Drawn by		Feb 19
Checked by		Feb 19
Drawing No.		

VELUX Low Pitch Fixed Skylight in Trapezoidal Steel Roof with metal water-shed flashing (3-60 degrees)

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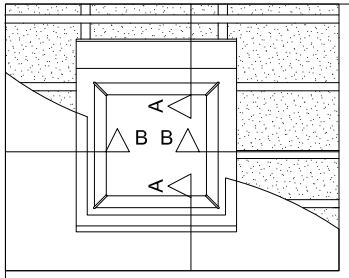
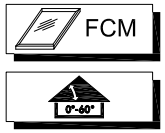
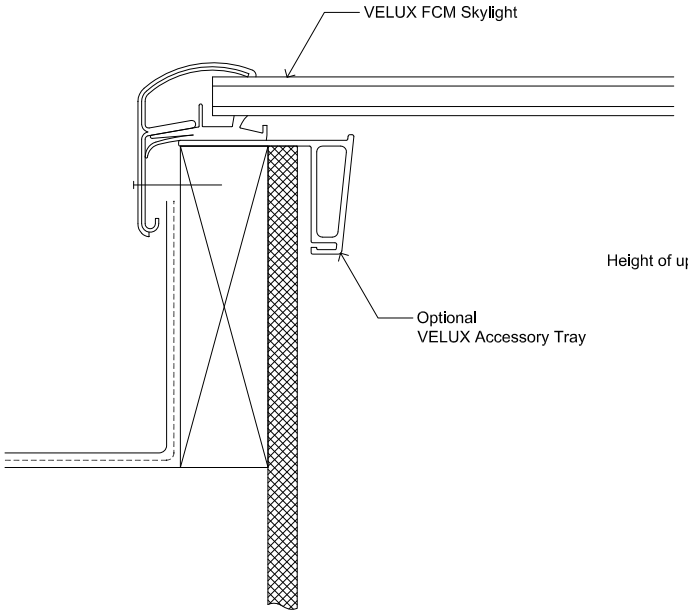
® VELUX is a registered trademark

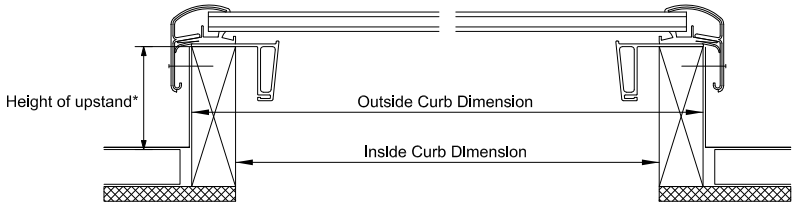


Please note:
Below 15 degrees:
- Any condensation that forms on the glass due to high humidity may drip
- Standing water and dirt left on the glass over time may cause smudging and corrosion on the glass



ELEVATION





VELUX FCM skylight at 0 degrees minimum pitch with purpose-made flashing to suit roofing material

SECTION B-B

* The upstand shall be the greater of 110 mm or the minimum requirements as set out in the Approved Document for New Zealand Building Code - External Moisture, clause E2

All flashing for FCM skylight are to be purpose-made to suit the roofing material, and subject to Approved Document for NZ Building Code - External Moisture, clause E2

PRODUCT DIMENSIONS METRIC UNITS (MILLIMETERS)		
SIZE	OUTSIDE CURB DIMENSION	INSIDE CURB DIMENSION
2222	648 x 648	572 x 572
2246	648 x 1257	572 x 1181
2270	648 x 1867	572 x 1791
3030	851 x 851	775 x 775
3434	952 x 952	876 x 876
4646	1257 x 1257	1181 x 1181

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BC201209 12/01/2021 Michaelmo

VELUX NEW ZEALAND LTD.
Sky-Product Management
0800 650 445

	Name	Date
Drawn by		May 12
Checked by		May 12
Drawing No.		

FCM Skylight general installation details

This drawing is an instrument of service and is provided for informational use only.

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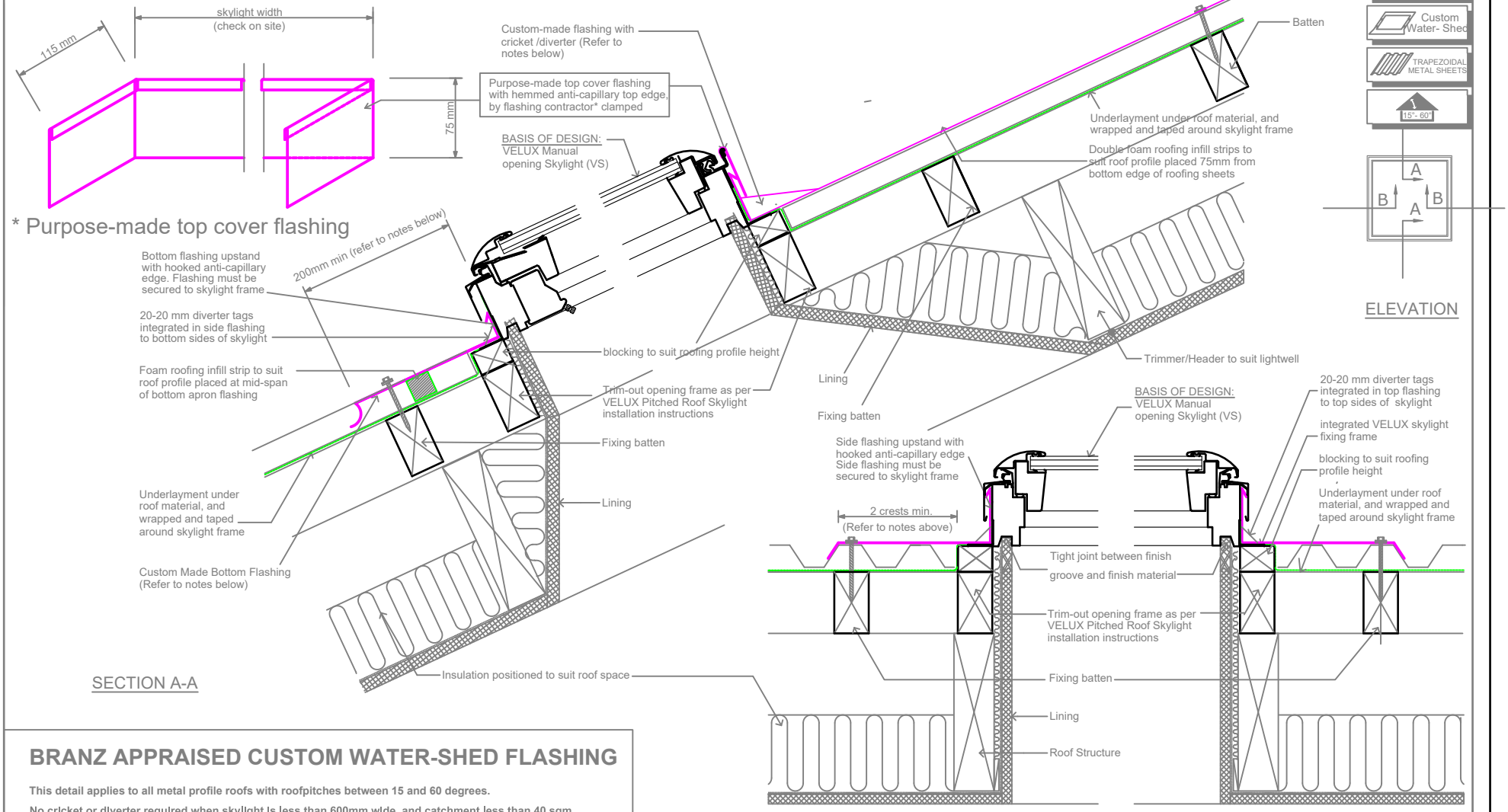
THIS DETAIL APPLIES TO METAL TRAPEZOID AND TROUGH ROOF PROFILES WITH ROOFPITCHES BETWEEN 15 AND 60 DEGREES.



BRANZ APPRAISED CUSTOM WATER-SHED FLASHING

This detail applies to all metal profile roofs with roofpitches between 15 and 60 degrees.

No cricket or diverter required when skylight is less than 600mm wide, and catchment less than 40 sqm.

Custom flashings must be designed to meet the requirements set out in the latest version of the New Zealand Metal Roof and Wall Cladding Code of Practice, and shall be manufactured and installed by a specialist flashing contractor to the latest trade practices.

For roofs with roof pitches less than 15 degrees, the VELUX Skylight must be installed to a min.15 degrees.

The flashing and installation must be guaranteed against weathertightness by the specialist flashing contractor.

Insulation material meeting the requirements of NZBC/H1 is required in the cavities of the lightwell structure.

VELUX NEW ZEALAND LTD.
0800 650 445
Sky-Product Management

	Name	Date
Drawn by		Mar 19
Checked by		Mar 19
Drawing No.		

VELUX VS Manual Opening skylights with custom-made water-shed flashing for Trapezoid Metal Roofs with roof pitch 15-60 degrees

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WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
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Received 12/01/2021

FIRE BY escea.

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Installation / Service Instructions

DS 1150, DS1400, DS1650

Gas Fireplace

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Received 7/01/2021

Important:

The appliance shall be installed in accordance with;

- This installation instruction booklet
- Local gas fitting regulations
- Municipal building codes
- Electrical wiring regulations
- Any other relevant statutory regulations
- AS/NZS 5601.1:2013 Gas Installations

WARNING:

This appliance must be installed by a qualified person.

DO NOT SPRAY AEROSOLS IN THE VICINITY OF THIS APPLIANCE WHILE IT IS IN OPERATION.
DO NOT USE OR STORE FLAMMABLE MATERIALS IN OR NEAR THIS APPLIANCE.
DO NOT PLACE ARTICLES ON OR AGAINST THIS APPLIANCE.
DO NOT MODIFY THIS APPLIANCE.

This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.

Young children should be supervised to ensure that they do not play with the appliance.
Failure to follow these instructions could cause a malfunction of the heater, which could result in death, serious bodily injury, and/or property damage. Failure to follow these instructions may also void your fire insurance and/or warranty.

Who can install this product:

Installation must be carried out by a registered installer who, on completion of the installation, must issue a:
AUS: Certificate of Compliance
NZ: Certificates that comply with the latest legislation in accordance with national and/or local codes. If these are not issued then the Escea warranty may be void.

Warranty Repair and Annual Servicing:

Please contact Escea if you require warranty work. Warranty repair work must be carried out by a recognised gas fire technician. It is recommended that recognised Escea Gas Fire Technicians are also used to carry out annual servicing requirements (particularly during the warranty period). For contact details of recognised Escea Gas Fire Technicians in your area, or for replacement parts, please contact the retailer from whom the appliance was purchased our visit our website.

The heater must be installed according to these instructions and in compliance with all relevant: building, gas fitting, electrical and other statutory regulations (eg. AS/NZS 5601). Any shortcomings in the appliance and flue installation will be the responsibility of the installer, and Escea will not be accountable for any such failings or their consequences.

Manufactured by: Escea Ltd, PO Box 5277 Dunedin NZ, Ph: +64 3 478 8220. For contact details of your local Escea distributor or dealer in New Zealand, please visit: www.escea.com or email: info@escea.com. From Australia, please visit www.escea.com.au, call AU: 1800 460 832 or WA: 1800 730 140, or email us at info@escea.com

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DS1150 PRODUCT SPECIFICATION

MODEL NAME		DS1150		
Description of Appliance		Gas Fire Heater		
Star Rating		4.4 Stars		
Max. Heat Output		8.2kW		
A/NZ Approval No.		AS/NZS 5263.1.3:2016		
Gas Type		Natural	Propane	ULPG
Gas input	High	34 MJ/hr	34 MJ/hr	34 MJ/hr
	Low	25 MJ/hr	25 MJ/hr	25 MJ/hr
Inlet Pressure	Max	5 kPa	5 kPa	5 kPa
	Min	1.13 kPa	2.75 kPa	2.75 kPa
Operating Pressure on High		0.68 kPa	1.8 kPa	1.8 kPa
Operating Pressure on Low		0.3 kPa	0.9 kPa	0.9 kPa
Burner Jet Size		LH & RH: 1.5mm Middle: 1.95mm	LH & RH: 0.85mm Middle: 1.3mm	LH & RH: 0.85mm Middle: 1.3mm
Burner Aeration		LH & RH: Closed Middle: 1 x 3.5mm	LH & RH: 2 x 4mm Middle: 2 x 12mm	LH & RH: 2 x 7mm Middle: Spacer (no restriction)
Pilot injector		#37	#27	#27
Appliance Dimensions (mm)	Width	1401mm		
	Height	788 mm		
	Depth	350 mm		
Weight	Kg	130 kg		
Ignition System		Electronic Ignition to pilot system		
		Escea PCB		
Ignition Activation		20 secs (approx)		
Flame Safeguard		Flame Rectification		
Consumption		160W @ 0.69A 230V		
Remote controls		Yes		
Timers		Yes		
Clock		Yes		
Function lock / child		Yes		
Temperature control		Yes		
Connections	Electric	230V AC		
	Gas	1/2" BSPP female lower centre of fireplace chassis		
	Flue Type	Aluminium Flexi Flue		
	Flue Size	75mm and 100mm Flexi Flue & PolyPro		
	Spigot Location	Right hand top		
Data badge location		On Chassis Base		

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Received 12/01/2021

DS1400 PRODUCT SPECIFICATION

MODEL NAME		DS1400		
Description of Appliance		Gas Fire Heater		
Star Rating		5.1 Stars		
Max. Heat Output		9.7kW		
A/NZ Approval No.		AS/NZS 5263.1.3:2016		
Gas Type		Natural	Propane	ULPG
Gas input	High	40 MJ/hr	40 MJ/hr	37 MJ/hr
	Low	30 MJ/hr	28 MJ/hr	28 MJ/hr
Inlet Pressure	Max	5 kPa	5 kPa	5 kPa
	Min	1.13 kPa	2.75 kPa	2.75 kPa
Operating Pressure on High		0.82 kPa	1.98 kPa	1.68 kPa
Operating Pressure on Low		0.4 kPa	0.93 kPa	1.04 kPa
Burner Jet Size		LH & RH: 1.70mm Middle: 1.95mm	LH & RH: 1.02mm Middle: 1.3mm	LH & RH: 1.02mm Middle: 1.25mm
Burner Aeration		LH & RH: 1 x 3.5mm Middle: 1 x 6mm	LH & RH: 2 x 7mm (identification grooves present) Middle: 2 x 13mm	LH & RH: 2 x 8mm Middle: Spacer (no restriction)
Pilot injector		#37	#27	#27
Appliance Dimensions (mm)	Width	1693 mm		
	Height	788 mm		
	Depth	350 mm		
Weight	Kg	150 kg		
Ignition System		Electronic Ignition to pilot system		
		Escea PCB		
Ignition Activation		20 secs (approx)		
Flame Safeguard		Flame Rectification		
Consumption		160W @ 0.69A 230V		
Remote controls		Yes		
Timers		Yes		
Clock		Yes		
Function lock / child		Yes		
Temperature control		Yes		
Connections	Electric	230V AC		
	Gas	1/2" BSPP female lower centre of fireplace chassis		
	Flue Type	Aluminium Flexi Flue		
	Flue Size	75mm and 100mm Flexi Flue		
	Spigot Location	Right hand top		
Data badge location		On Chassis Base		

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Received 12/01/2021

DS1650 PRODUCT SPECIFICATION

MODEL NAME		DS1650		
Description of Appliance		Gas Fire Heater		
Star Rating		5.0 Stars		
Max. Heat Output		10.2kW		
A/NZ Approval No.		AS/NZS 5263.1.3:2016		
Gas Type		Natural	Propane	ULPG
Gas input	High	44 MJ/hr	44 MJ/hr	44 MJ/hr
	Low	32 MJ/hr	32 MJ/hr	32 MJ/hr
Inlet Pressure	Max	5 kPa	5 kPa	5 kPa
	Min	1.13 kPa	2.75 kPa	2.75 kPa
Operating Pressure on High		0.67 kPa	1.67 kPa	1.67 kPa
Operating Pressure on Low		0.34 kPa	0.82 kPa	0.82 kPa
Burner Jet Size		LH & RH: 1.95mm Middle: 1.95mm	LH & RH: 1.1mm Middle: 1.2mm	LH & RH: 1.1mm Middle: 1.2mm
Burner Aeration		All collars (Coals/ Crystalight): Closed All collars (Logs and Woodland): 1 x 3.5mm	LH & RH: 2 x 4mm Middle: 2 x 12mm	LH & RH: 2 x 7mm Middle: Spacer (no restriction)
Pilot injector		#37	#27	#27
Appliance Dimensions (mm)	Width	1987mm		
	Height	788 mm		
	Depth	350 mm		
Weight	Kg	130 kg		
Ignition System		Electronic Ignition to pilot system		
		Escea PCB		
Ignition Activation		20 secs (approx)		
Flame Safeguard		Flame Rectification		
Consumption		160W @ 0.69A 230V		
Remote controls		Yes		
Timers		Yes		
Clock		Yes		
Function lock / child		Yes		
Temperature control		Yes		
Connections	Electric	230V AC		
	Gas	1/2" BSPP female lower centre of fireplace chassis		
	Flue Type	Aluminium Flexi Flue		
	Flue Size	75mm and 100mm Flexi Flue		
	Spigot Location	Right hand top		
Data badge location		On Chassis Base		

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A Product Description and Installation Process

A1 Product Description

The Escea DS-Series gas fire is a room sealed gas appliance designed to be built into a false cavity. The appliance is flued using co-linear flexible aluminium flue. The user will control their fire with the Radio Frequency (RF) remote that will normally be located in its wall mount cradle. In addition to the RF remote the appliance has a single auxiliary On/Off button on the unit. When not in operation it is in a standby mode unless it is physically isolated from the mains supply.

A2 Recommended Install Process

The following diagram illustrates the steps required to install your gas fire. The sequence in which you choose to do these tasks will vary depending on your individual scenario. Please read these instructions fully before proceeding with the installation.

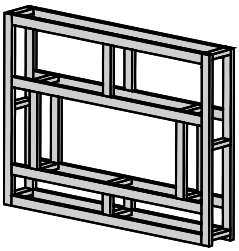
Important: Installations that are not specifically outlined in this manual should be referred to the Escea Architectural Advisory Team.

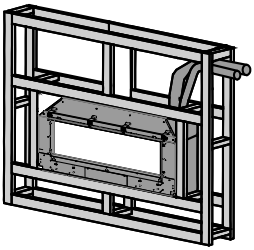
Please email aa@escea.com

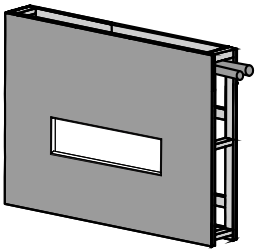
i.e. Hutch, under bench, recessed, and joinery enclosed installations.
i.e. Use of heat sensitive materials such as resin stone or laminated timber.
i.e. Flue installations between 8m and 40m.

To ensure that your installation is fully complete, please use the “Installation Checklist” on page 49.

False Cavity Installation







Create the Cavity	Install electrical / gas connections, flue system, and fireplace	Finish installation and fit fascia
Section B	Section C, D	Section F

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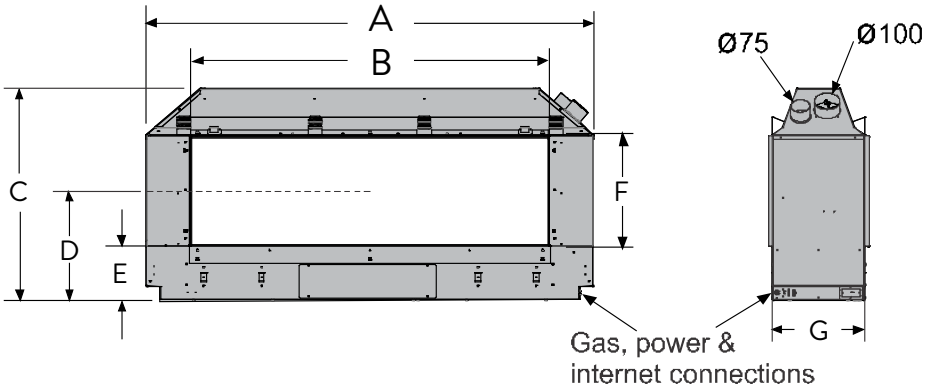
A3 Product Dimensions

NOT TO BE MISTAKEN FOR CAVITY DIMENSIONS

All dimensions are in mm.



For more detail, view architectural drawings at www.escea.com or www.escea.com.au

Model	A	B	C	D	E	F	G
DS1150	1401	1067	788	408	203	411	350
DS1400	1693	1359	788	408	203	411	350
DS1650	1987	1653	788	408	203	411	350

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B Creating the Cavity

B1 Cavity Shape

The DS Range is suitable for timber framed cavities.

Most existing masonry cavities will not be suitable.

B2 Designing the Cavity

The following aspects must be considered when designing this installation:

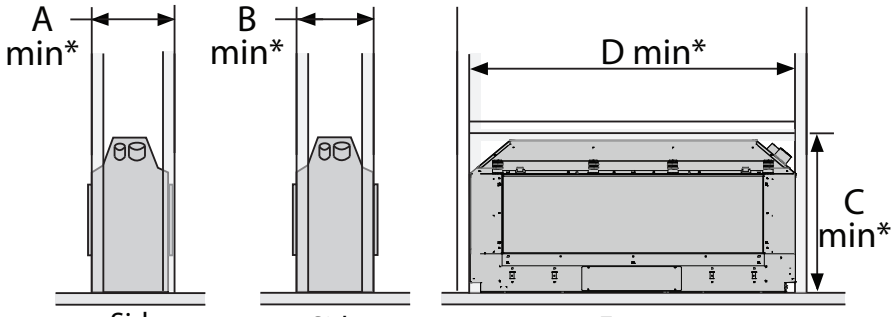
- Appliance physical size
- Single sided or double sided
- Wall finishing and interaction with appliance
- Positioning of appliance in regards to wall lining (depth into wall)
- Use of a fascia - one side or two sides?
- Exhaust termination aspect – horizontal / vertical and flue configuration
- Flue exhaust fan noise - Is there a direct noise path along the flue, especially for short flue runs?
- Exhaust cowl access for maintenance
- Gas pipe layout
- Gas isolation valve / pressure test point position
- Electrical isolation switch
- Home automation network connections - ethernet cable layout

These DS Series fires are to be installed prior to any wall lining.
The wall lining is the very last task to be completed in this installation.

The cavity and wall linings may be constructed from standard timber framing materials and do not need to be non-combustible.

It is not necessary to line the sides or back of the cavity.

Minimum Framing Dimensions



*Dimensions shown do not include allowances for clearance to combustibles to the flue

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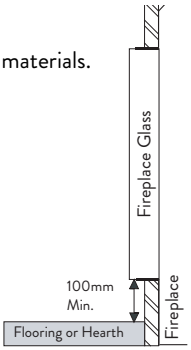
Model	A	B	C	D
DS1150	364	350	850	1408
DS1400	364	350	850	1700
DS1650	364	350	850	1994

B3 Hearth

A hearth is not required. If a hearth is installed below the fire, it must be at least 100mm below the bottom of the glass or be composed entirely of non-combustible materials.



B4 Cavity Base

This appliance MUST be fully supported on its base, over the entire area of the underside of the appliance. The base must also be level and strong enough to support the total product weight, which is approximately **150kg**.

The fireplace can be recessed into the ground but must maintain clearances detailed in the diagram (shown right) for any combustible flooring materials.
NOTE: A recessed floor is required to install the fire with the opening less than 200mm above the floor.

