WHANGANUI
DISTRICT COUNCIL
Te Kaunihera a Rohe o Whanganui

IMPORTANT NOTE

These documents are required to be onsite for all inspections and must be a complete and full copy of the WDC stamped “Approved” documents.

Failure to have a full and legible set of documents may result in a terminated inspection. A terminated inspection will incur additional charges.

Bcon22/0511 - WDC Approved Plans - 16/09/2022

101 Guyton Street
P O Box 637, Whanganui
Phone: (06) 349 0001
Fax: (06) 349 0000
Email: wdc@whanganui.govt.nz
Web: www.whanganui.govt.nz

WHANGANUI DISTRICT COUNCIL
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INSPECTION RECORD

This record, together with the Building Consent and approved plans, is to remain on the construction site at all times.

Project Location	***TO BOOK AN INSPECTION PLEASE PHONE WDC BUILDING CONTROL ON 349 0001 AND QUOTE THE FOLLOWING APPLICATION NUMBER:***	***BCon22/0511***
55 Tawhero St WHANGANUI		
Description of Work	**Construct a dwelling with attached garage.**	

Applicant	G J Gardner Homes Ltd PO Box 695, Whanganui Mail Centre, Whanganui 4541

SUMMARY OF CONDITIONS

Building Consent Number BCon22/0511

PIM Conditions

Code	***Condition***
	All work