B5 Wall lining

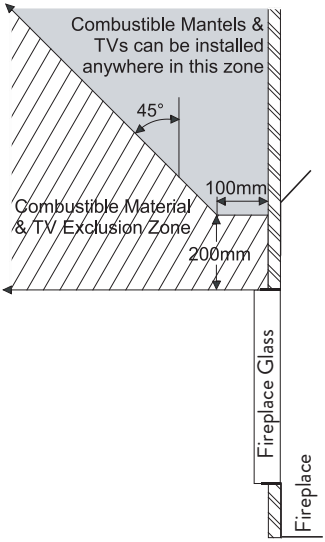
Only after all applicable sections up to section F5 on page 43have been completed is it permissible to commence with the final wall linings detailed in section F6 on page 44. Wall lining cutout dimensions around the glass must be adhered to.

Please refer to section F6 on page 44 for wall finishing dimensions surrounding glass.

B6 Television & Mantel Clearances

Television

The diagram (shown right) shows the recommended minimum clearances for the location of any electrical equipment (such as Plasma TV, LCD TV or home theatre) above a DS Series gas fire. A mantel/recess is not required to comply with our recommendation of TV installation.
NOTE: Dimensions are from the top edge of the glass frame.



NOTE: The television clearance recommendations are to be treated as a suggestion of a suitable installation only. It is the responsibility of the end user to check the installation instructions of their electrical appliances to ensure that the location in relation to the gas fire is suitable. Escea in no way guarantees or takes responsibility that the recommended installation suggestion will be suitable for all electrical or home entertainment appliances.

Mantel

Please refer to the diagram (shown right). Mantels or protruding ledges above the heater must not be installed lower than the dimension shown.

NOTE: Dimension are from the top edge of the glass frame.

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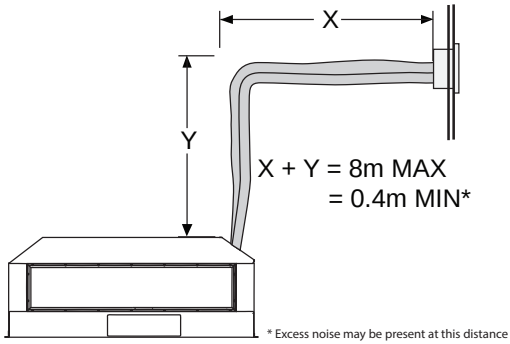
C Installing the Flue

C1 Flue Configuration (If less than 8m flue length is required)

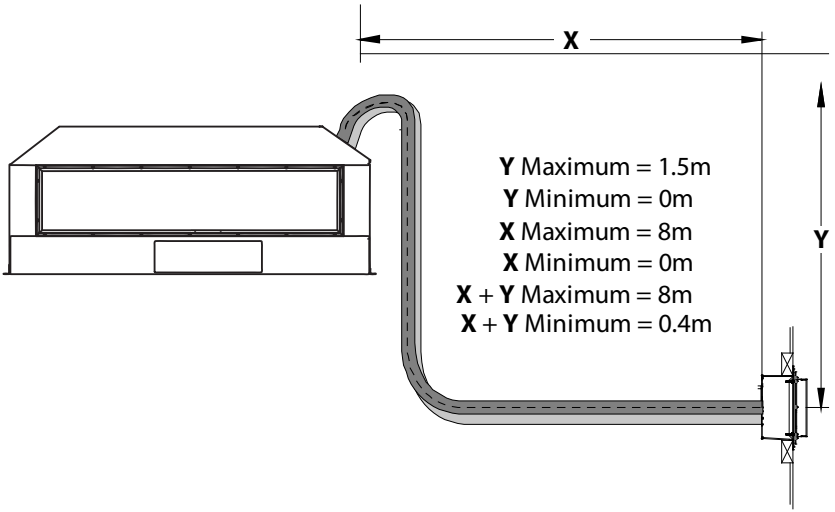
If your flue system is less than 8m long (as shown in diagrams below), then a simple aluminium flexible flue is required. If you wish to install a longer flue run of up to 40 metres, please contact the Escea Advisory Team at AA@escea.com.

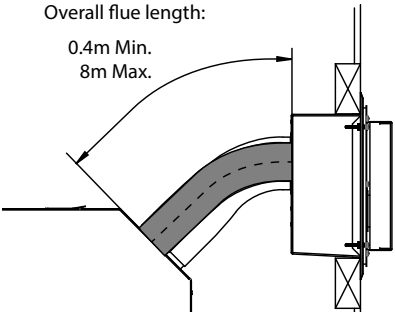
Horizontally Terminated: Utilises the Escea horizontal power flue enclosure kit.

The horizontal offset of the terminal can be any amount up to the total flue length listed below. Please consult with Escea's technical staff if your intended flue configuration falls outside of the bounds of the flue configurations shown below.

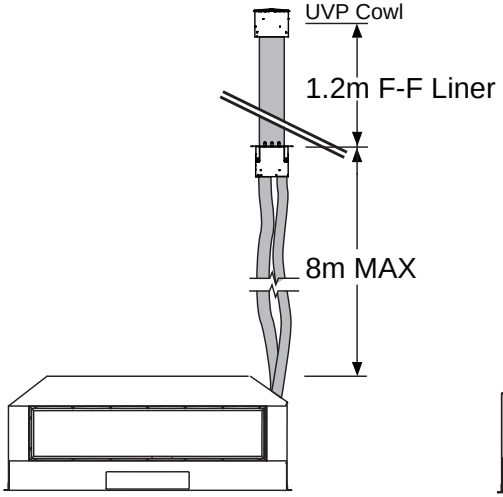


NOTE: When flueing above the fire, the pipe must slope towards fire - NOT towards the terminal. Also when flueing below the fire, the pipe must slope towards the terminal - NOT towards the fire.

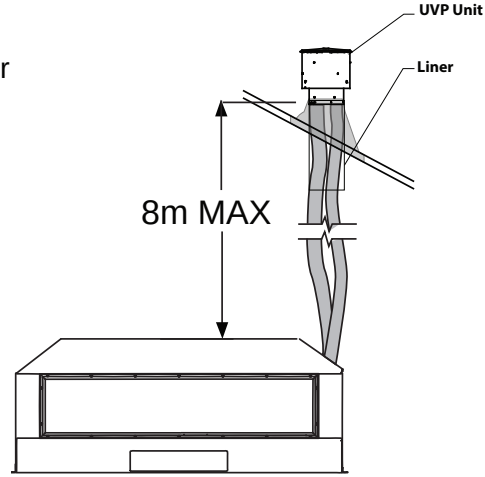




Vertically Terminated: Utilises the Escea universal vertical power flue enclosure kit.



Internal



External

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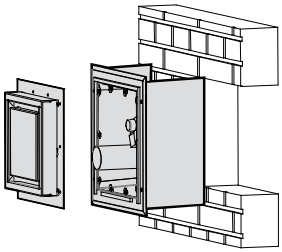
C2 Flue Configuration (If more than 8m flue length is required)

If your flue system is greater than 8m long (up to 40m long), then please contact the Escea Advisory Team at aa@escea.com for further guidelines.

C3 Installing the Horizontal Powerflue Wall Terminal option

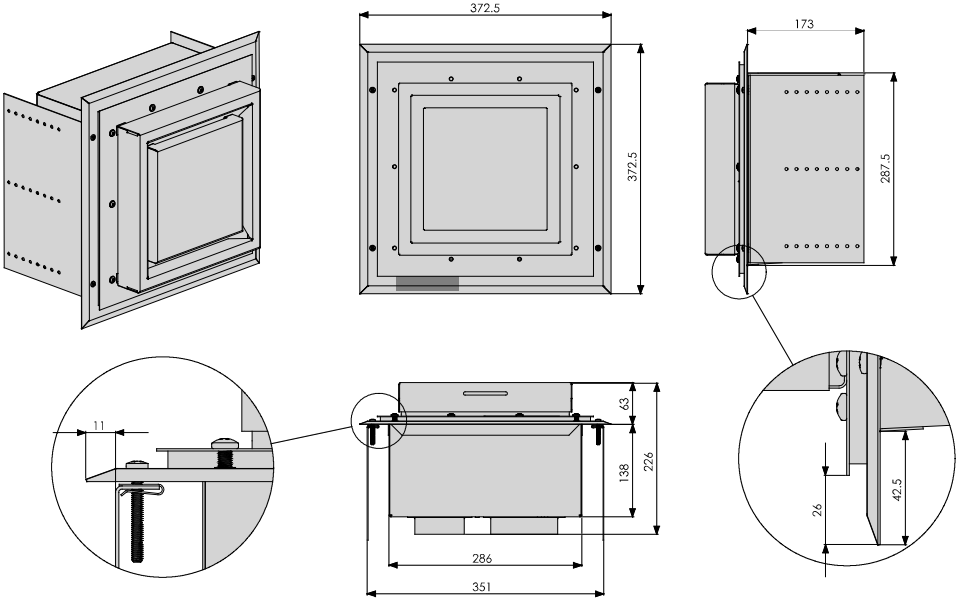
The horizontal powerflue wall terminal must be installed in the correct orientation (the small horizontal slot should be at the bottom). This allows for the correct operation of the flue system and prevents the ingress of water.



The horizontal powerflue wall terminal must be weather-tight when installation is complete to prevent damage to the dwelling. It must be installed by a suitably qualified person.

Fit the horizontal powerflue wall terminal into the hole and fix in place, making sure the installation is sealed appropriately to prevent the ingress of water from outside the wall cladding. Take notice of the label on the termination which shows the correct orientation of the terminal.

Note: It is the responsibility of the installer to ensure the horizontal powerflue wall terminal is installed to all relevant building codes to ensure weather tightness.



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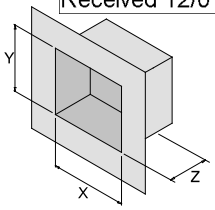
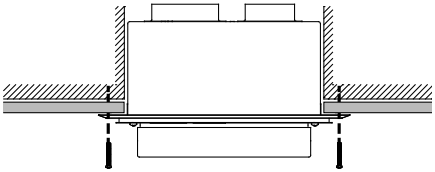
Creating the Hole in the Outside Wall

When cutting the hole in the outside wall, be mindful of how the installation of the horizontal powerflue wall terminal will be finished; the installation must be weatherproof.

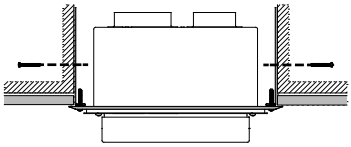


Ideal Hole/Cavity Size for Horizontal Powerflue		
	Without Side Brackets	With Side Brackets
X	298mm	360mm
Y	298mm	298mm
Z	175mm Excluding allowance for flue which exits here	

The horizontal powerflue wall terminal can be attached to the wall in two ways:
A) From the front of the terminal:



B) By attaching the optional wall terminal installation brackets to the sides of the cavity and attaching the horizontal powerflue wall terminal to these, from the front:



Attach the Ø100mm and Ø75mm flexible aluminium flues to the spigots on the rear of the horizontal powerflue wall terminal using the hose band clamps supplied. Plug the powerflue electrical cable into the back of the horizontal powerflue wall terminal.

Ensure that the electrical cable is firmly secured to the wall terminal or building to prevent damage or disconnection if pulled.

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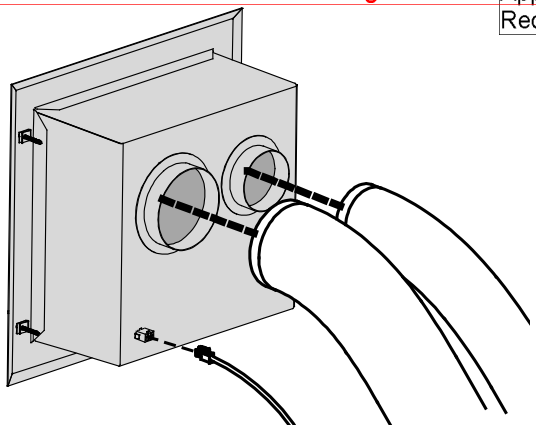


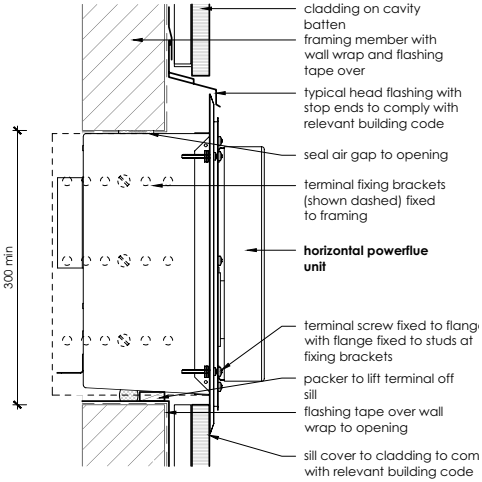
Fit the horizontal powerflue wall terminal into the hole and fix it in place, making sure the installation is sealed appropriately to prevent the ingress of water from outside the wall cladding.

Note: It is the responsibility of the installer to ensure the horizontal powerflue wall terminal is installed to all relevant building codes to ensure weather tightness. This may necessitate the use of appropriate flashing material where appropriate.

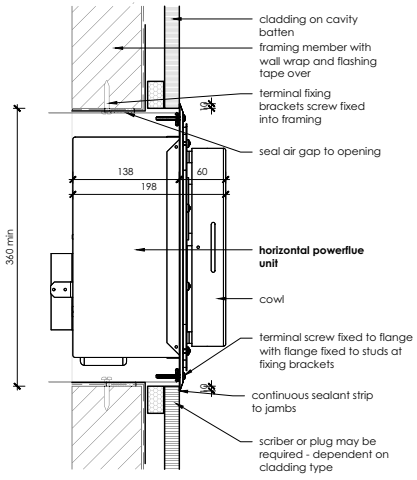
IMPORTANT: Ensure that flashings do not restrict the air intake slot around the periphery of the cowl.

How to Flash the Horizontal Powerflue

The following diagrams are excerpts from the Escea architect drawings and are available in full on our website. These diagrams are recommendations, and your installation must comply with any local or national building codes.



Head and Sill scale 1:5



Jamb scale 1:5

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C4 Installing the Universal Vertical Powerflue (Internal Install)

Note: For information regarding an external install of the UVP, go to section C5 on page 19.

The Universal Vertical Powerflue (UVP) internal configuration is designed to have the fan, mounted within the roof space of the house, and the vertical Ø225mm diameter liner, containing a Ø100mm flexi, penetrate through the roof. The UVP internal conversion kit comes with a 1200mm liner that is specific to the internal installation and must always be used.

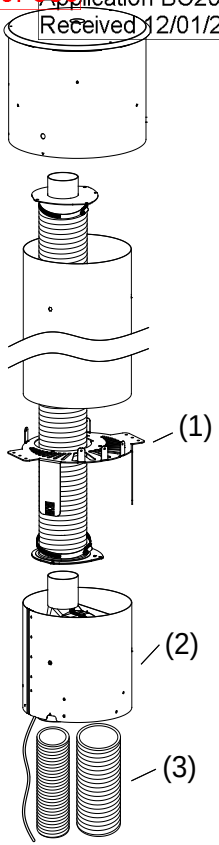
Note: The flue setup must comply with either section C1 on page 12 or C2 on page 14.

Use standard methods to flash the roof penetration. The installation must be weatherproof and conform to all local council standards including powered flue termination rules.

Mount the fan mount bracket (1) to the roof framing and strapping using timber ensuring that the flue is rigid and vertical. Ensure that the mounting timber does not obstruct access to the 3xM5 screw threads on the side of the fan unit.

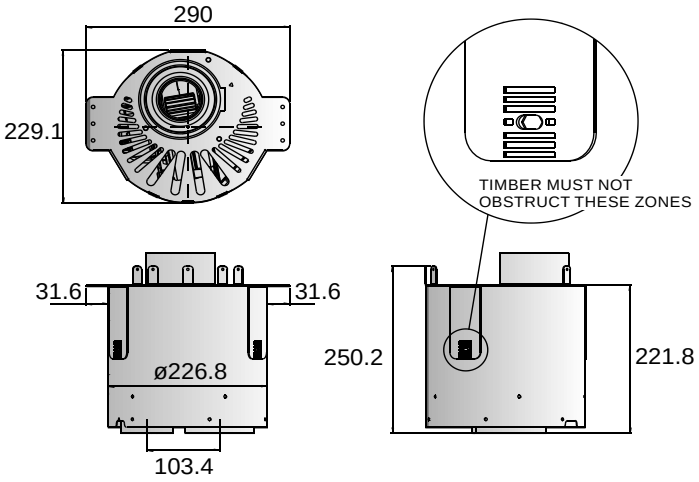
Aim to have the fan enclosure (2) mounted as high as possible, mainly to allow sufficient fall for condensation drainage if the flexi-flue is to run horizontally.

Ensure there is sufficient space below fan enclosure (2) to have access to fit the flexi-flue tubes (3) and allow flowing bends if required.



Note: The UVP-Internal and the flexi flue connections must be installed in a location accessible for service or replacement; a service hatch or removable flashing to allow access may be required.

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. ***ENSURE*** *the Ø25mm restriction plate is installed on the inlet.*



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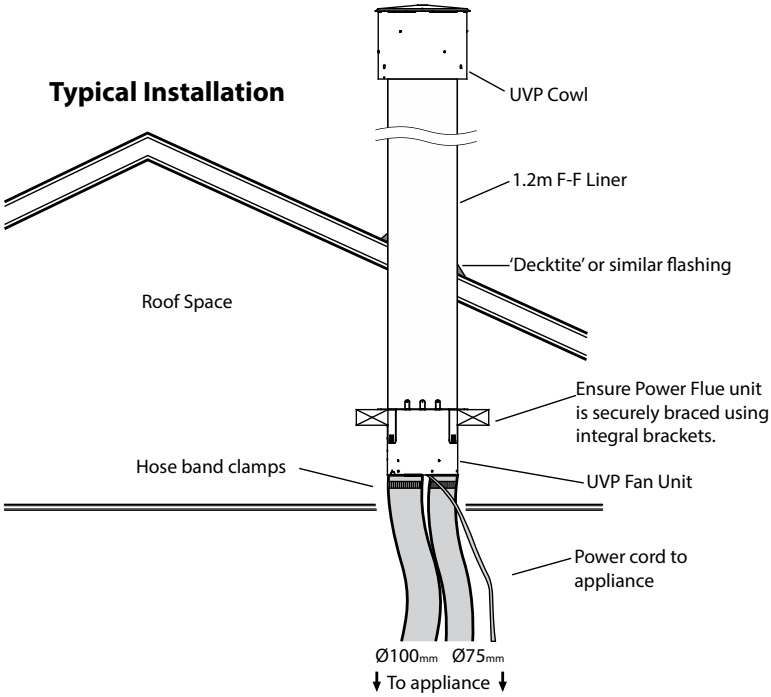
The UVP-Internal kit is intended for use within an accessible roof space or 'cheaney' and is 2.0m.
Service access must be provided.

Ensure installation complies with relevant building codes and regulations



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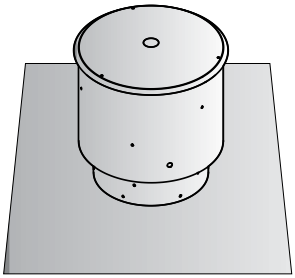
C5 Installing an Universal Vertical Powerflue (External Install)

Note: For information regarding an internal install of the UVP, go to section C4 on page 17.

The UVP is designed to have the enclosure containing the fan unit mounted externally.

The cowl surround should be fixed in place as shown.



Mount the UVP kit to the top of a chimney flashing plate or penetrate the roof with an optional flue liner accessory and fit the UVP kit over the flue liner, sealing the penetration with a decktite or similar flashing. Ensure the terminal is vertical and rigidly mounted, the flexi flue attached below is fixed to the terminal spigots using the supplied hose clamps. The flexi flue is held in place by drilling 3 holes and screwing 3 self tapping screws evenly around each hose band clamp (as shown in the picture below).

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. ENSURE the Ø25mm restriction plate is installed on the inlet.

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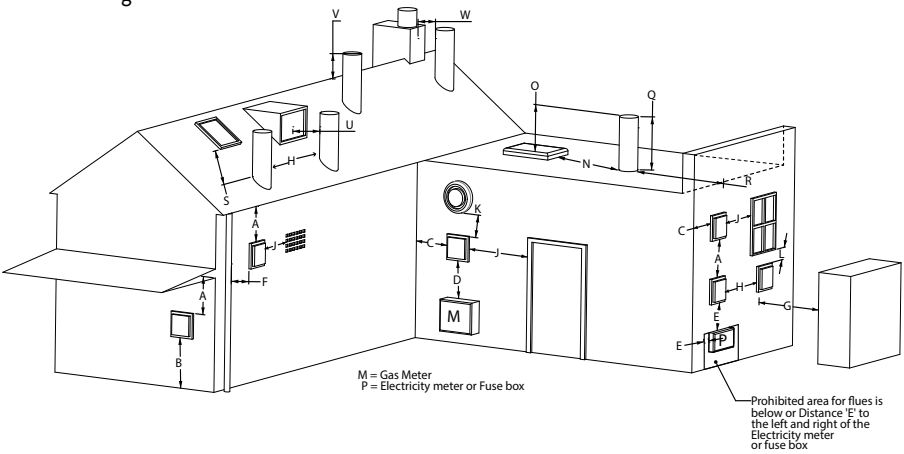
C6 Installing in Accordance with Relevant Codes

The location of the horizontal powerflue wall terminal must be installed in accordance with AS/NZS 5601 and any other relevant building codes. If possible, avoid installing the horizontal powerflue wall terminal in areas exposed to high winds and extreme weather.

Some of the minimum clearances for a fan assisted wall terminal are listed below; please refer to AS/NZS 5601 Gas installation standard for full guidance on the design of the flue system. Where possible allow a greater clearance.



A	Below eaves, balconies and other projections	200mm
B	From the floor, above a balcony or other surface	300mm
C	From a return wall or external corner	300mm
D	From a gas meter or regulator vent	1000mm
E	From electricity meter or fuse box	500mm
F	From a drain pipe or soil stack	75mm
G	Horizontally from any building structure or obstruction	500mm
H	From any other flue terminal or combustion air intake	300mm
J	Horizontally from any moving window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
K	From a mechanical air inlet or spa blower	1000mm
L	Vertically below any moving window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
N	Horizontally from a roof light	600mm
O	Vertically from a roof light	500mm
Q	Vertically from a flat roof	500mm
R	Horizontally from a vertical structure	500mm
S	Below a roof window	2000mm
T	Above or either side of a roof window	600mm
U	From a dormer window	1500mm
V	Above the apex of the roof (see note 1 on following page)	300mm
W	From an open flue	1500mm

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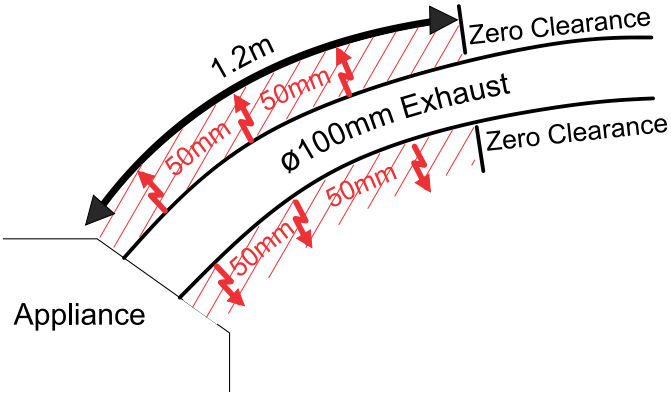
Notes:
1) Should the flue not extend past the apex of the roof, the bottom opening of the flue should extend at least 200mm from the roof (or 300mm in regions with heavy snow).
2) The installation of a flue into a carport is not recommended.
3) The flue terminal will get very hot when in use. Precautions should be taken to protect people and animals from injury.

C7 Running the Flue

A 50mm clearance to combustibles must be maintained from the exhaust flue for the first 1.2m of flexi flue from the appliance (see diagram below).

Run the Ø100mm and Ø75mm flexible aluminium hoses from the cavity to the rear of where the horizontal or vertical powerflue terminal will be installed. Allow enough stretch in the flexible aluminium flue to allow it to protrude through the wall/ceiling/roof/flue liner to enable it to be connected to the powerflue terminal. The flue should be expanded at each end in order for the flue to be attached to the fire/powerflue. It is advisable to secure the flexi flue at regular intervals to prevent vibration, movement and sagging. Steel wire or 'builders strapping' may be used for this purpose.

Note: The flexible flue is shipped in a 'compressed' form. Extend it to your desired length by stretching.



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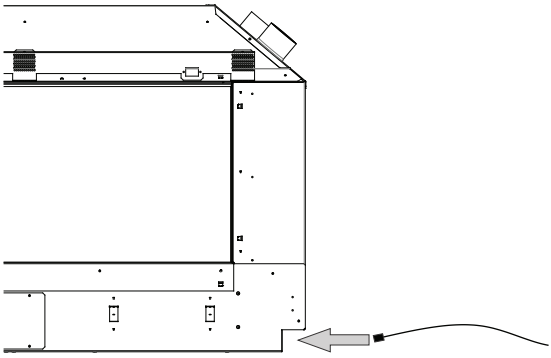
C8 Running the Powerflue Electrical Cable

Note: The powerflue terminal is powered from the appliance and must be connected to the appliance with the supplied electrical cable only.

Note: Ensure that the appliance power supply is disconnected before making the connection to the terminal

The supplied electrical cable is 7m long; flue extension kits also include a powerflue electrical cable extension.

Run the electrical cable from the cavity where the appliance will be installed to the hole in the outside wall. Ensure it is not draped over, or in contact with, the outer shell of the appliance or the flues. The cable must be kept clear from any other possible heat sources, sharp edges, or moisture. Fix it appropriately and allow enough cable to be able to pull both the appliance and the powerflue terminal out from their installed positions.



If you do not connect the powerflue electrical cable to both the fireplace and the powerflue, this will result in an error when the fireplace is turned on. Test the fan before continuing with the rest of the installation.

END OF SECTION C

By the end of this section, you should have:

- ☐ A weather-tight installed powerflue terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the terminal for maintenance purposes
- ☐ Flue attached to the powerflue terminal leading back to the appliance with the correct flue clearances
- ☐ The electrical cable from the powerflue terminal run back to the appliance cavity in an electrically safe manner

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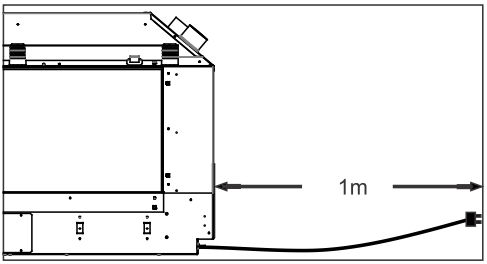
D Installing the Electricity and Gas to the Appliance

D1 Power Supply

While the cavity is being created, consideration must be given to the location of an appropriate power supply. An earthed 230/240 volt mains power connection (typically a standard 3 pin outlet) must be available within 1m of the bottom right of the appliance. This connection **must** be accessible after the heater has been fully installed so that the appliance can be safely disconnected from the mains power supply prior to servicing.



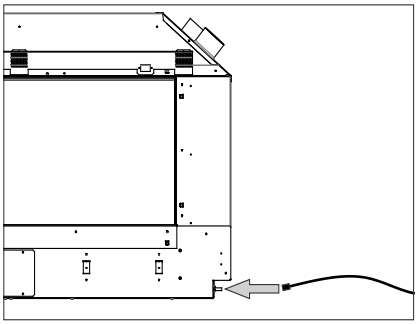
A mains isolation switch (compliant to AS:NZS 5601 Clause 6.2.8) which is accessible from outside the cavity can also be used to disconnect the power.

Regardless of the method used, it **MUST ALWAYS** be possible to safely isolate the electrical supply to the appliance after it has been fully installed.

This appliance must not be located immediately below a socket outlet. This appliance will draw a maximum of 2 Amps from a 230/240V supply. No additional power supply is required for the power flue.

D2 Network Cable

A 10 metre length of network (ethernet) cable has been supplied. Connect it to the appliance (lower right) and the buildings' modem.



Two network cable access points are available: the primary connection is on the bottom of the RH outer face of the appliance for connecting permanently to the buildings' router; the secondary connection point is located where the AUX button is (shown in section E10) for service technicians to access when the main connection method has not been used and has become inaccessible.

If you do not wish to connect the fireplace to the modem, the network/ ethernet cable should be run to somewhere accessible by a service technician, such as a cupboard.

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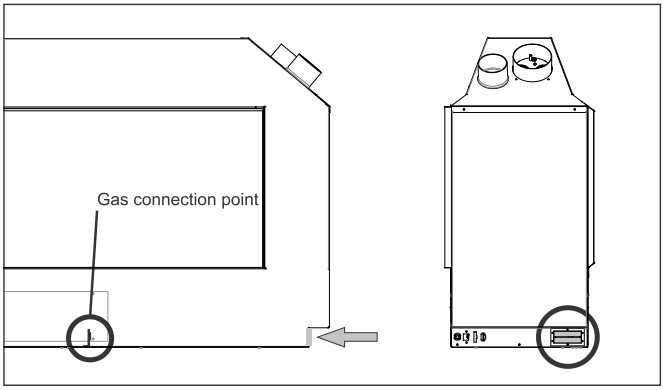
D3 Gas Pipe Sizing

Gas pipe should be sized as per the requirements of AS/NZS 5601.1. The pipe sizing must be sufficient to deliver the following volume of gas to the heater with all other gas appliances in the home running at the same time:

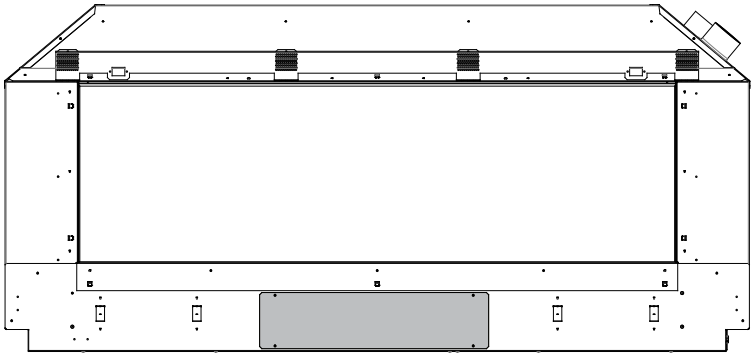
Maximum DS1150 Gas Consumption = 34MJ/hr
Maximum DS1400 Gas Consumption = 40MJ/hr
Maximum DS1650 Gas Consumption = 44MJ/hr

D4 Gas Pipe Position

The gas connection is inside the appliance and is ½" male BSP on the lower right of the appliance as shown below. Access is through the silicone grommet circled below on the RH side of the chassis.



Access for connecting the gas supply to the gas connection point (shown in the diagram above) should be through the access hatches located on the front and back of the appliance (the front as shaded in the diagram below).



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D5 Gas Isolating Valve

A gas isolating valve must be installed in the gas line as close to the appliance as possible. Fix it in a convenient position to allow it to be closed off quickly and easily during normal operation. Take into consideration access to this valve once the wall linings are on. This will also allow for easier servicing in the future.

END OF SECTION D

By the end of this section, you should have:

- ☐ An unlined cavity with 230/240V AC supply where the appliance can be plugged into an electrical isolating switch that is accessible once the appliance is installed
- ☐ A suitably sized gas supply to the right hand side of the appliance with a pressure test point, ready to be connected once installed
- ☐ Network cable installed, ready for plugging into appliance, regardless of being connected to Internet router/network

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E Installing the Appliance

E1 Connecting the Flue

Access the top of the appliance and connect both the inlet flue (Ø75mm ID/85mm OD) and the exhaust flue (Ø100mm ID/110mm OD) to their respective spigots. Tighten the hose clamps onto the spigots. Ensure the flue connection is air tight. Sealant is not required.

WARNING: The flue connection MUST be secured with the clips provided and tape MUST NOT BE USED. If any of the flue pipe is damaged and integrity compromised then it should not be repaired with tape, it should be replaced.

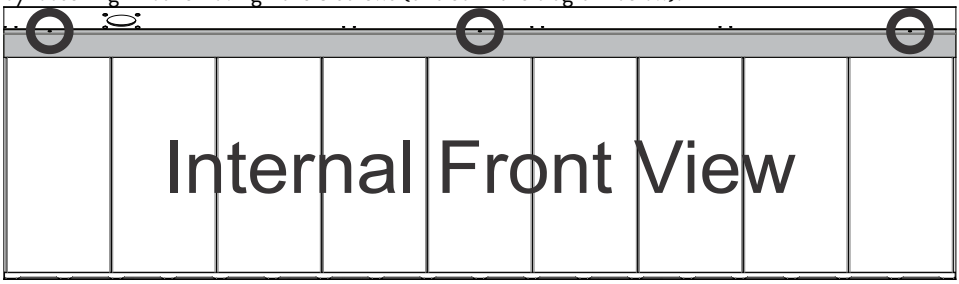
E2 Installation

Insert the gas fire into the cavity and fix the appliance down in the correct position using the brackets on each end of the appliance. It is a requirement that this appliance be securely fastened at the base. **Ensure that the fire is seismically restrained in a manner appropriate to the installation location.**

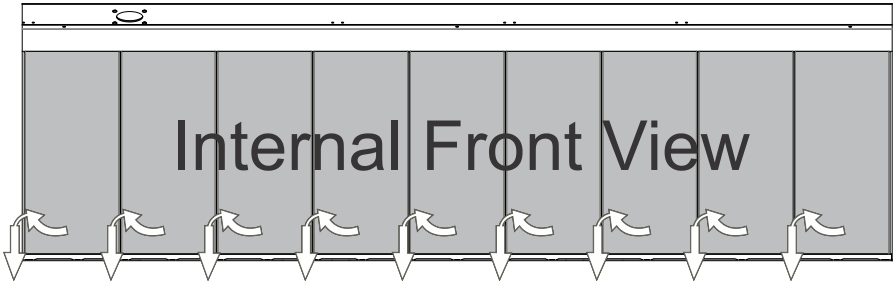
E3 Double Sided Conversion

1. Follow sections E5 on page 30, E6 on page 30, and E10 on page 36 to remove the glass, infill, burners, and bottom trim bracket.

2. On the inside of the firebox, slightly loosen the firebox liner bracket (shaded in the diagram below) by loosening—not removing—the 3 screws (circled in the diagram below).



3. Carefully swing the lower edge of each firebox liner towards you and pull down to release each panel (shaded in the diagram below). It may be necessary to slide the firebox liner to the side first. Remove the firebox liner bracket and replace the screws.



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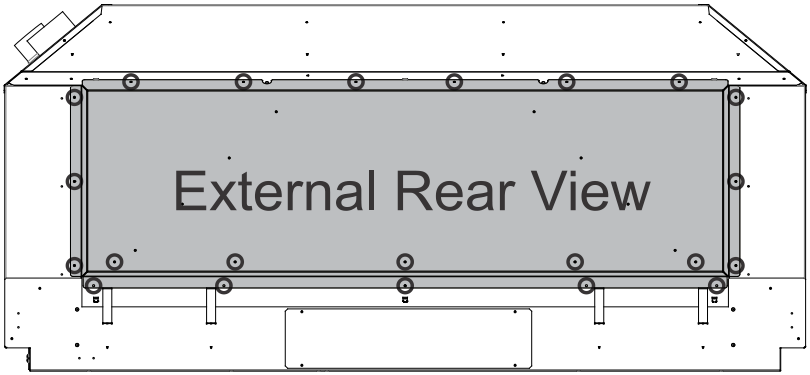
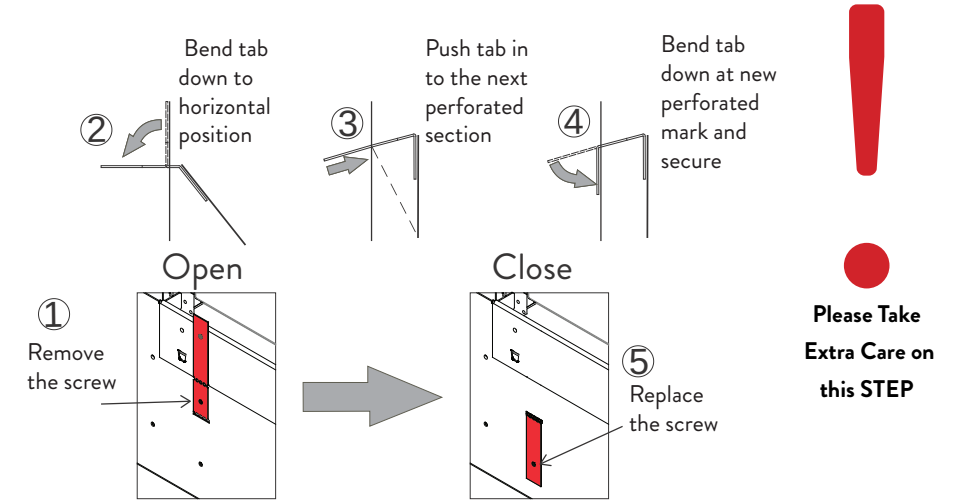
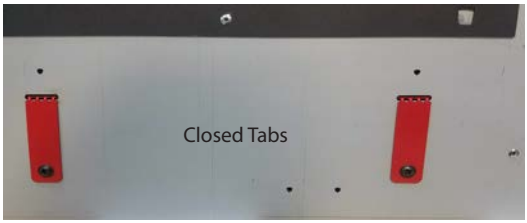
4. Move to the back of the fire for the following steps. Remove the screws (circled in the diagram below) in the back panel of the appliance. Remove the back panel.



5. On the back of the appliance remove one screw from each of the four red tabs and set each pair of tabs from 'open position' to 'close position' (shown below). This is necessary to change the airflow path of the fire for a double sided conversion.





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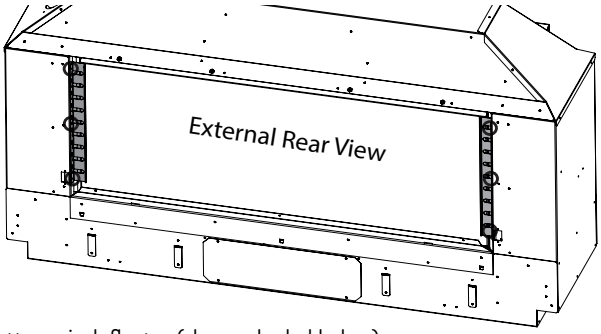
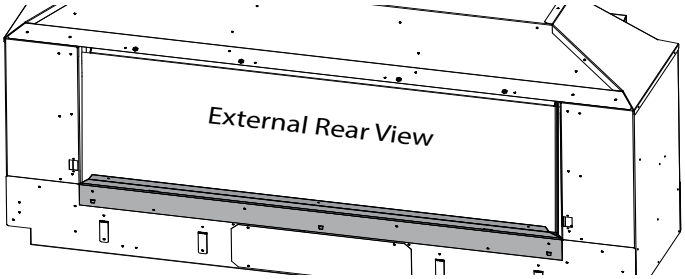
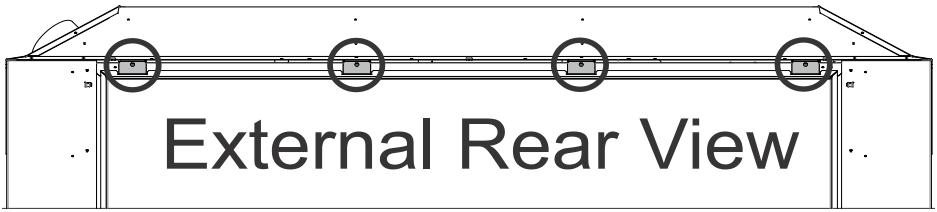
6. Remove the 6 screws in the chassis (shown circled below) and remove the side louvres (4) (not shaded below) by pulling them in towards the centre of the fire.



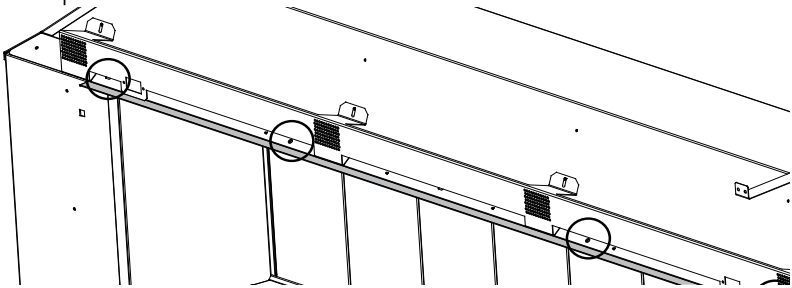
7. Remove the bottom air deflector (shown shaded below).



8. Now remove the top bracket by unscrewing the 1/4 turn fasteners (circled below) and allow the panel to lean forward so you may lift the panel out.



9. After removing the components in the previous steps, fix the top trim in place with the black machine screws provided (circled below). The screws are inserted from the inside of the fire.



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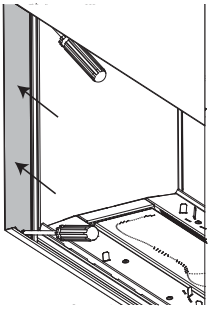
10. Reinstall the burners and the infill by reversing the steps in E6. Fit the side trims. There are 4 x 2 top and bottom with the low profile black self tapper screws (see below).



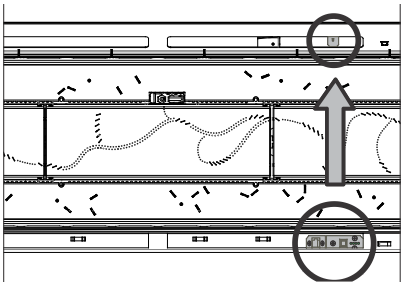
11. Install the fuelbed media as per section F on page 38. Finish the conversion by installing both pieces of glass and both bottom trim brackets.
Note: After any conversion ***AIRFLOW MUST NEVER*** *be coming up the glass from the bottom, it must* ***ALWAYS EXITING FROM*** *the top of the glass.*

E4 Single Sided Front to Back Conversion (only for single sided fires)

1. Follow section E5 on page 30 and E6 on page 30 to remove the glass, infill, and burners.

2. Remove the rear panels by following steps 2, 3, 4, 6, 7, & 8 from section E3 on page 26 above.

3. Relocate the diagnostic bracket to the opposite side of the appliance by carefully removing the middle screw and feeding it through to the opposite side of the fire (as shown in the diagram below).
Note: this step must be completed after preparing the other side of the appliance for either a LH to RH conversion or a double sided conversion.



4. Carefully remove the bracket in step 2 of section E3 and replace the bracket on the other side of the firebox.

5. Remove the bottom, side and top trim brackets from the front and replace on the rear of the appliance (see steps 9 to 11 from section E3 for more info).

6. Replace all the rear panels (removed in step 2) to the front of the appliance by reversing the procedure in step 2.

7. Using the diagram from step 5 in section E3 above, change the position of the four tabs on the original front side from closed to open. Ensure those on what is now the front are in closed position.

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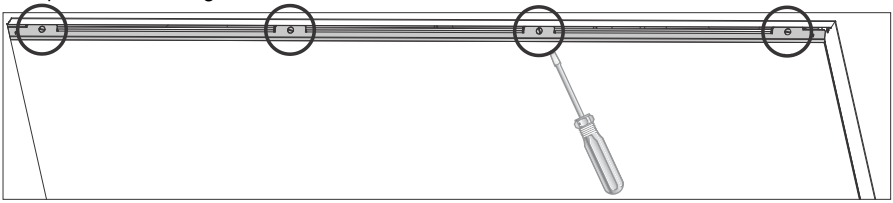
E5 Removing (and Replacing) the Glass

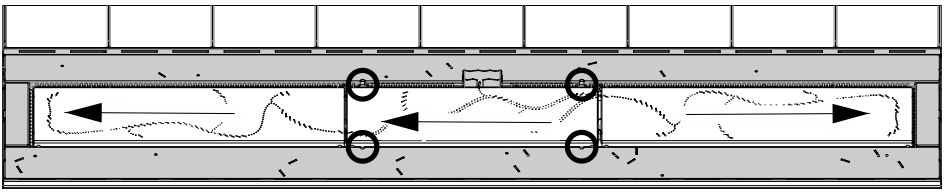
Remove the glass by unscrewing the four 1/4 turn fasteners located at the top of the glass (circled below) and remove the bracket (shown below shaded grey). Allow the glass to lean towards you and carefully lift it out. Place the glass carefully aside. Note that the fiberglass tape around the glass can mark carpet and furnishings.



NOTE: When replacing the glass, check the channel that the glass sits in for debris that may be sitting on top of the fiberglass tape. Remove any debris prior to placing the glass. If you feel resistance when leaning the glass towards the fireplace, remove it and double check for debris in the glass channel.

E6 Remove the Infill & Burners

Remove the four screws shown in the diagram below. Lift one end of the infill up into the top corner of the firebox and then out towards you, taking care not to scratch the firebox paint and reflective panels. Remove the outer burners first by sliding them away from the centre of the fireplace, followed by the centre burner, which slides out to the left.



E7 Gas Type Conversion

THIS APPLIANCE IS CONFIGURED TO OPERATE ON NATURAL GAS (NG). For the DS1650, please double check that the configuration of the collars match the fuelbed. For all other fires, if gas type conversion is not required then skip to the next section.

Your gas fire has been supplied with the necessary parts for gas conversion. Follow the steps on the following pages to change from NG to ULPG/Propane or vice versa.

WARNING: The regulator that is supplied with the fire MUST NOT BE REMOVED.
Removal of the regulator, or replacing it with one not intended for use with this Escea fire, will void the limited appliance warranty.

Turn off power and gas first.

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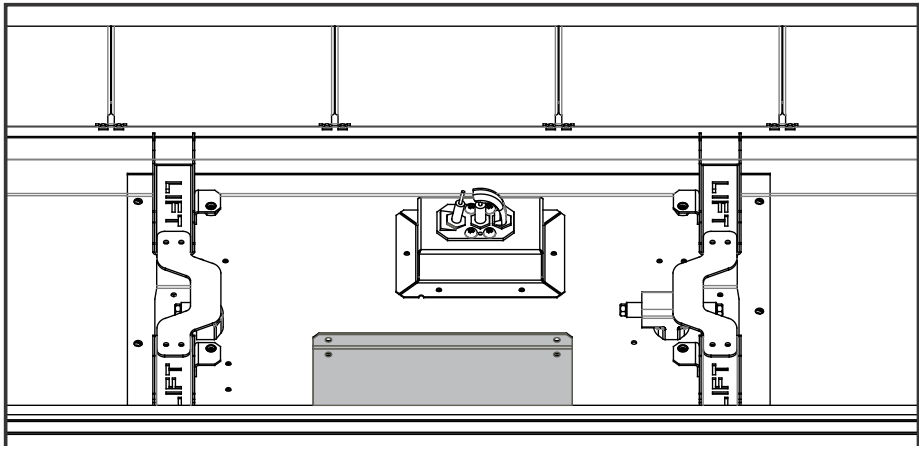
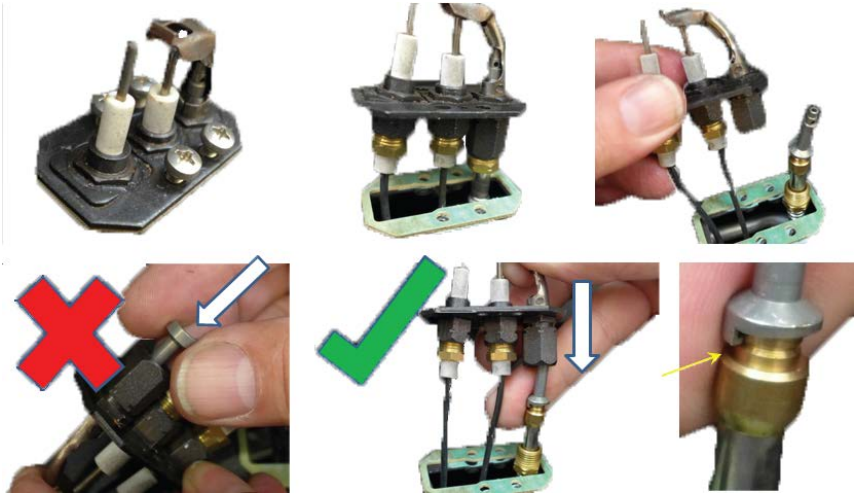
Step 1: Remove the 6 screws on the control tray hatch (shown shaded in the diagram below).



Remove the hatch to access the regulator and modulating valve below.

Step 2: Change the three main burner jets with the jets supplied in kitset (see tables on next pages).

Step 3: Replace the pilot jet (see tables below). *Note: Ensure the pilot jet is joined up to the olive before inserting the jet into the pilot assembly (as shown below).*



Step 4: Screw out the nylon adjuster screw inside the regulator to remove the existing spring. Replace the spring with the coloured spring supplied in the conversion kit and reassemble the regulator.

Step 5: Stick the new gas type label supplied in the kitset on the underside of the tray hatch. Ensure the serial number and date of manufacture are still visible. Write your name, company (if appropriate) and date of conversion on the new label with permanent marker.

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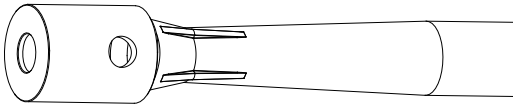
Step 6: Replace the hatch (removed in step 1). Take care not to over tighten screws.

Step 7: The burner tubes on the underside of all burners have convertible aeration collars. Ensure the aeration collars on all burners are correctly fitted on each burner tube.



	Natural Gas				
	Burner Jets			Burner Collars	
	Middle Burner	Side Burners	Pilot	Middle Burner	Side Burners
DS1150	Ø1.95mm	Ø1.5mm	#37	1 x Ø3.5mm Hole	Fully Closed
DS1400	Ø1.95mm	Ø1.7mm	#37	1 x Ø6mm Hole	1 x Ø3.5mm Hole
DS1650 Coal and Crystalite	Ø1.95mm	Ø1.95mm	#37	Fully Closed	Fully Closed
DS1650 Logs & Woodland ONLY	Ø1.95mm	Ø1.95mm	#37	1 x Ø3.5mm Hole	1 x Ø3.5mm Hole

	Propane				
	Burner Jets			Burner Collars	
	Middle Burner	Side Burners	Pilot	Middle Burner	Side Burners
DS1150	Ø1.3mm	Ø0.85mm	#27	2 x Ø12mm Hole	2 x Ø4mm Hole
DS1400	Ø1.3mm	Ø1.02mm	#27	2 x Ø13mm Hole	2 x Ø7mm Hole
DS1650	Ø1.2mm	Ø1.1mm	#27	2 x Ø12mm Hole	2 x Ø4mm Hole

	ULPG				
	Burner Jets			Burner Collars	
	Middle Burner	Side Burners	Pilot	Middle Burner	Side Burners
DS1150	Ø1.3mm	Ø0.85mm	#27	Spacer	2 x Ø7mm Holes
DS1400	Ø1.25mm	Ø1.02	#27	Spacer	2 x Ø8mm Holes
DS1650	Ø1.2mm	Ø1.1mm	#27	Spacer	2 x Ø7mm Holes

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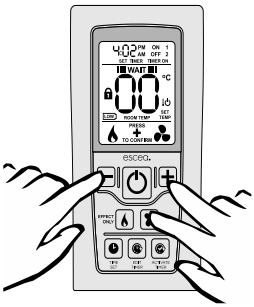
Step 8: Adjusting the electronic controller for gas type

Ensuring the gas is still OFF, Turn the power ON. Insert “AA” size batteries into the remote control. You should now see the time on the remote display showing 0:00.



Press the MINUS, PLUS and FAN BOOST buttons simultaneously (as shown right) until the characters “03” light up on the display. Release the buttons and the remote will count down and display “GO”. The screen will then display all characters. This will put the remote into test mode and the two big temperature digits should begin counting from 0 to 99 repeatedly.

Now hold down the ‘EDIT TIMER’ and ‘ACTIVATE TIMER’ buttons simultaneously; the remote display will show the current configuration of either ‘NG’ for Natural Gas or ‘LP’ for ULPG/Propane. To change this configuration, hold down the ‘EDIT TIMER’ and ‘ACTIVATE TIMER’ buttons simultaneously for 5 seconds. This will now have toggled between gas types.

Once you are have chosen the correct gas mode, simply press the ‘⏻’ power button once to exit this diagnostics mode.

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E8 Operating the Appliance

Turn on the fire by pressing the "⏻" power button on the remote. Within a few seconds the appliance will begin its startup sequence with a 15 second purge of the flue fan. After the purge it will attempt ignition. It may take a few attempts to light the first time due to air in the gas line. You may wish to purge the gas line at the valve by bleeding the first test point. This requires a small blade screwdriver.

Once the fire has lit the pilot and main burner you will be able to measure the operating pressure. Set the remote temperature to 40deg by pressing the "+" button and ensure the remote is kept in a cool environment. This will allow maximum gas flow into the appliance.
Ensure all other gas appliances within the house are also operating at maximum.
If the operating pressure does not read within 5% of the table (shown below) then remove the cap from the gas pressure regulator within the appliance and adjust the threaded spring stop. Press the ⏻ button again to shut down the fire.

E9 Checking the Gas Operating Pressure

Note: Ensure the thermostat control within the remote does not cause the flame to modulate down by increasing the set temperature and keeping the remote in a cool environment.
Turn on the gas. Turn the power on. Check the inlet pressure upstream of the appliance using the test point installed earlier.
Note: The regulator that is supplied with the fire MUST NOT BE REMOVED. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty and may be dangerous.

The gas valve (shown right) has manometer test points at A and B.

Gas Pressure Table - DS1150		Gas Type	
	Natural Gas	Propane (AUS)	ULPG (NZ)
Minimum Inlet Pressure - Pre-Regulator	1.13 kPa	2.75 kPa	2.75 kPa
Maximum Inlet Pressure - Pre-Regulator	5.0 kPa	5.0 kPa	5.0 kPa
Operating pressure - Post-Regulator (Point A)	1.0 kPa	2.3 kPa	2.3 kPa
Operating Pressure when on high - (Point B)	0.68 kPa ±5%	1.8 kPa ±5%	1.8 kPa ±5%
Operating Pressure when on low - (Point B)	0.3 kPa ±5%	0.9 kPa ±5%	0.9 kPa ±5%

Gas Pressure Table - DS1400		Gas Type	
	Natural Gas	Propane (AUS)	ULPG (NZ)
Minimum Inlet Pressure - Pre-Regulator	1.13 kPa	2.75 kPa	2.75 kPa
Maximum Inlet Pressure - Pre-Regulator	5.0 kPa	5.0 kPa	5.0 kPa
Operating pressure - Post-Regulator (Point A)	1.0 kPa	2.3 kPa	2.3 kPa
Operating Pressure when on high - (Point B)	0.82 kPa ±5%	1.98 kPa ±5%	1.68 kPa ±5%
Operating Pressure when on low - (Point B)	0.4 kPa ±5%	0.93 kPa ±5%	1.04 kPa ±5%

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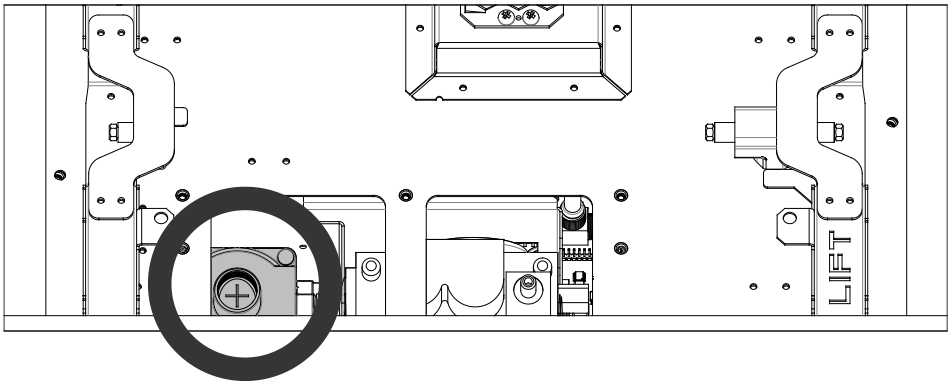
Gas Pressure Table - DS1650		Gas Type	
	Natural Gas	Propane (AUS)	ULPG (NZ)
Minimum Inlet Pressure - Pre-Regulator	1.13 kPa	2.75 kPa	2.75 kPa
Maximum Inlet Pressure - Pre-Regulator	5.0 kPa	5.0 kPa	5.0 kPa
Operating pressure - Post-Regulator (Point A)	1.0 kPa	2.3 kPa	2.3 kPa
Operating Pressure when on high - (Point B)	0.67 kPa ±5%	1.67 kPa ±5%	1.67 kPa ±5%
Operating Pressure when on low - (Point B)	0.34 kPa ±5%	0.82 kPa ±5%	0.82 kPa ±5%

Remove the small access hatch found on top of the engine.

Loosen test point A (shown in the first diagram of this section) and attach a manometer tube in preparation for measuring the operating pressure—post regulator.

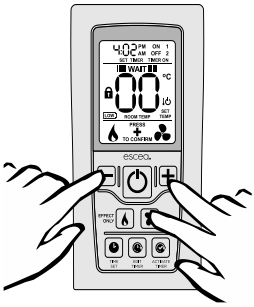
Turn the fire on high and adjust the operating pressure at the regulator (shaded grey in the diagram below)



Once the operating pressure—post regulator—is set, check the operating pressure at test point B (shown in the first diagram of this section).

Changing the Operating Pressure from the Remote

The following instructions **must only be undertaken by a suitably approved person**. Any tampering by an unauthorised person will void the product's warranty and may result in a dangerous condition.



While the remote is in its "OFF" mode with only the time showing on the display, press the MINUS, PLUS and FAN BOOST buttons simultaneously (as shown right) until the characters "03" light up on the display. Release the buttons and the remote will count down and display "GO". The screen will then display all characters and should be reading 00. This will put the remote into test mode.

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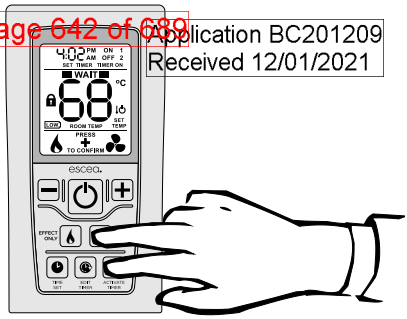
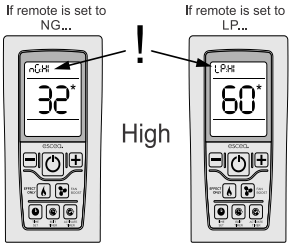
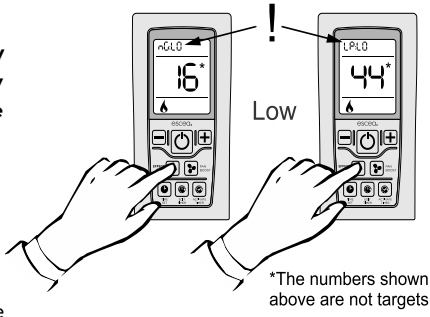
Whilst in test mode: press and hold the “ACTIVATE TIMER” and “FAN BOOST” buttons for 10 seconds to access the gas valve settings. The appliance will automatically turn on while in this mode.



WAIT. Allow the appliance to fully light all burners before continuing.



The high setting for the currently set gas type is displayed first (indicated in the clock segments at the top - see ! right). Pressing the plus or minus keys will change the setting up or down respectively, which will change the gas pressure measured at point A or D. The large digits will blink rapidly after the setting is made until the verification is received from the fire.
Note: The numbers displayed on the remote should only be used to achieve the correct pressure. The numbers by themselves do not represent anything and should not be relied upon.

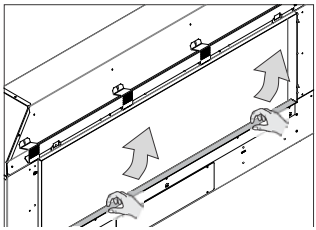


Toggling to the low setting is done by pressing the ‘EFFECT ONLY’ button (indicated in the clock segments at the top and by the ‘EFFECT ONLY’ icon at the bottom). Settings are made with the PLUS and MINUS buttons as above. Exit this mode by pressing the on/off button.

E10 Auxiliary On/Off button

The auxiliary on/off button is used to turn the fireplace on without the remote control and for “teaching” the fireplace to listen for new remote controls. For information on teaching a new remote control, see section S6 on page 53 of the service manual at the end of this document.

To access the auxiliary on/off button, remove the bottom trim bracket by lifting the bracket upwards (as shown in the diagram below).



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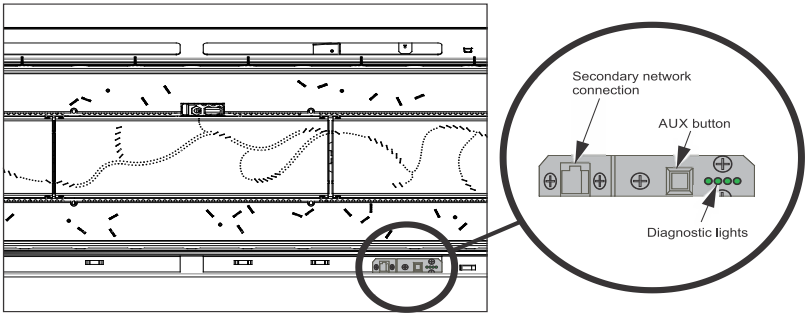
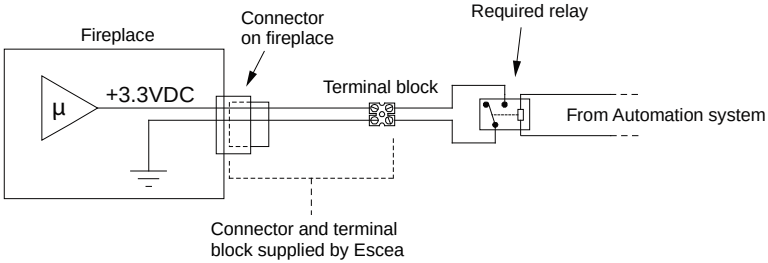
The AUX button location can be seen in the diagram below.



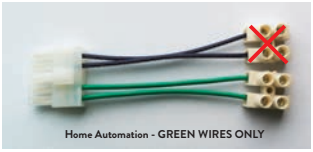
E11 Home Automation Setup

Escea D-Series fireplaces have a simple interface for connection to a home automation system. This allows the fireplace to be woken up, started, and then shut down. The “Close to Wake” connection (shown below) is essentially taking one of the 3.3 volt DC pins on the fireplace microcontroller and shorting it to ground.

In order to isolate the fireplace from the automation system, a relay needs to be used (as shown). This allows you to keep the fireplace’s 3.3V supply isolated.



The home automation connection can be found in your fireplace accessory pack (shown to the right).



This connects to the fireplace via the lower RH outside panel of the fireplace, next to the primary network cable access point, as shown in section D2 on page 23.

Home Automation Operation

Relay closed

The fireplace will start in a medium setting until the remote control talks to the fireplace and picks up the ‘ON’ signal (which can take up to 4 minutes). Once the remote has communicated with the fireplace it will turn on and begin operating thermostatically. The remote will use whatever temperature the user has previously set and cannot be altered by the home automation system. The fireplace will continue to operate while the relay is closed.

Note: If the fireplace cannot communicate with the remote controller within 10 minutes of the relay contact closure then the fireplace will shut down and return to standby. The remote controller is required to be operating within range of the fireplace for its safe operation.

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Relay open

If the fireplace is operating with a closed relay then, upon opening the relay contacts, the fireplace will shut down and return the remote controller to its standby mode when it next updates (which can take up to 4 minutes). While the relay is open the fireplace will be in standby mode and available for manual operation by the user.

END OF SECTION E

By the end of this section, you should have:

- ☐ The appliance installed in the cavity
- ☐ Check that red tabs are in the correct position
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ The appliance gas supply attached and pressure tested with all other gas appliances running

F Finishing the Installation

F1 Coal, Crystalight or Driftwood Fuelbed Installation

If using the crystalight, coal, or driftwood fuel beds, first place all the crystalight/coal pieces in a single layer atop the burners and fuelbed tray. Cover the entire area except for the pilot shield, ensuring coverage right up to the edges of the firebox or glass.

If the driftwood fuelbed style has been chosen, follow the above directions for placing the crystalight and then place the driftwood pieces randomly atop the crystalite layer. Ensure the wood pieces are evenly spread out and do not cover the pilot assembly.

Do not heap or mound any fuelbed.

F2 Log and Woodland Log Fuelbed Retainer Setup

When setting up a log or woodland log fuel bed, you must have the correct retainers present before assembling the fuel bed. The correct retainers are supplied with the fuel bed packaging. On your retainers you will see either a letter at the start that will determine the fuelbed type (i.e. W = Woodland, L = Logs). The letters and numbers that follow help to determine the retainer location.

Remove the infill by following section E6 on page 30. Place the infill upside down with the hole for the pilot on the side furthest from you; this is the back (for the DS1400, place the pilot on the side closest to you). Remove the retainers from the flat nested sheet. When reading the text on each retainer, fold **ALL** the retainer tabs 90° away from you.

For some older infills, on the **UNDERSIDE** of the infill you may see numbers from 1 to 4. If the infill has numbers, then match the numbers on the infill with the numbers on the log retainers.

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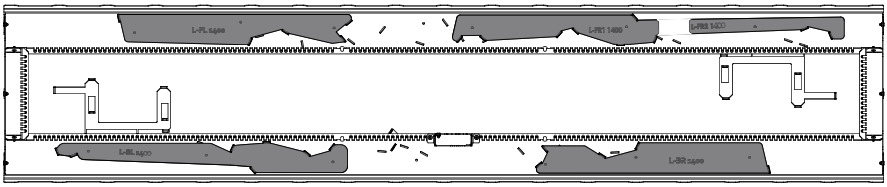
For all other infills, the combination of letters and numbers provides an indication of the location: B- Back, F- Front, L-Left, R-Right. The infill for the DS1400 Log installation is shown below as an example.

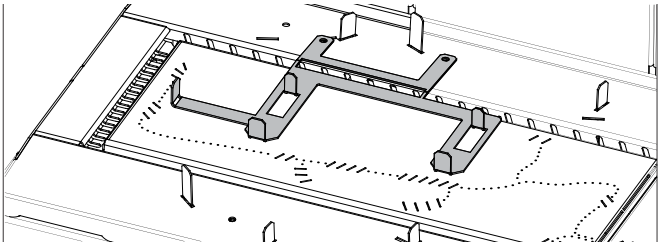


Attach all retainers by feeding the tabs from the **UNDERSIDE (unpainted side)** through the cutouts on the infill. Fix each retainer in place from the top of the infill with the screws provided.

Replace the infill and burners in the fireplace.

For Logs Only: the final log retainers are placed on **TOP** of the infill and burners to support the end log (number 2 from index). This part comes in flat form and is to be folded as per the image below.

They are then installed on both outer sides of the infill and are fixed in place by 1 screw as below.



F3 Log Fuelbed Installation

Logs must be located correctly as stated/depicted in this section.

The final layout should replicate the picture shown in Step 3. Place the embers or flakes in a single even layer after the logs have been located correctly (excess embers or flakes should NOT be added if one even layer has been achieved). The embers or flakes must not cover the pilot or pilot guard.

Note: Improper positioning of any fuelbed media may create carbon build-up and will alter the unit's performance. Malfunctions due to improper fuel media placement will not be covered under warranty.

Log Index

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Use the index above as a guide for selecting the correct logs.

Log Setup DS1150

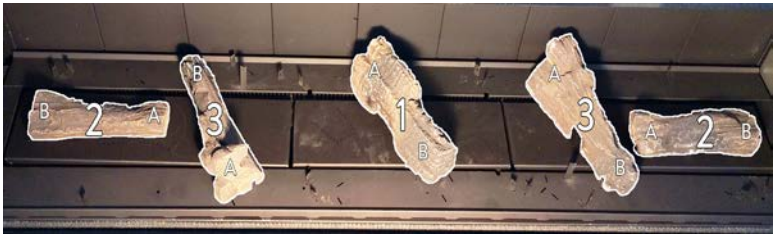
Step 1:

Step 2:

Step 3:

Log Setup DS1400

Step 1:



Step 2:

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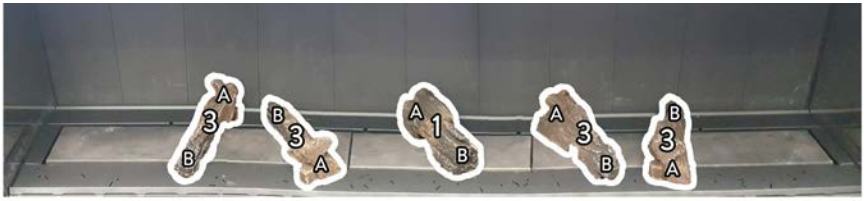
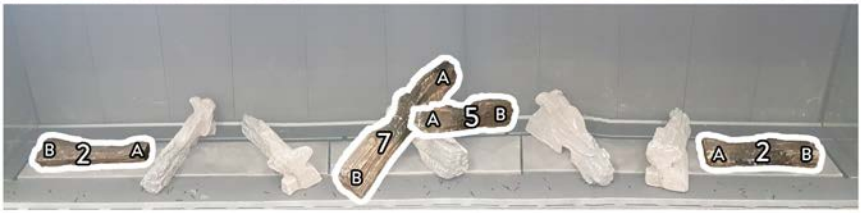
Step 3:

Log Setup DS1650

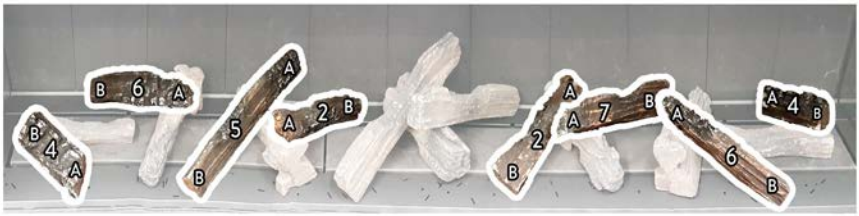
Step 1:



Step 2:

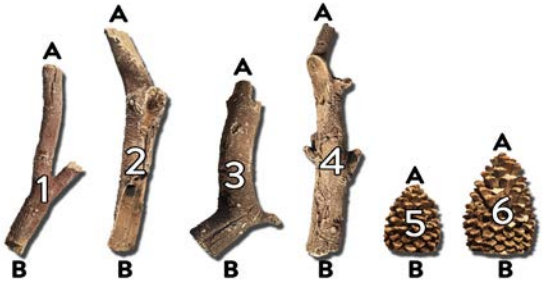


Step 3:



F4 Woodland Fuelbed Installation

Woodland Log Index



Use the index above as a guide for selecting the correct logs. Place the flakes in a single layer evenly after the logs have been located correctly (excess flakes should NOT be added if one even layer has been achieved). The flakes must not cover the pilot or pilot guard.

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Woodland Log Setup DS1150

Step 1:

Step 2:

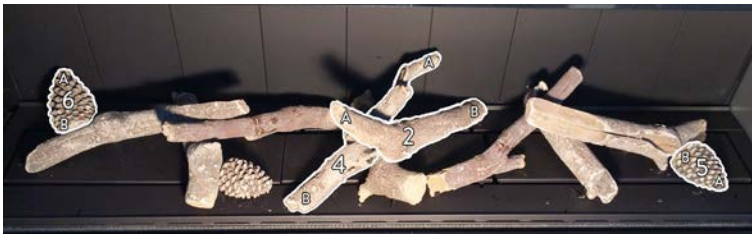
Step 3:

Woodland Log Setup DS1400

Step 1:

Step 2:

Step 3:



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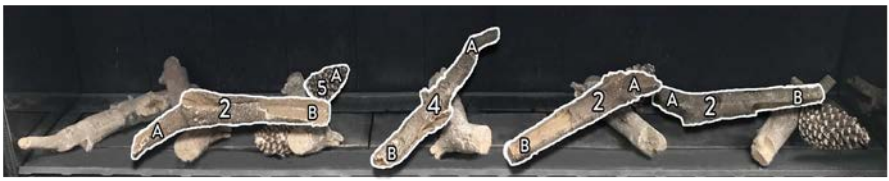
Woodland Log Setup DS1650

Step 1

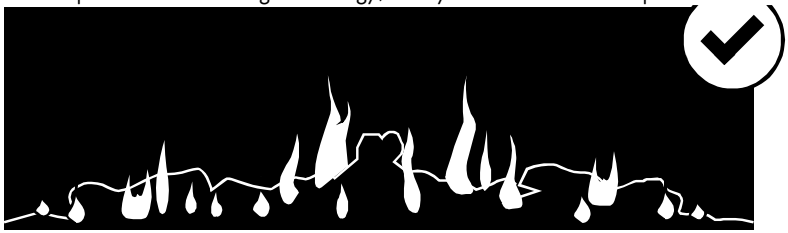
Step 2



Step 3

F5 Flame Picture

An abnormal flame pattern will look long and stringy; it may cause soot to build up inside the firebox.



An abnormal flame pattern will likely be the result of incorrect settings (jet size, burner aeration collar). Check that these are correct before proceeding. If an abnormal flame pattern is still present, please contact Escea.

It is the responsibility of the installer to ensure a correct flame pattern.

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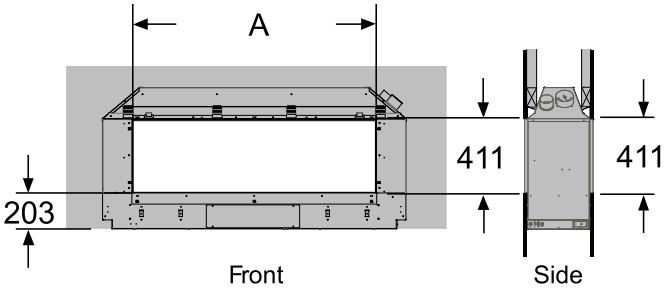
F6 Wall Linings

The final wall lining can only be commenced after all previous applicable sections have been completed. The appliance must be installed prior to and behind the finished wall surface. Allow clearance for any plasterboard, tiles, or other finishing materials that may be intended for the finished wall surface. The wall board that lines the outside of the opening can be normal plasterboard and does not need to be non-combustible. The plasterboard must protrude beyond the framework as shown in the following diagram.

Note: The final wall lining must not encroach within the specified dimensions in this section. These dimensions indicate the opening required in the wall lining. Encroaching on the minimum cut out dimension may inhibit the future serviceability of the fire.

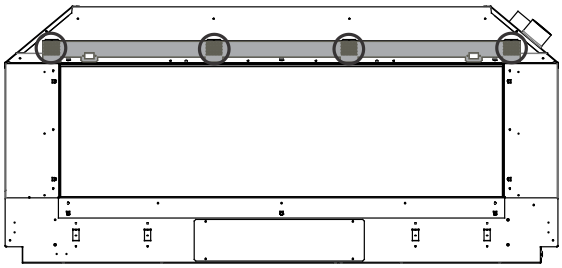
DS-Series Minimum Wall Lining Dimensions



Model	A
DS1150	1068
DS1400	1359
DS1650	1653

Note: The wall lining directly above the appliance will get warm and hence may discolour paint finishes that are susceptible to temperature damage. The heat may also distort vinyl wall coverings. For durability of finishes and surfaces you should contact the relevant manufacturer for their specification and avoid materials that are not suitable for use above a fireplace.

The wall lining can be fixed to the gib fixing bracket (shaded below). There are four areas on the bracket (circled below) that can be used for fixing screws.



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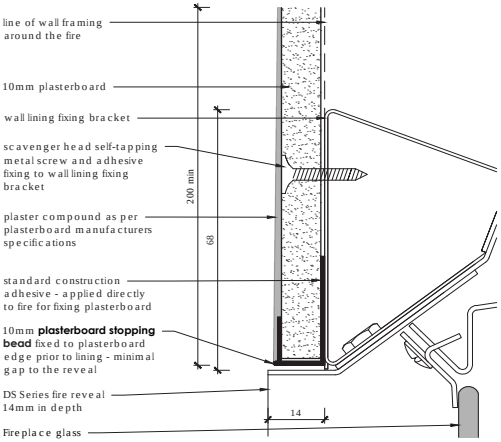
Frameless

If not using a fascia, ensure the edge of the wall lining is finished in a tidy manner (for a nice Gib finish we recommend Gib Rondo stopping bead).



*NOTE: a 20mm or less wall lining must be used when installing a DS Series fireplace **without** a fascia. For wall linings with a total thickness of 10mm or larger, a "Linear Trim" may be purchased to cover any exposed wall lining. A 10mm wall lining is recommended for ease of installation.*

Bevelled Lite Fascia

If using a Bevelled Lite fascia, cutouts will be required in the finished plaster board to allow for the fascia securing pins to attach to the appliance.

NOTE: A 13mm wall lining must be used when installing a DS fireplace with a Bevelled Lite fascia; this is the maximum distance the Bevelled Lite fascia can sit off the front face of the fire.

Linear Trim

For 10mm-20mm wall linings, an optional "Linear Trim" can be used to cover any unwanted exposed wall lining and/or act as a slimline fascia.

F7 Fitting the Bevelled Lite Fascia

To avoid scratches to the fascia panels of this heater, they must be fitted at the conclusion of the installation process, after wall linings are in place.

NOTE: Never rub the fascia.

Step 1: Ensure the plastic spacer is placed on the thread of the studs.

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Step 2: Screw and tighten the 4 studs with spacers onto the back of the fascia.

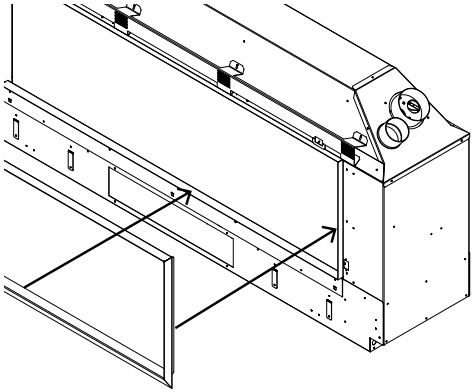
Step 3: Rivet the 4 spring clips onto the bracket on top of chassis of the appliance.

Step 4: After the 13mm thick wall has been finished, the fascia clips onto the appliance.

Linear Trim

To install the Linear Trim onto the DS Series, slide the bottom of the trim along the gib trim and push it in flush with the wall cladding. It should slide in on all four sides and fit by friction just inside the existing gib trim.

NOTE: If the friction fit is loose, please use the provided fiber tape along the bottom edge of the linear trim to tighten the fit.



F8 Locating Wall Mount Cradle for Wireless Control

The appliance's remote contains the thermostat that will sense and communicate the room temperature back to the heater via radio frequency.

A wall mount cradle has been provided for the wireless control and, where possible, the control should be housed in this cradle.

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The location of this cradle should be decided by taking the following factors into account:

- ☐ Simple and convenient access for the user
- ☐ Away from air flow and drafts through the room
- ☐ The parts of the room that people are likely to spend time
- ☐ Away from direct sun light
- ☐ A suitable distance away from the heater
- ☐ Ideally 1.2m to 1.5m from the floor

The radio frequency signal will go through some walls but for best results Escea suggest that the cradle position is less than 10 metres away from the heater.

The best height to locate the cradle off the ground is about chest height. This gives a good average room temperature and easy access for the user.

Please ensure that cradle is screwed firmly onto the wall using the screws provided.

F9 Operating the Appliance

If you haven't done so already, insert the supplied "AA" size batteries, being careful of the polarity. "0:00" should now be showing on the remote display.

To turn the fire on, press the 'POWER' button once; within a few seconds the appliance will begin its startup sequence.

NOTE: The appliance begins its startup with a 15 second pre-start purge, where the combustion fan runs on its own to clear the firebox before it tries to ignite. During the pre-purge the remote will alternately show the remotes "set" temperature and a rotating segment indicator to show that the fire is in start up mode and will try to ignite.

When the appliance has lit, set the room temperature by pressing the 'PLUS' or 'MINUS' buttons repeatedly until the display is showing the desired temperature. The remote will then revert back to the 'current' room temperature 30 seconds after making the change.

Run the appliance on full for an hour with the windows and doors open in the dwelling. This will ensure any initial smells have the chance to dissipate.

The appliance is turned off by pressing the 'POWER' button once more. The remote will display the time only.

Run the appliance again and check the operation of the thermostat by increasing and decreasing the set temperature. Check that the Effect Only and Fan Boost functions work correctly.

For further operation instructions please refer to the User Guide.

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F10 Normal Operating Sounds and Smells

Note: Each time the fire is lit from cold the glass may fog up with condensation. This is normal and the condensation will disappear within a few minutes once the glass heats up.

Sounds

It is possible that you will hear some sounds from your gas appliance. This is perfectly normal due to the fact that various types of materials are used within your appliance. Listed below are some examples. These are all normal operating sounds and should not be considered as defects in your appliance.

Fan:
Escea gas appliances use electric fans to push heated air into the room. It is not unusual for the fan to make a "whirring" sound when ON. This sound will increase or decrease in volume depending on the speed setting of your fan.

Gas Control Valve:
As the gas control valves turn ON and OFF, a dull clicking sound may be audible. This is the normal operation of a valve. When the fire is switched off after being run for a while, there may be popping and fluttering noises as the residual gas in the burners burns away. These are normal and are no cause for concern.

Unit Body/Firebox:
Different types and thicknesses of steel will expand and contract at different rates resulting in some "cracking" and "ticking" sounds being heard throughout the heating and cool down processes.

Smells

The first few times the unit is operated, the unit may release an odour and the flames will appear orange due to: the curing of the paint, the burning off of the starch in the gas logs, and the oils in the metal. This is a temporary curing process which will disappear with use.

A deposit on the inside of the glass, caused by the starch in the logs, may appear as a build up after several uses. If this film is not removed, it will bake on and may become difficult to remove. When the glass is cold, remove it (see section E5) and clean the inside with a non-abrasive cleaner.

DO NOT ATTEMPT TO CLEAN THE GLASS WHILE IT IS HOT.

UNDER NORMAL USE NEVER OPERATE THE UNIT WITH THE GLASS REMOVED.

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G Installation Checklist

Go through the following checklist to ensure you have installed the appliance correctly

- ☐ Correctly sized cavity to suit your fascia and flue configuration
- ☐ Correct clearances to combustibles
- ☐ An electrical isolating switch to the appliance, accessible after finished installation
- ☐ Correctly sized gas supply with a pressure test point, ensuring adequate supply with all other gas appliances in the dwelling running
- ☐ Gas type conversion process carried out if required
- ☐ A weather-tight installed horizontal or vertical powerflue terminal with clearance as specified by AS/NZ5601.1
- ☐ If chosen, reasonable access to the outside face of the horizontal powerflue wall terminal for maintenance purposes and flue attached to the rear of the horizontal powerflue wall terminal leading back to the appliance (or similar for vertical powerflue terminals)
- ☐ The electrical cable from the powerflue terminal attached correctly and run back to the appliance cavity in an electrically safe manner
- ☐ The appliance fixed to the cavity base
- ☐ The appliance plugged into a mains electricity supply
- ☐ All gas joints and pressure points leak tested with suitable leak detection solution and drop tests completed on gas pipework
- ☐ Fuel bed correctly installed
- ☐ Glass correctly fitted
- ☐ A fitted fascia
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Appliance functions checked, including thermostat operation, Effect Only, and Fan Boost
- ☐ Data label marked up with correct gas type and dated by installer if converted during installation
- ☐ Home-owner shown how to operate the appliance correctly
- ☐ Warranty card filled in with installer details and appliance serial number
- ☐ User Guide made available for end user
- ☐ Plumbing Industry Commission Compliance Certificate given to end user

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IMPORTANT:

- This appliance must be serviced every 12 months.
- Any service operation should be carried out only by a suitably qualified and trained person.
- Gas and electricity supply MUST be isolated before any service operation is carried out on this appliance.
- This manual should be left with the appliance.
- Only use **Escea approved** spare parts.
- Spare parts are available from an Escea Distributor or Retailer
- DO NOT MODIFY THIS APPLIANCE.

S1 Annual service procedure

- ☐ Isolate power and gas supply to fire.
- ☐ Remove front glass and clean inside of glass.
- ☐ Remove fuel bed and brush off any soot.
- ☐ Clean electrode and pilot hood of any carbon build up and ensure correct gaps between electrode and pilot hood
- ☐ Remove burners and blow compressed air through the burner ports.
- ☐ Remove jets and clean injector hole with solvent.
- ☐ Vacuum any dust from the cavity that houses the fan and from the underside of the fire box around the valve and solenoids.
- ☐ Test all joints for gas tightness.
- ☐ Reassemble heater and check that operating pressure is correct.
- ☐ Check glass sealing tape and replace if necessary.
- ☐ Check to make sure that flue system is intact and not in any way blocked.
- ☐ Trial heater with several start/stop cycles. Trial fan-boost, Effect Only, and thermostat modes to ensure that all modes function correctly.

To access the product data plate, first remove the fireplace glass, any fuelbed media, the burners, and the firebox base. The data plate is located underneath the controls tray (step 1 of section E6).

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S2 Error Codes

This gas fire has been designed to show error codes to help explain and identify any fault situation that occurs. These codes will appear on the wireless remote control in the form of a large letter “E” with a number beside it. Codes can normally be reset by turning the heater off then on again at the wall.

The following table shows what each code means and possible ways to rectify the situation. In the case of persistent or repeated shutdown errors, action must be taken immediately to find and repair the fault.

Error Code	Suggested action
 Electronics Over Temp	The electronics have gone over temperature. • Check for excess lint and dust build-up on the PCB/Controller. • Check that fascia panels are installed correctly as incorrect installation may result in restricted air flow. • Ensure correct gaps are present around glass. • Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, clean, and free turning. *Note: This error has a permanent lock out and will require the unit to be reset after the initial error (turning the power to the fire off “at the wall” then on again after a few seconds).*
 Flame Failure or Power Flue trip	The fire has tried to light three times and failed. • Check gas supply and check other gas appliances to see if they are affected. If you have two separate LPG cylinders, switch over to the full bottle or contact your gas supplier. You may need to retry igniting the fire a few times after re-establishing gas supply. • Check correct gas pressure to the appliance with all other appliances running. • Check the electrode placement in relation to the pilot flame. Ensure it is well enveloped in flame as per the diagram in the installation instructions. Ensure no small coals have dropped onto the ignition electrodes between the burners. • Ensure the electrode is not contacting any metalwork including the burners and has the correct air gap. • Check that the electrical power cable between the appliance and the power-flue wall terminal is connected and not damaged.

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Appliance Over Temperature Sensor Trip

The bimetallic snap disk mounted on the exhaust collector box has tripped.

- Check that fascia panels are installed correctly as incorrect installation may result in restricted air flow.
- Check that fans are plugged in, cleaned, and free turning - room air fans may be slowed or stalled.
- Check the regulator -being set too high may result in excess heat build-up.
- Check flues are securely connected at both ends - if the inlet flue is not connected the appliance may draw warm air from the cavity.
- Check the jets
- Check the red tabs are in the correct orientation (see section E2, step 2).

Valve Solenoid Check Failure

The valve solenoids have failed the pre-ignition test. A wire may have dislodged or the valve solenoid is faulty.

- Check that the connections to each solenoid are secure and in place. The connections on the ends of the wires may need to be tightened (e.g. with a pair of pliers) to ensure a robust connection to the valve terminal.
- Disconnect and reconnect the firebox connectors ensuring they are firmly pushed into place.
- One of the solenoids on the valve inside the fire may have failed. If this is the case, the valve will need to be replaced.

Remote Cannot communicate with fire

The remote cannot communicate with the fire.

- Check if the fire is turned off “at the wall” i.e. a loss of power to the fire or the remote is outside of its effective radio frequency range (too far away from the fire). Typical remote range is 1m to 10m.
- Ensure there is power to the fire by pressing the auxiliary on/off (red) button on the fire, then press the on/off button on the remote to clear the error.

Combustion Air Flow Error

- Check whether the pressure switch is activating at startup (there is an orange indicator LED in the control tray). If not, check that the pressure switch electrical connection is correct.
- Check that the hoses are connected at both ends. Ensure the hoses are not kinked.
- Ensure the pressure switch is mounted vertically and the diaphragm is operational. The black hose should be connected to the low pressure port and the translucent to the high pressure port
- Check that both flues are securely connected at both ends to the appliance and the powerflue wall terminal and that the flue is not damaged
- Check that the fan inside the powerflue wall terminal is running during startup. This fan may need servicing if it is slowed or stalled.

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S3 Cleaning the Fuel bed and Glass

ALWAYS USE GLOVES WHEN HANDLING THE FASCIA AND GLASS.

Follow section on page 31 to remove the glass. Place the glass carefully aside. Any standard ammonia-free glass cleaner may be used to clean the glass. Use a soft brush to clean the fuel bed media, being careful to replace it according to the instructions in section F1 on page 38, F3 on page 39, or F4 on page 41.

If soot build up on the fuelbed and/or the inside of the glass becomes excessive or regular then one of the following actions may be required:

- Reset the gas pressure - pressure may be too high;
- Reposition the fuelbed - check with specific fuelbed instructions for details;
- Clear any blockage from primary aeration port of burner;
- Check that the flue tube is not damaged or disconnected;
- Check that the exhaust fan is operating and cowl is not blocked in any way.

S4 Cleaning the Fascia

The outside of an Escea Fascia must only be cleaned with a soft microfibre cloth. If heavier cleaning is required for the likes of grease or stubborn fingerprint removal we recommend the use of a dedicated stainless steel cleaner for stainless steel fascias or warm soapy water for powder coated fascias.

NEVER RUB THE FASCIA.

For Stainless Steel Fascias:

1. Ensure that the Gas Fireplace is off and that the fascia is cold to the touch.
2. Using the gloves provided with your fascia, a stainless steel cleaner and a clean cloth, apply a small amount of cleaner to the cloth and wipe the fascia with even, straight strokes.
3. Make sure your strokes follow the direction of the grain or brush finish. Wiping across the grain can leave small scratches.
4. The cleaner may leave a very fine film over the fascia, ensure this film is distributed evenly.
5. If the film is applied too heavily and is quite visible, you can remove the excess by gently wiping dry with a microfibre cloth. Ensure your strokes still follow the direction of the grain or brush finish.
6. Ensure that no film is applied to the glass of your Escea Gas Fireplace. If applied accidentally, wipe off with an absorbent microfibre cloth.

For Powder Coated Fascias:

1. Ensure that the Gas Fireplace is off and that the fascia is cold to the touch.
2. Using the gloves provided with your fascia, gently clean the fascia with a cloth and warm soapy water.
3. Wipe off with an absorbent microfibre cloth.

S5 Checking Operating Pressure

See section E9 of this manual.

S6 Replacing a Remote Control

If the wireless control becomes lost or damaged, a new one can be ordered from any Escea retail agent. When you have the new remote, the following procedure needs to be followed to “teach” the remote to only communicate with that fire.

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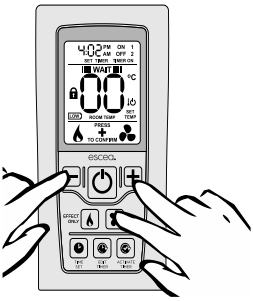
1. Ensure the fire and remote are set to “OFF” (only the time is displayed on the remote).

2. While the remote is in its “OFF” mode with only the time showing on the display, press the MINUS, PLUS, and FAN BOOST buttons simultaneously (as shown to the right) until the characters “03” light up on the display. Release the buttons. The remote will count down and display “GO”. The screen will then display all characters and should be reading “00”. This will put the remote into test mode. *Note: if the digits start counting then the remote is already paired.*



3. Press and hold the MINUS button until the two large temperature digits reading “00” start to flash slowly. Release the MINUS button. The remote control is now ready to be linked to the fire.

4. Press and hold the auxiliary ON/OFF button on the fireplace for a minimum of ten seconds or until the two large temperature digits start counting upwards from 00 to 99 repeatedly.

Note: Pressing the red auxiliary button on/off button will start the fire. Once the remote control is counting the fire can be turned off by pressing the red auxiliary button again.

5. Press the power button in the middle of the remote control to exit the test mode and return to normal operation. The remote should only be displaying the time. Check the fire will start using the remote control by pressing the power button. Turn it off again using the remote control.

6. The fire is now linked to the remote control.

S7 Replacing the Burners

Remove all components of the fuelbed, taking care not to damage any fuelbed media.

Remove the 4 screws in the infill and lift from the fire box by lifting one end up into the top corner and then out towards you. Take care not to scratch the firebox paint. Lift out the burners and replace as necessary.

S8 Serial Number

The serial number for the fire can be found in two places. The first is in the battery compartment of the wireless remote under the batteries. The second is on the data sticker on the chassis under the electronics tray.

S9 Removing or Cleaning Fan

As part of regular service procedure, it is recommended that the fan is removed for cleaning. Dust will build up on the fan rotor and in the cavity where the fan is located. This can be removed by the service person using a hearth brush and a vacuum cleaner.

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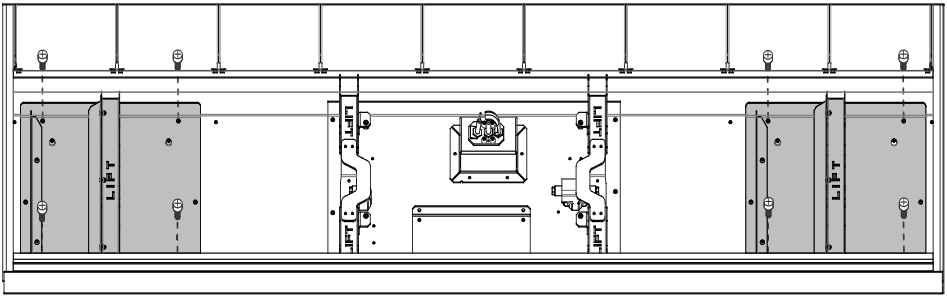
ISOLATE THE POWER TO THE FIRE BEFORE STARTING THIS PROCEDURE.

Screw Locations:

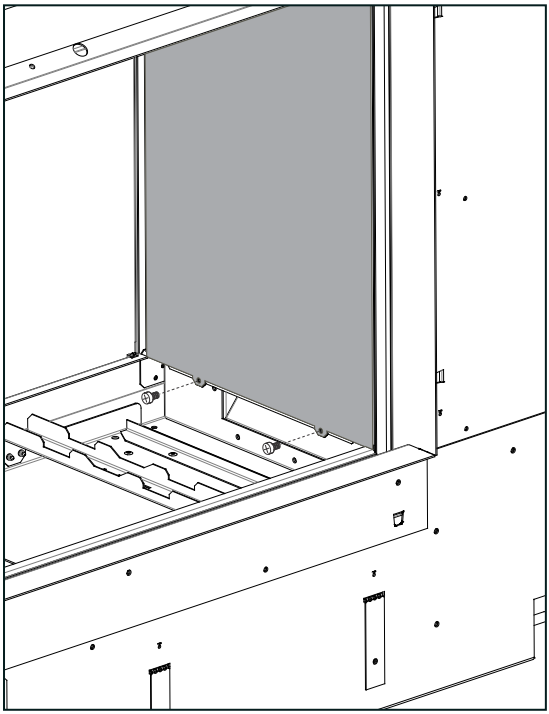


S10 Removing the Control Tray

ISOLATE THE POWER TO THE FIRE BEFORE THIS PROCEDURE.
Refer to Step 1 of Section E6

S11 Pressure Switch Removal

1. With the infill removed, remove the 3 screws in the reflective panel (shown shaded in the diagram below). Carefully remove the panel from the firebox.



2. Remove the 10 screws (shown in the diagram below) in the access hatch and carefully remove from

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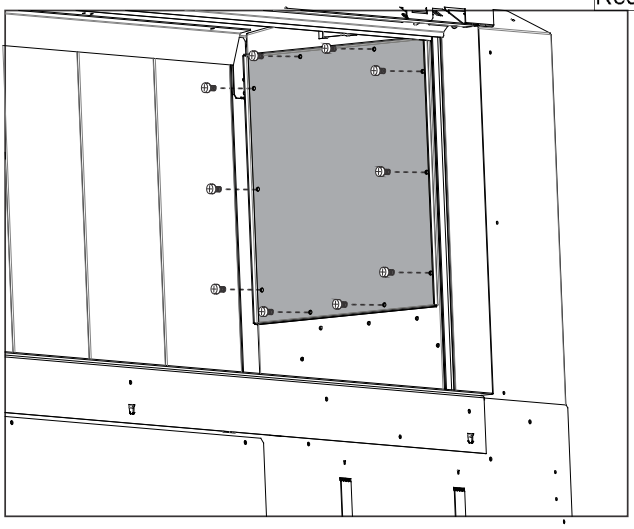
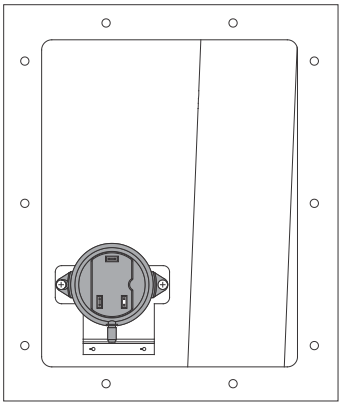
the firebox.



3. Remove the 2 silicone tubes (making note of which tube goes on each spigot).

Disconnect the two wires from the pressure switch and remove the two screws on either side of the pressure switch to remove it from the bracket. The black hose should be connected to the low pressure port and the translucent to the high pressure port.



S12 Replacing the Thermal Cut Out (TCO)

WARNING - Ensure power is turned off before removing any TCO.

There are two thermal cutouts: one in the LH room fan assembly (60°C) and the other attached to the exhaust manifold (120°C).

Exhaust TCO (120°C)

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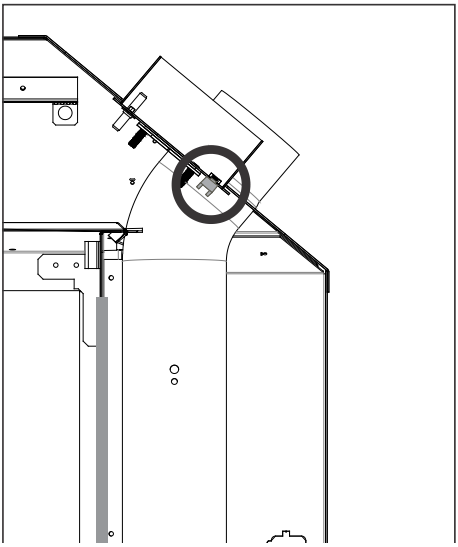
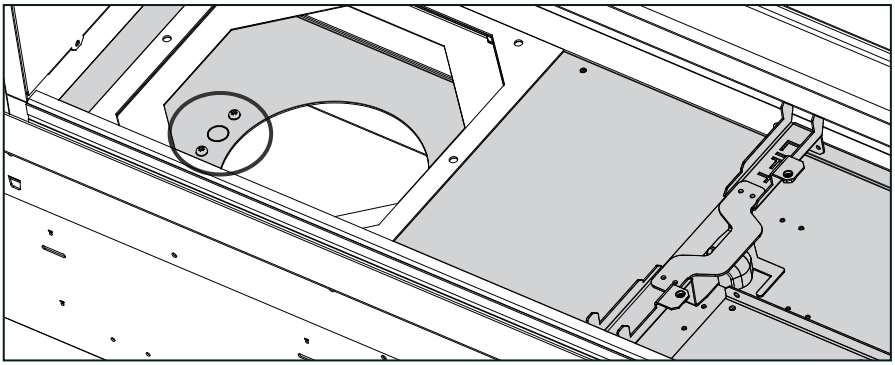
Access to this TCO by following steps 1 and 2 from section S11.
Reach into the hatch and locate the TCO (circled in the diagram below). The TCO has two wires connected to the main body; remove these. Unscrew the TCO by hand and remove from the firebox.



Fan TCO (60°C)

Access to this TCO by following S9 and removing the left hand fan (not exhaust side). Once the fan is removed you will see the TCO (circled in the diagram below). To remove this, unscrew the two visible screws and, once free, remove the two wires connected to the TCO. Remove the TCO from the chassis.



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S13 Servicing the Horizontal/Universal Vertical Powerflue

Ensure the power to the powerflue is off by disconnecting the power to the appliance inside. If the appliance has been running, allow the powerflue to cool before attempting to service it.

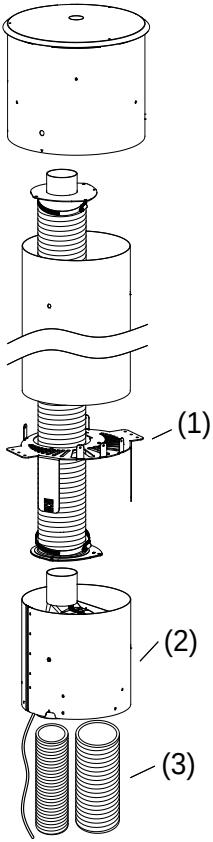
Servicing a Horizontal Powerflue:

If the powerflue needs servicing, the fan can be accessed from the outside of the installation for horizontal termination and accessed from within the roof space for vertical termination.

Undo the screws on the outside of the powerflue box and separate the two parts, giving you access to the fan inside.

Removing this plate gives complete access to the fan for servicing or replacement. Check that all the seals are still intact. Check that the fan electrical terminals, motor, and impeller are not corroded. Ensure there are no signs of leakage in or around the terminal.

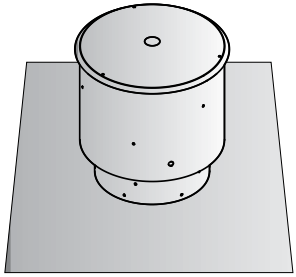
When reassembling the powerflue, line up the round silicon grommets with the outlet tube of the fan and push the cowl back into place. Ensure all seals are still in place and replace all of the screws to hold the cowl in the correct position.



Servicing a Universal Vertical Powerflue:

If the UVP is internally installed remove the unit (2 in the right hand image) and replace the complete fan unit.

If the UVP is externally installed the cowl/fan unit pictured below is to be completely replaced by removing it from the liner or flashing.



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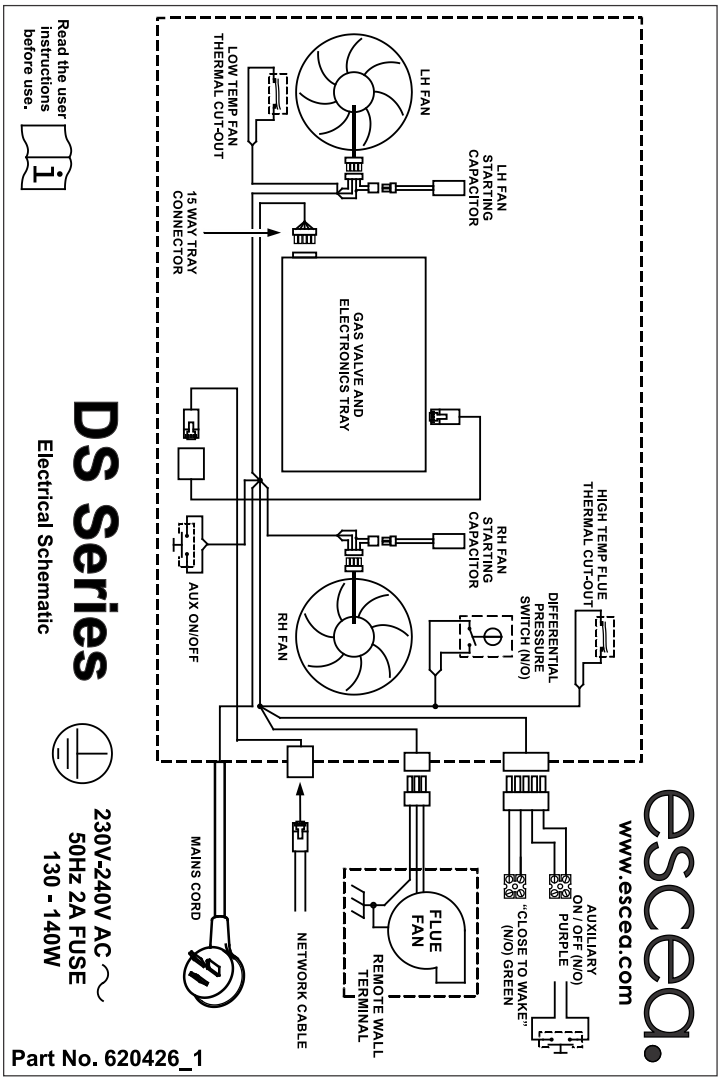

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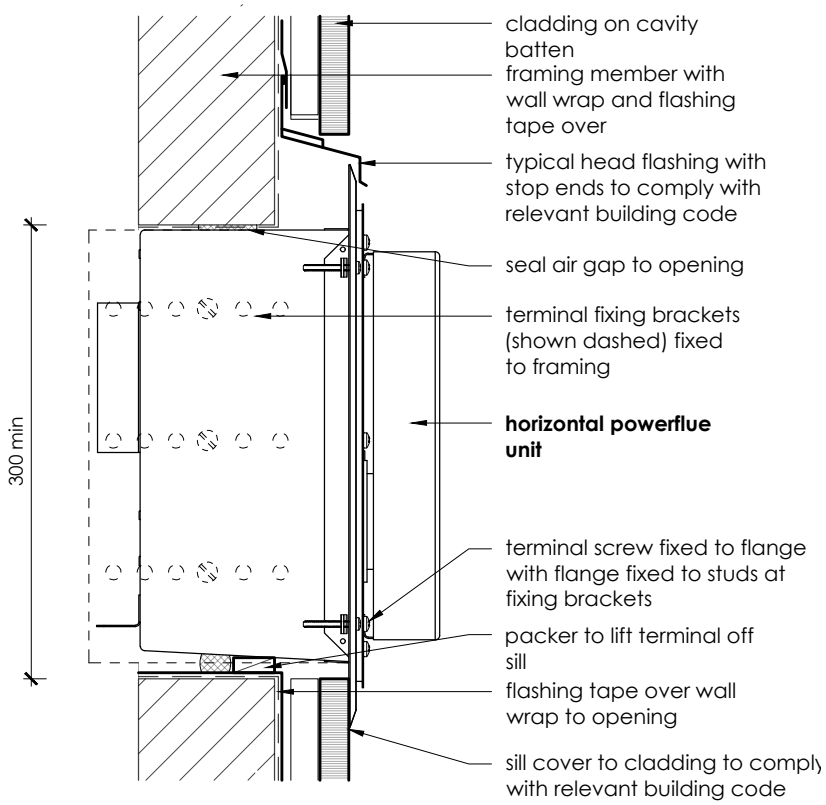
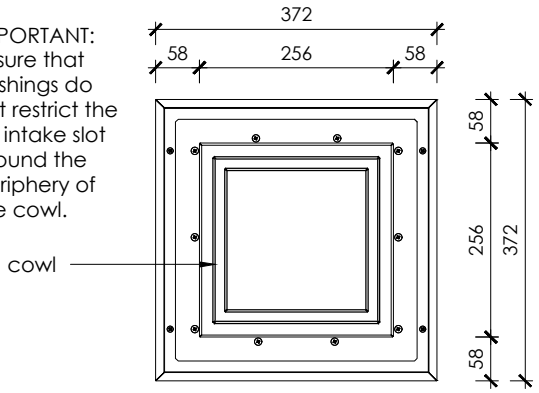
Horizontal Powerflue Detail

FIRE BY escea.

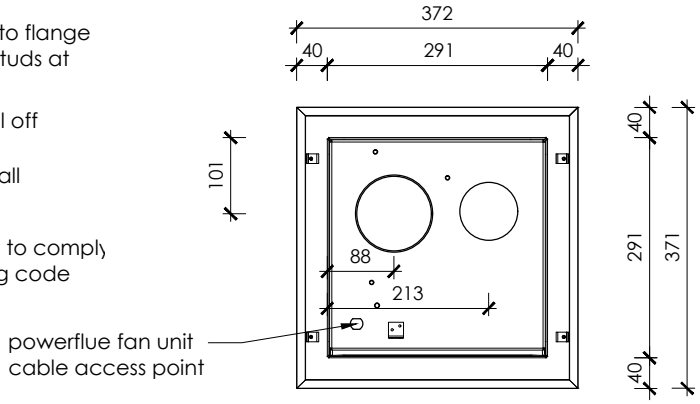


Head and Sill scale 1:5

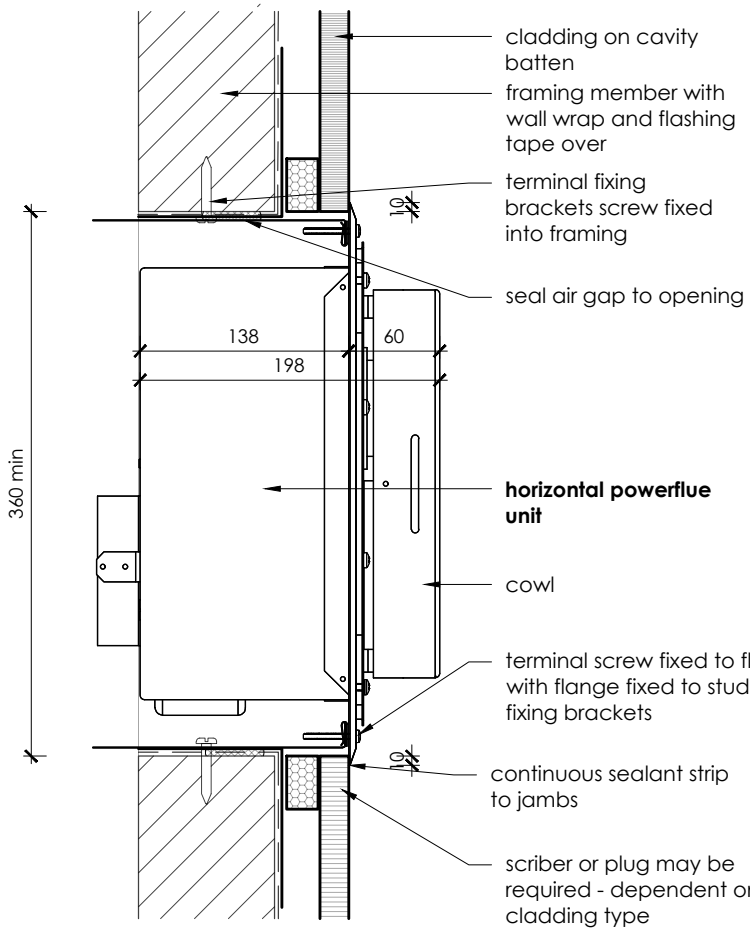
IMPORTANT: Ensure that flashings do not restrict the air intake slot around the periphery of the cowl.



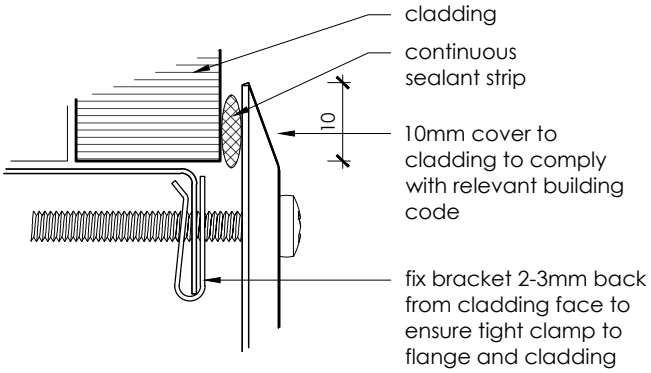
Front Elevation scale 1:10



Rear Elevation scale 1:10



Jamb scale 1:5



Fixing Detail scale 1:1

IMPORTANT:
This technical sheet must be read in conjunction with the requisite Escea D-Series Gas Fire Installation Manual, the latest version can be found on our website **www.escea.com/nz/technical/**

Contact the ESCEA Architectural Advisory Team for assistance with installation of this fire - *aa@escea.com*

GENERAL CONSTRUCTION AND FINISHES SHOWN INDICATIVE ONLY

file:	scale:	ecn:	drawing no:	revision:	date:	drawn:
D-Series FLUE Master File.dwg	as shown	ECN-2155	EDA-0006	V. 02	08.12.2017	MG

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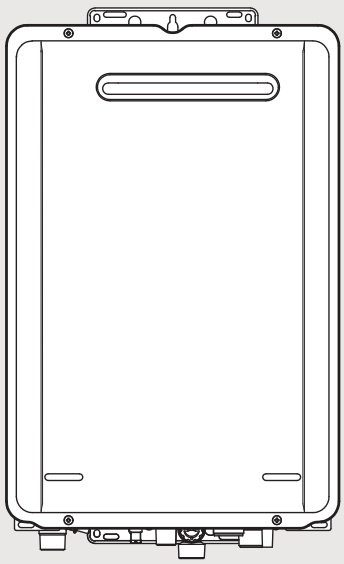
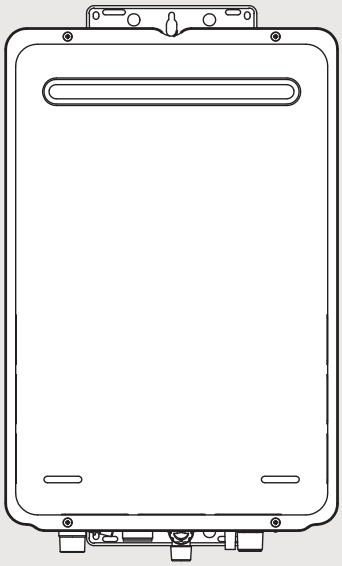
Suitable for the following Rinnai INFINITY models:

- A16 (REU-A1620WG-ZK)
- A20 (REU-A2024WG-ZK)
- A24 (REU-A2426WG-ZK)
- A26 (REU-A2626WG-ZK)
- EF26 (REU-E2626W-ZK)





INFINITY EF26 and A-Series continuous flow water heaters

Installation guide

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

Rinnai

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Important

This appliance must be installed in accordance with:
- Manufacturer's installation instructions
- Current AS/NZS 3000, AS/NZS 3500, AS/NZS 5601.1 and G12/AS1

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.
Not suitable for hydronic applications.
Not suitable for commercial or solar applications.
Not suitable for locations greater than 1000 m above sea level.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter.

Warning
Improper installation, adjustment, alteration, service and maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624).

Rinnai New Zealand Limited
105 Pavilion Drive, Mangere, Auckland
PO Box 53177, Auckland Airport, Auckland 2150

Phone: (09) 257-3800
Fax: (09) 257-3899
Email: info@rinnai.co.nz
Web: rinnai.co.nz
youtube.com/rinnainz
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Before installation

Unpack the appliance and check for damage. DO NOT install any damaged items.

Check all components and that the correct gas type has been supplied.

Get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.

These instructions apply only to the continuous flow water heater models listed on the front of this guide.

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Specification

Designed and made in Japan, the Rinnai INFINITY EF26 and A-Series are continuous flow gas hot water heaters with inbuilt frost protection. The EF26 is a condensing model. They have electronic ignition and require electricity to operate. They are factory preset to 55 °C (maximum set temperature is 65 °C).

Scope of use

Suitable for **residential** applications only. They are designed to be externally mounted on an outside wall and located as close as practicable to the most frequently used hot water outlet(s), to reduce the delay for hot water delivery.

They are not suitable as a spa or swimming pool heater, and for hydronic heating. They are also not suitable as a gas boost for solar installations as the temperature cannot be set high enough.

Hard or acidic water will need to be treated to use this product.

Specification summary

	A16 REU-A1620WG-ZK	**A20** REU-A2024WG-ZK	**A24** REU-A2426WG-ZK	**A26** REU-A2626WG-ZK	**EF26** REU-E2626W-ZK
Thermal efficiency	80.5%	80.5%	81%	80.5%	91.5%
Hot water capacity	1.5-20 L/min	1.5-24 L/min	1.5-26 L/min	1.5-26 L/min	1.5-26 L/min
Hot water capacity at a 25° rise	16 L/min 960 L/h	20 L/min 1200 L/h	24 L/min 1440 L/h	26 L/min 1560 L/h	26 L/min 1560 L/h
Input	16.3-124 MJ/h	19.9-156 MJ/h	16.3-184 MJ/h	16.3-199 MJ/h	16.3-175 MJ/h
Output	27.8 kW	34.9 kW	42.0 kW	44.5 kW	44.5 kW
Weight	13 kg	14 kg	15 kg	15 kg	18 kg
Water, nominal operating pressure	120-1000 kPa	160-1000 kPa	200-1000 kPa	200-1000 kPa	220-1000 kPa
Ingress protection	IPX4	IPX4	IPX4	IPX4	IPX5
Power consumption: - Normal - Standby - Frost protection	 47 W 2 W 68 W	 58 W 2 W 68 W	 56 W 2 W 68 W	 65 W 2 W 68 W	 63 W 2 W 92 W

Safety devices

- Flame failure
- Boil-dry protection
- Overheat protection (OHS)
- Fusible link
- Pressure relief valve
- Combustion fan rpm check

Line pressures

- NG 1.13-3.0 kPa
- LPG 2.75-3.0 kPa

The maximum line pressure is 3.5 kPa, with the maximum standing pressure under abnormal intermittent conditions 5.0 kPa. In the case of commercial metering (i.e. 35-37 kPa coming in), there may be a requirement to regulate the incoming line pressure down.

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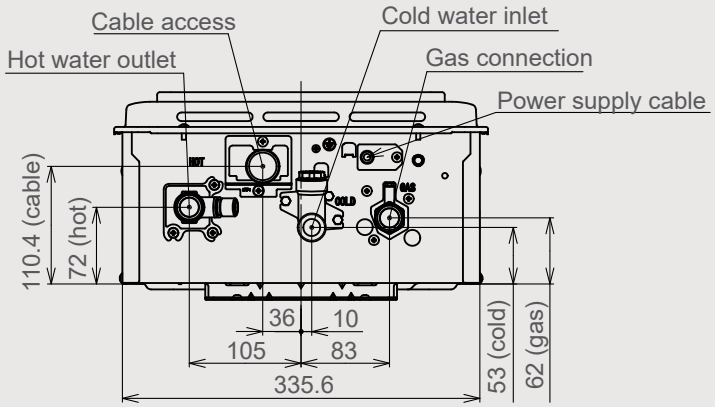
Connections and fittings

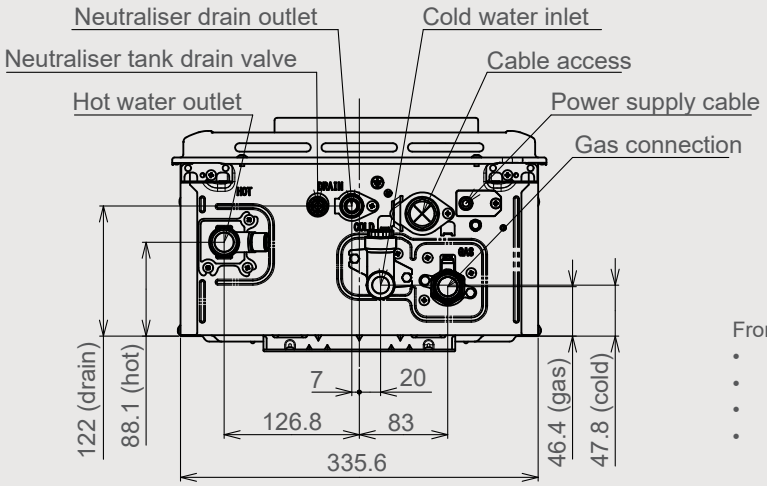
A-Series



From bottom of unit:

- Hot 41 mm (A16 39 mm)
- Cable 29 mm
- Gas 40 mm
- Cold 50 mm

EF26



From bottom of unit:

- Hot 41 mm
- Cable 26 mm
- Gas 38 mm
- Cold 50 mm

		Hot	Cold	Gas	Condensate
A16 external	REU-A1620WG-ZK	R½ (15 mm)	R½ (15 mm)	R¾ (20 mm)	N/A
A20 external	REU-A2024WG-ZK	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	N/A
A24 external	REU-A2426WG-ZK	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	N/A
A26 external	REU-A2626WG-ZK	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	N/A
EF26 external	REU-E2626W-ZK	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	R½ (15 mm)

Service connection points

An approved full flow isolation valve and disconnection union MUST BE fitted to the cold water inlet. A non-return valve is not required unless stipulated by local regulations.

Isolation valves MUST NOT be fitted directly the appliance.

It may be necessary to fit a temperature limiting device for delivery to areas used primarily for the purposes of personal hygiene, refer page on ‘Water delivery temperature’ for more information.

Purge gas and cold water supply lines to remove air and swarf before final connection. Swarf in the gas or water supplies may cause damage, a common problem, which is not covered by warranty.

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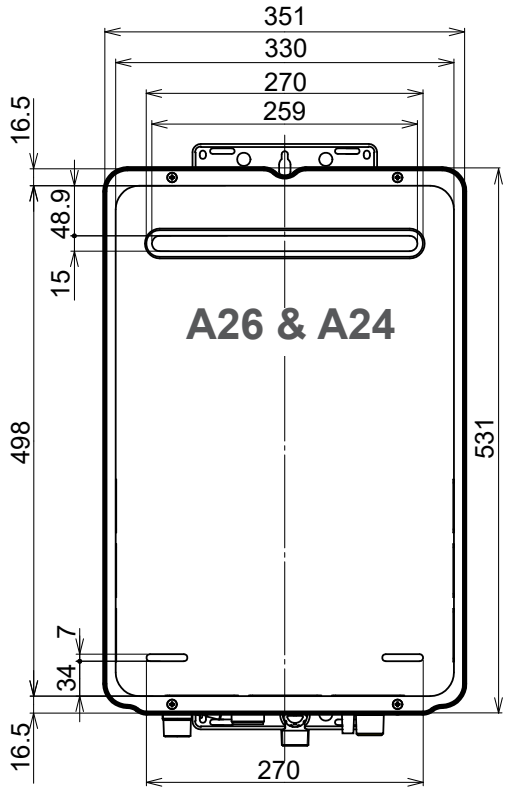
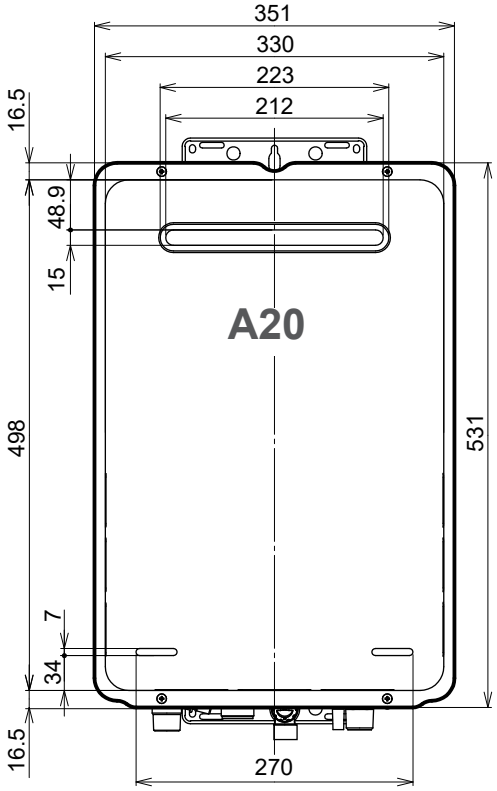
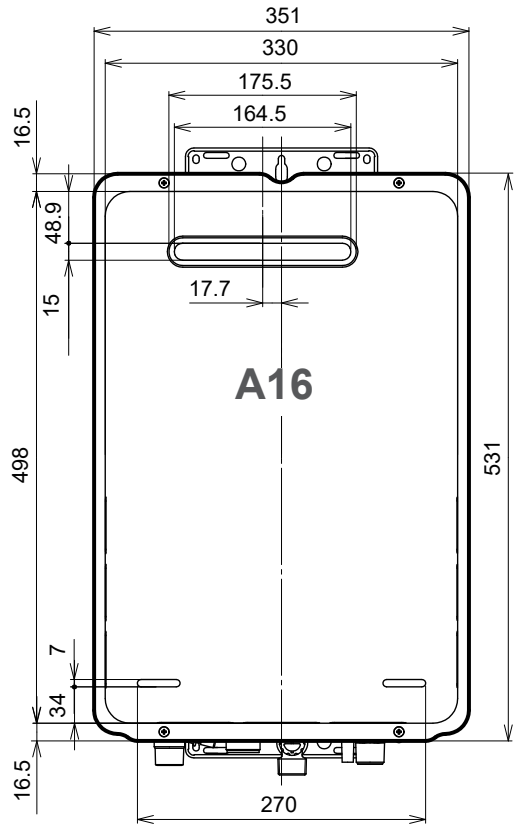
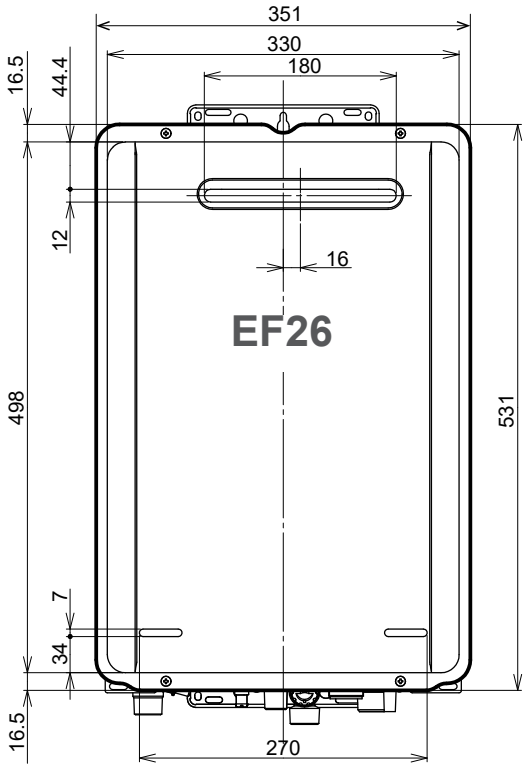
Dimensions (mm)









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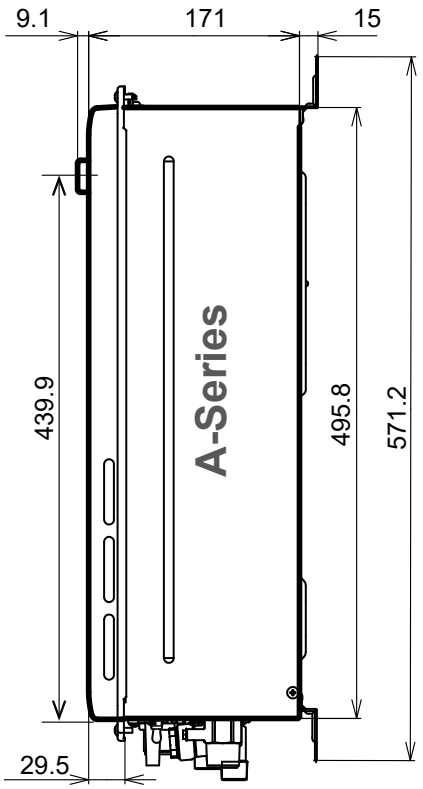

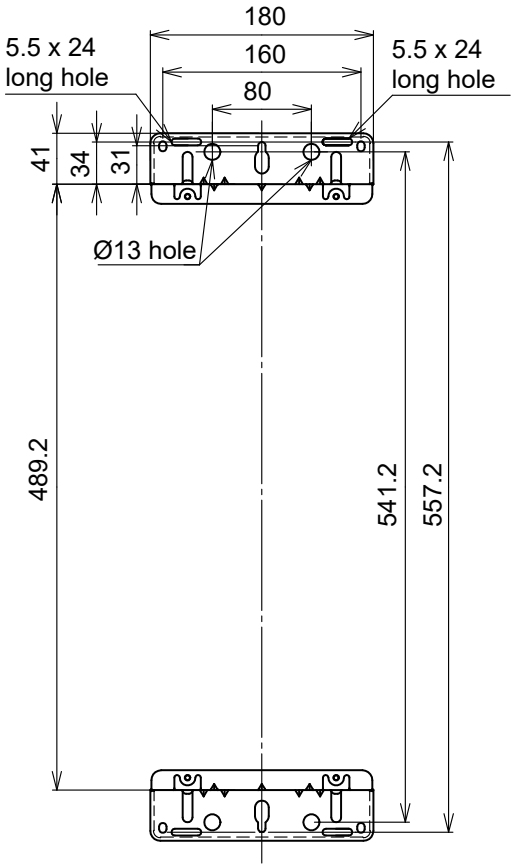

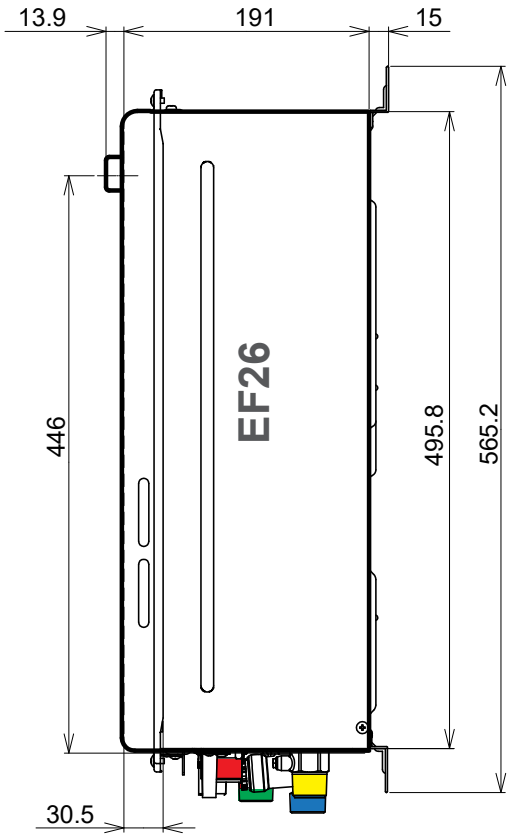

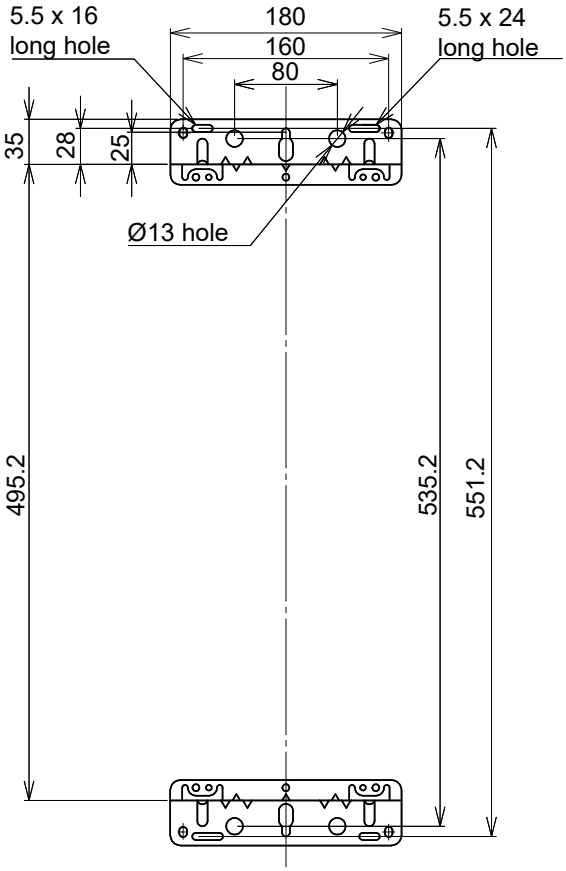

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Appliance location

This appliance is designed for outdoor installations only. It MUST BE located above ground in open air with natural ventilation, without stagnant areas, where gas leakage and products of combustion can be rapidly dispersed by wind and natural convection.

This appliance MUST BE placed as close as possible to the most frequently used hot water outlet(s) to minimise the delay for hot water delivery[1]. For installations where the distance between the water heater and outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively multiple appliances can be strategically placed to serve outlets with minimal delay.

An AC 230 V, 10 A earthed power point must be provided adjacent[2] to the appliance. This power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances MUST BE installed to ensure access can be gained without hazard or undue difficulty for maintenance and servicing. Sufficient clearances shall allow access and removal of all serviceable components. Appliances should not be mounted more than 2.5 m above the ground or floor level unless the customer can arrange permanent and safe access, or can provide another means of safe access.

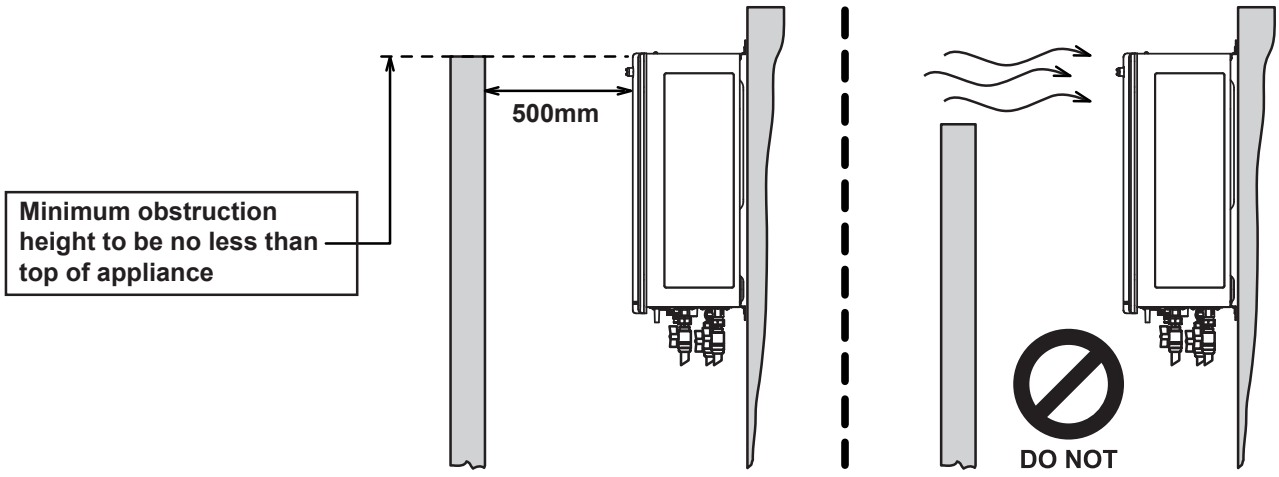
The appliance MUST BE mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

Location of the flue terminal MUST BE in accordance with Section 6 and Figure 6.2 of AS/NZ 5601.

The E26 / A-Series are suitable for installations up to 1000 m above sea level. They are not suitable for alpine areas.

Horizontal obstructions

AS/NZS 5601 states a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit, as shown below, and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing the flue gases back into the flue terminal.



IMPORTANT

There **MUST** be **NO** partial obstructions to the appliance front cover or any other part of the appliance casing. This will avoid the appliance from failing to operate under windy conditions.

[1] Rinnai recommend a maximum pipe run of 10 m.
[2] Power point can be within the pipe cover if a pipe cover is installed—must comply with AS/NZS Wiring rules

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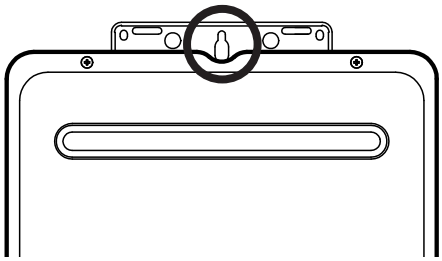
General installation information

Securing the Rinnai INFINITY

The wall structure on which units are mounted MUST BE capable of supporting the weight of the appliance and associated pipe work.

Ensure that suitable fixing screws or bolts are used to secure the unit to the wall, in accordance with AS/NZS 5601 section 6. Wooden plugs shall not be used.

The top bracket has a keyhole slot so that the appliance can be positioned by hanging it on one screw. Once in position the appliance can be secured with appropriate fixings.



The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting or leave an air gap between the appliance back panel and the wall or structure to meet the temperature hazard requirements of AS/NZS 5601.

Pipe sizing

If the gas pipe sizing is insufficient the appliance won't perform properly. Gas pipe sizing must consider the gas input into this appliance as well as other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601 should be used. Refer specification for gas consumption details.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water supply

The appliance is intended to be permanently connected to the water mains.

Refer specification for operational water pressure limitations. Approved pressure limiting valves may be required if the maximum rated water supply pressures are exceeded. To achieve the rated flow, the minimum water supply pressures must be met.

The water heaters will operate at lower pressures but will not achieve the rated flow. Contact Rinnai for gravity fed or low pressure installations.

Water chemistry and impurity limits are detailed in the operation guide within the warranty section. Most metropolitan water supplies fall within these requirements.

If you are unsure about the water quality contact your water authority. If sludge or foreign matter is present in the water supply, a suitable filter or strainer is required in the water supply to the water heater to prevent unwarranted damage and loss of performance.

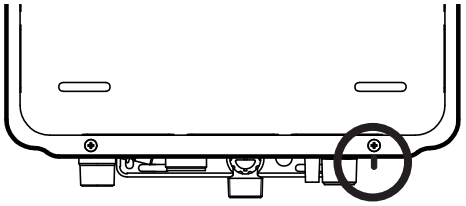
Frost protection

Frost protection operates automatically, as long as the appliance is connected to the electrical power supply, by activating when the temperature inside the unit drops below 3.5 °C[1], and turns off once the temperature inside the unit reaches 7 °C[1].

[1] Approximate temperatures

Frost protection thermistor

The EF26 and A-Series models have an external thermistor to control frost protection. It is a small black indicator located on the bottom right hand side of the unit, directly underneath the cover screw (circled below). The frost protection thermistor needs to be exposed to the outside air to correctly function—do not insulate the frost protection circuit will not work correctly.



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Water delivery temperature

Requirements of AS/NZS 3500 MUST BE considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS 3500.4, a Temperature Limiting Device (TLD), such as a tempering valve may be required, even if the appliance is set to 55 °C or less. For these types of applications contact Rinnai.

Requirements for Rinnai INFINITY units installed without controllers

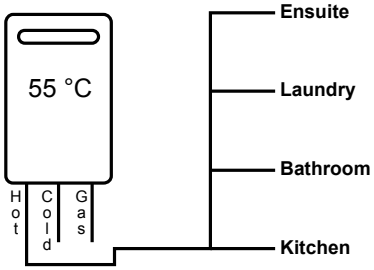

Diagram 1 - 55 °C Appliance

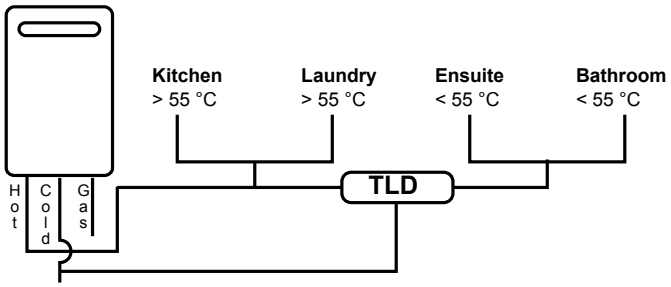

Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the Rinnai INFINITY is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

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Controller installation

The maximum number of controllers that can be fitted is **four**, refer water controller configurations section below.

General information

Other manufacturers water controllers are NOT compatible with Rinnai water heaters. Water controllers MUST NOT be used with any solar boost water heater. Rinnai water controllers bought in from other countries are not compatible with Rinnai appliances sold in New Zealand.

Water controllers and transceivers (for those with wireless controllers) DO NOT contain serviceable parts and must only be serviced by an authorised person.

Master controller

Only one master controller can be designated as a 'master' water controller. This water controller is normally used in the kitchen. The remaining controllers are 'sub-controllers' and are for use in bathrooms, toilets, and laundries. The temperature limit for all sub-controllers is 50 °C, this is a safety feature, to reduce the risk of burns in these areas. A master controller MUST NOT be installed in a bathroom.

Water controller configurations

- A maximum of four Compact controllers (MC-601) can be fitted.
- Only one master controller can be installed. This can be a Kitchen Deluxe[1] (MC-100V), or any other Compact controller (MC-601).

  [1] When a Kitchen Deluxe controller is fitted, it will always function as a master controller, this is the default setting and cannot be changed.

- In addition to a master controller, up to three additional controllers can be fitted

Controller location

- Do not install water controllers near a heat source, such as a cook top, stove or oven. Heat steam, smoke, and hot oil may cause damage.
- Do not install water controllers outdoors unless protection from water/dust ingress and sunlight are provided.
- Do not install water controllers in direct sunlight.
- Do not install water controllers against a metal wall unless the wall is earthed in accordance with AS/NZS 3000.
- Water controllers must not be installed where chemicals such as benzene, alcohol, turpentine, hydrogen sulphide, ammonia, chlorine or other similar chemicals are in use.

The water controller is water resistant, however excessive exposure to water may result in damage. Durability is improved when positioned OUTSIDE the shower recess.

- Avoid direct exposure to water or steam as these may cause the controller to malfunction.
- Water controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m from the floor), and installed at least 400 mm above the highest part of a sink, basin or bath.

When cleaning your water controller use only a damp cloth and mild detergent.

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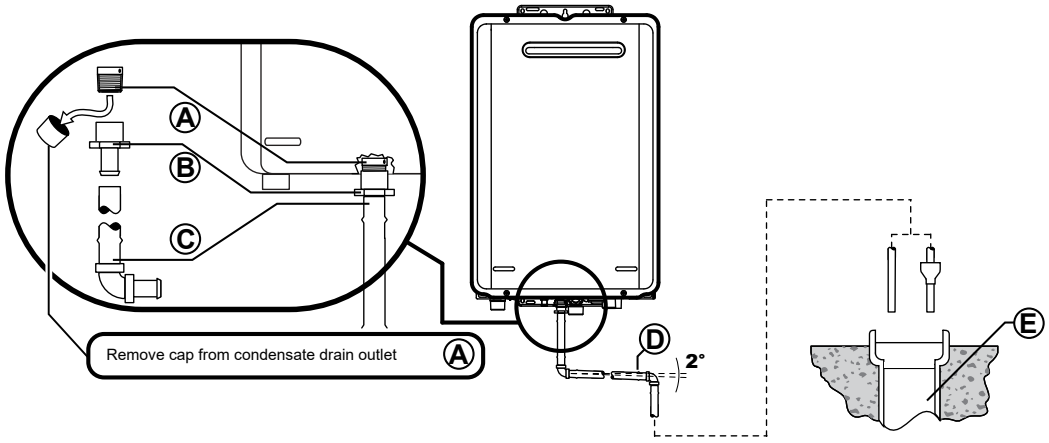
EF26 condensate neutraliser tank and drain

The Rinnai INFINITY EF26 water heater generates condensate continuously at a rate of up to 5 litres per hour as a by-product of a highly efficient gas burner. This condensate has been neutralised by having an inbuilt condensate neutraliser kit.

Important considerations for the neutraliser drain pipe
The content of AS/NZS 3500 ‘ Temperature / Pressure Relief and Expansion Control Valve Drain Lines’ has been used as a guide in preparing the information below.



A. Water heater drain outlet connection, R½” (15 mm) BSP male. Condensate / neutraliser drain outlet connection, ½” (15 mm) BSP male nylon.

N.B: The black plastic shipping cap MUST BE removed from the condensate / neutraliser drain outlet prior to water heater operation.

B. PE R½” BSP (15 mm) female to barbed irrigation system connector (13-19 mm) or equivalent plastic fitting[1].

C. Drain pipe and fittings to match B.

D. Continuous fall of at least 2° from water heater to discharge point. Lengths and bends in accordance with the table below.

Lengths and changes of direction				
Max. length (m)	9	8	7	6
Max. changes of direction greater than 45°	3	4	5	6

E. Suitable points of discharge are deemed to be drains, sewers or pits. DO NOT discharge onto electrical connections, earth stakes, copper pipes, concrete paths or into a pond.

Installation
The drain line MUST NOT discharge onto electrical connections, earth stakes, copper pipes, concrete paths or into a pond.

The point of discharge from each drain line shall be located so that the release of condensate / neutraliser does not cause a nuisance, is readily discernible and incurs no risk of damage to the building.

There shall be no tap, valve or other restrictions in any line.

Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray.

The end of the condensate line shall be:

- Not lower than 200 mm or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm, or higher than 300 mm above a gravel pit not less than 100 mm in diameter in a paved surface.
- Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of the drain line.

[1] Non-PE plastics will fail over time due to contact with the acidic condensate. Damage caused by installation of non-PE plastics will not be covered by warranty.

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Interconnection of condensate drain lines
Condensate / neutraliser drain lines from multiple water heaters may be joined together provided they conform with the requirements detailed on the previous page.

Common stack discharge
Where individual water heaters are installed in a multi-storey building, the condensate / neutraliser drain lines may discharge into a common stack, subject to the following:

- The discharge from the common stack is to a tundish, having a discharge line, that is not less than the size of the common stack, directly connected to a fixture trap, and installed in connection with any adjacent soil or waste stack.

- The discharge point of the common stack is such that any discharge is readily visible and will not cause any nuisance.

- The common stack is vented by extending the pipe upwards, above the roof level.

Tundish drain lines
The drain line from any tundish shall not be less than DN 20 or less than one size larger than that of the largest drain line discharging into a tundish. Tundish drain lines shall comply with the requirements detailed on the previous page.

Areas subject to freezing
In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 75 mm and not more than 150 mm measured from the outlet of the drain pipe to the rim of the tundish.

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Commissioning

AS/NZS 5601.1, clauses 2.6.8 and 6.11.2, states that every part of a gas installation shall be commissioned prior to initial use. It is the installer's responsibility to ensure all current AS/NZS 5601 requirements are met. The URL's provided are links to short videos on how key steps are performed.

The appliance operation must be tested after installation. Ensure the building occupants do not have access to the hot water outlets during this procedure.

Please note
The Rinnai INFINITY EF26 and A-Series come with a factory preset outlet temperature of 55 °C. The high and low gas operating pressures are also factory preset. Under normal conditions the operating pressures do not require adjustment during installation. Make adjustments ONLY if the unit is not operating correctly and all other possible causes for incorrect operation have been eliminated.

Inlet supply pressure to the appliance MUST BE checked and set within the operating parameters of the appliance in all instances.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

Commissioning steps

1	**Flush water pipes and gas line**	Before final connection of the water heater , flush the gas, hot and cold water supply lines. Swarf in the gas or water supplies may cause damage, a common problem, which is not covered by warranty.
2	**Connect the gas line**	
3	**Purge the gas line of air**	
4	**Final connection test**	
5	**Check supply pressure**	Operate ALL other gas appliances at their maximum rate. With all gas appliances on maximum the supply pressure must read between 1.13-3.0 kPa on Natural gas and on LPG 2.75-3.0 kPa. If the pressure is lower, the gas supply is inadequate and the appliance will not operated to specification. It is the installer's responsibility to check the gas meter, service regulator and pipe work for correct operation and sizing, and rectify as required.
6	**PCB settings checked**	Refer sideways flue diverter information on the next page and the PCB interface layout and functions page. PCB settings checked if the factory default temperature has been changed. Dip switch settings checked if a sideways flue diverter is fitted. Short video: http://rinnai.co.nz/007
7	**Operate and test for gas leaks**	Replace the appliance front cover otherwise the unit won't operate correctly, and operate and test for gas leaks using an electronic leak detector.
8	**Operational test**	Confirm the water flow and hot water delivery temperature using a thermometer. If water controllers are fitted, it is necessary to test their operation through the complete range of functions, refer separate instructions provided with the water controllers.

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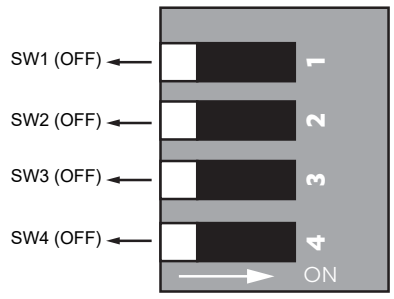
9	**Check cold water inlet filter**	Inspect and clean the water inlet filter. This may need to be repeated to ensure the filter remains clear, especially on new installations. Short video: http://rinnai.co.nz/006 If you feel the customer is capable of doing this check it would be beneficial to show them how to inspect and clean the water filter as well.
10	**Customer handover**	After testing is completed, explain to the customer the function and operation of the water heater and water controllers (if fitted). Also talk to them about: • The gas, power, and water connections • How frost protection works • Procedure for draining the water heater • Where to find the data plate • Maintenance and servicing If the customer is not there try and contact them by phone to discuss these important points. Ensure the installer details section is completed in the operation guide, the commissioning checklist has been completed and signed, and that the guide and checklist are left with the customer.

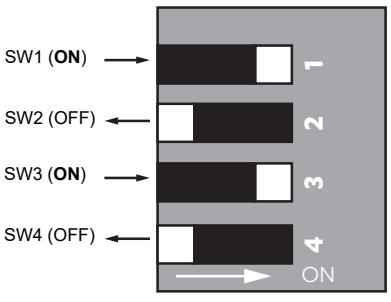
Sideways flue diverter dip switch changes

When delivered ex-factory, by default SW1, SW2, SW3, and SW4 of the DipSW are set to the OFF position.

If a sideways flue diverter is installed onto the water heater, SW1 and SW3 of the DipSW must be set to the ON position.



Default dip switch settings as they are ex-factory.



Dip switch settings required for a sideways flue diverter installation.

The dip switch change for a sideways flue diverter is required to increase the combustion fan speed, which helps overcome the friction losses from having a sideways flue diverter installed on the water heater.

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PCB interface and dip switch settings

The PCB interface and dip switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater of change the dip switch settings if fitting a sideways flue diverter.

WARNING Care must be taken when changing the temperature or dip switch settings as they can be easily switched or bumped into the wrong position. Fully check the operation of the water heater before leaving including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or something similar.

Rinnai will accept no liability for issues arising out of the use of this information.

If you have any doubts about the performance of the water heater, please contact Rinnai by phoning 0800 RINNAI (0800 746 624).

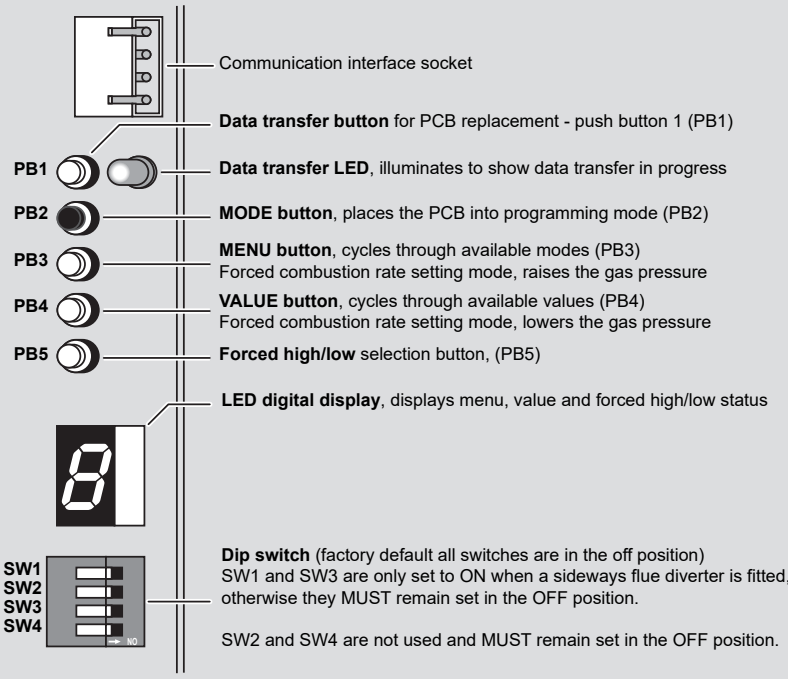
The following information details settings for the Rinnai INFINITY EF26 and A-Series models only. They are not applicable for other models.

Basic operation of the PCB interface

- To place the PCB into programming mode press PB2 until the LED digital display shows 1, noting that the current set value will be displayed shortly afterwards.
- To alter a value press PB4, each press of the button will select the next available value.
- To change to another menu, press PB3, each press of the button will select the next available menu.
- To exit the programming mode and save the selected settings press PB2 until the LED display goes blank.

Note:

- If no buttons are pressed the PCB will automatically exit programming mode after 10 mins.
- Exiting programming mode sets the value last viewed as the current value.



EF26 error code 92

Neutraliser alert will flash when the total calorific value reaches 255 GJ, approximately 16 years of residential use. Water heater can still work, but the condensate trap should be changed.

To cancel the error code, press PB4 and PB5 together and hold for more than five seconds.

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Menu	Menu description	Value							
		A	b	C	d	E	F	H	J
1	Gas type	ULPG	NG	N/A	N/A	N/A	N/A	N/A	N/A
2	Model	2626	2426	2024	1620	N/A	N/A	N/A	N/A
3	Fixed / Max. temp	55 °C	65 °C	60 °C	50 °C	42 °C	40 °C	N/A	N/A
4	OFF water flow rate	+ 3 °C	+ 6 °C	N/A	N/A	N/A	N/A	N/A	N/A
5	50 °C delivery adjustment temp.	0	N/A to NZ—Australian models only					+1 °C	+2 °C
6	Remote controller safe program	ON	OFF	N/A	N/A	N/A	N/A	N/A	N/A
7	OHS	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A
8	**EF26 only** Condensation prevention on manifold	Default							
9	**A24/A26 only** Fan revolution	180 Hz	100 Hz	Setting change to reduce fan noise if customer states unit is too noisy (Ver. 7, PCB label G)					
0	Post fan time	65 sec	120 sec	240 sec	480 sec	To reduce the HEX temp. after combustion			

If the settings are changed, please note these on this sheet for future reference. These will be needed if a PCB replacement is required and a manual data transfer is needed.

Dark shaded sections = default setting

Parameter setting notes

- 2: Values in Menu 2 cannot be adjusted.

- 4: Menu 4 OFF water flow rate
  The temperature of the outgoing hot water is monitored by a built-in sensor. If the temperature of the outgoing hot water rises more than 3 °C (default, or 6 °C if 4b) above the selected temperature shown on the digital monitor or the preset limit when water controllers are fitted, the burner will automatically go out.

- 6: Menu 6 Remote controller safe program
  Factory default is ON. If a controller has been continuously connected for more than six hours, the PCB automatically defaults to controller only mode, making the assumption that the water heater will always be connected to and operated by a controller. This means if a controller is disconnected, the inbuilt safe program will only allow the unit to deliver a maximum temperature of 42 °C. If this safe program is not needed, change menu 6 from A (ON) to b (OFF).

- 7: OHS for solar applications
  N/A for New Zealand models, this is for Australian models only that have different temperature settings. Please remember that the A-Series and the EF26 are not suitable and will not be warranted for solar applications.

- 8: Prevention of condensation on the manifold (EF26 only)
  If exhaust gases go back into the combustion chamber, condensation on the manifold nozzle causes error 11. To prevent this, the post-fan time (fan revolution after combustion) can be controlled as follows.

8	Prevention of condensation on the manifold	A	b	C	d
	Post fan time	Outside temp. > 15 °C → 15 sec. Outside temp. ≤ 15 °C → 120 sec.	15 sec	240 sec	480 sec
	Post fan revolution	X (Hz), X depends on the model, e.g. 180 Hz	X (Hz)	X(Hz) + 50 Hz	X(Hz) + 50 Hz

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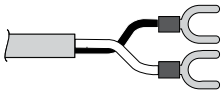
A-Series controller communication cables

Wired water controllers operate at an extra low voltage (12 V DC) which is supplied from the water heater, a 10 m long communication cable is supplied for connection to the water heater. Only Rinnai supplied communication cables may be used.

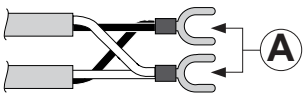
The water heater end of the cables is fitted with spade terminals. Only two pairs of cables (four spade connectors in total) may be terminated. When attaching three or four cables it is necessary to join the cable terminators as shown below.

For each pair cut off the existing spade connectors and re-terminate each pair into a new spade connector (A). Spade connectors are available from your local electrical component retailer

Single cables can be used when terminating up to two communication cables.



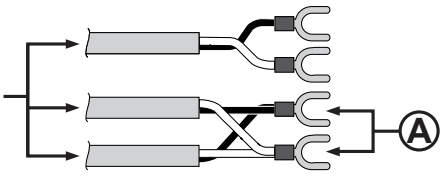
Paired cables are to be used when terminating three or four communication cables.



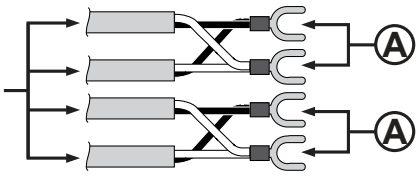
Connecting one or two communication cables
Follow steps one through five below to terminate the cables to the water heater.

Connecting three or four communication cables
To connect three or four cables, separate all the cables to be fitted into pairs.

When terminating three cables



When terminating four cables



Follow steps one through five below to terminate the joined cable pairs to the water heater.

1. Isolate the power supply by switching the power point off and removing the power plug of the water heater from the electric power socket.

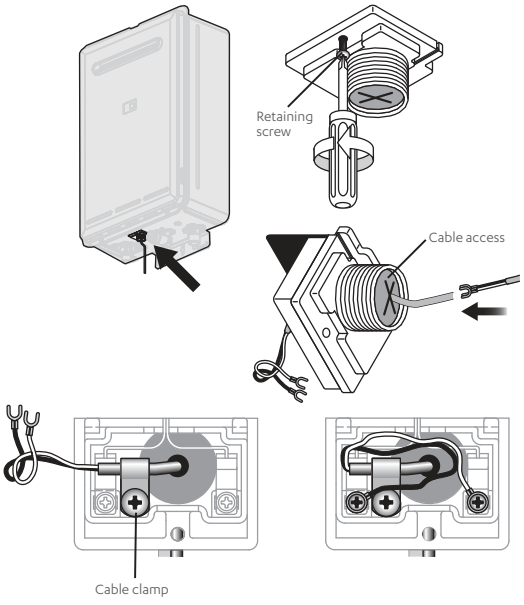
2. Removing the retaining screw of the cable connector at the base of the unit.

3. Swing the cable connector door open and thread the cable through the weather seal of the cable access hole, allowing sufficient cable length so that the sheath of the cable can be secured with the cable clamp supplied with the transceiver.

4. Loosen the screw terminals and connect the cable spade connectors to these terminals and re-tighten.

   Polarity is not important, either wire colour can be connected to either terminal.

5. Return the cable connector to the original position, taking care not to damage the cable wires in the process, and replace the retaining screw.



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EF26 controller communication cables

Wired water controllers operate at an extra low voltage (12 V DC), which is supplied from the water heater. A 10 m long communication cable is supplied for connection to the water heater. Only Rinnai supplied communication cables may be used.

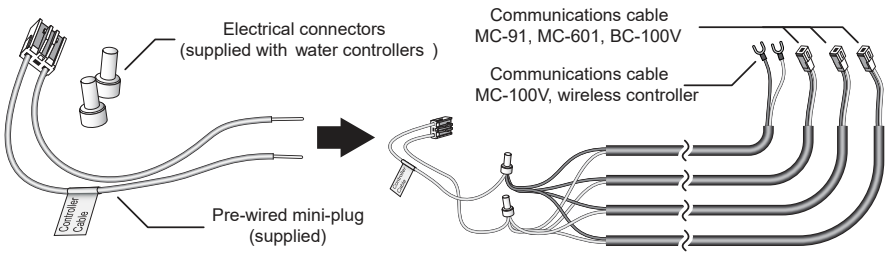
Connecting communication cables to the mini-plug

CAUTION

DO NOT attempt to connect water controller cables to the mini-plug when it is plugged into the PCB unless the power to the water heater is switched OFF, otherwise damage to electrical components may occur.

Water controllers are connected to the PCB by a dedicated pre-wired mini-plug.

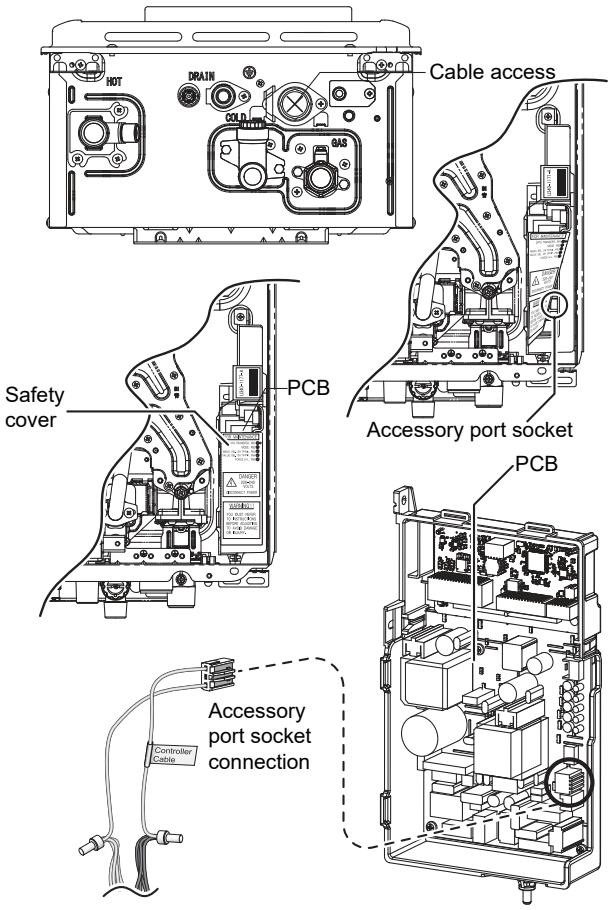
Standard electrical cable connectors can be used to terminate the water controller wires to those on the mini-plug. The existing spade connectors, of the communication cables, will need to be removed prior to termination. Controllers are not polarity sensitive, however to avoid confusion it is recommended that like coloured wires be terminated together.



Connecting communication cables to the PCB (refer image below)

DO NOT attempt to connect the mini-plug or water controller cables to the water heater unless the power to the water heater is switched OFF, otherwise damage to electrical components may occur.

1. Isolate the power supply by switching the power point off and removing the water heater plug from the power socket.
2. Remove the front cover of the appliance.
3. Insert the mini-plug and the connected water controller cables through the cable access at the base of the appliance. Ensure the cable connectors are located inside the appliance for protection.
4. Locate the PCB (bottom right of the appliance), and carefully move the plastic safety cover out of the way.
5. Locate the accessory port socket (bottom front of PCB).
6. Plug the mini-plug into the accessory port socket, the plug and socket are keyed so that they can only be plugged into the one direction).
7. Proceed with the water controller installation and connect the communication cables to the controllers.



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Rinnai.co.nz

Installation guide

Tel: 0800 746 624
http://www.youtube.com/rinnainz
http://facebook.com.rinnainz

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Rinnai

INFINITY EF26
Product technical statement

A product technical statement is a way to show how a product or system is fit for purpose for use in New Zealand and to demonstrate compliance with the New Zealand Building Code (Building Code Amendment Act 2013).

Product description
Designed and made in Japan, the Rinnai INFINITY EF26 is a gas condensing continuous flow water heater with inbuilt frost protection. It has electronic ignition and requires electricity to operate.

The temperature dip switch setting is factory preset to 55 °C. Model selection is based on the application.

Scope of use
Suitable for mains and medium pressure residential applications only. The INFINITY EF26 is designed to be externally mounted on an outside wall and located as close as practicable to the most frequently used hot water outlets to reduce the delay for hot water delivery.

They are not suitable as a spa or swimming pool heater, for hydronic applications, or for commercial applications. They are also not suitable as a gas boost for solar installations as the temperature cannot be set high enough.

Hard or acidic water will need to be treated to use this product.

Available for connection to natural gas or LPG, this must be specified at the time of purchase.

Flue terminations must comply with the flue terminal locations shown in AS/NZS 5601.1.

Design guidelines
Specification and installation must be in accordance with Rinnai installation requirements and with the Building Code.

Rinnai specify that installation must be in compliance with AS/NZS 5601.1:2013, AS/NZS 3000:2007, and AS/NZS 3500.

Quality assurance
- ISO 9001 Certified System
- ISO 14001 Certified System

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC201209 12/01/2021 Michaelmo

ISO 9001

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Rinnai

INFINITY EF26
Product technical statement

Compliance with the NZ Building Code
If specified, installed and maintained in accordance with all Rinnai requirements the INFINITY EF26 will comply with the below provisions of the NZ Building Code. AS/NZS 5601.1 is an acceptable solution within the NZBC for gas installations as per NZBC G11/AS1 9.0.1.

CODE CLAUSE	EVIDENCE OF COMPLIANCE
B1 Structure	
B1.3.1 B1.3.2 B1.3.3 (a,b,c,h,m)	Certified to AS/NZS 5263.1.2:2016 / AS/NZS 4552, a series of standards for safety, performance and energy efficiency in gas fired water heaters for hot water supply and/or central heating.
B2 Durability	
B.2.3.1 (c)	Durability testing and in-service history
C2 Prevention of fire occurring	
C2.2 and C2.3	Certification of continuous flow gas water heaters to AS/NZS 5263.1.2:2016 / AS/NZS 4552
E2 External moisture	
E2.3.2	Achieved by following E2/AS1
G4 Ventilation	
G4.3.3 (f,i)	Achieved as long as the building complies with G4/AS1
G9 Electricity	
G9.3.1 (a,b,c,d,f), G9.3.3	G9/AS1 as required by Rinnai installation guidance
G10 Piped services	
G10.3.2, G10.3.3, G10.3.4, G10.3.5, G10.3.6	G10/AS1 (NZS 5422 Natural Gas) and (NZS 5435 LPG)
G11 Gas as an energy source	
G11.3.1, G11.3.2, G11.3.3, G11.3.4	G11/AS1 (AS/NZS 5601.1) as required by Rinnai installation guidance
H1 Energy efficiency provisions	
H1.3.4	Certification of continuous flow gas water heaters to AS/NZS 4552.2* (Minimum energy performance standards for gas water heaters)

* Some provisions of the AS/NZS 5263.1.2:2016 apply to Australia only (e.g. thermal efficiency), which is why we have noted the equivalent AS/NZS 4552 standard.

Additional evidence to support the above statements
Energy Safety Supplier Declaration of Compliance:
- INFINITY EF26: 1923220199

Special conditions: Installation requirements
Full appliance information can be found at www.rinnai.co.nz.

Limitation: To be installed in accordance with all Rinnai installation requirements and by a licensed gasfitter/plumber, and electrician. Upon completion of the installation, a final inspection and test to demonstrate that the gas appliance has been installed in accordance with Rinnai's instructions and in accordance with Gas (safety and measurement) Regulations 2013 is required by the installer. The gasfitter is to issue a certificate of compliance.

Special conditions - maintenance requirements
For reliable operation Rinnai INFINITY units, in residential applications, should be serviced every two years. Installation, servicing and repair shall be carried out only by authorised personnel.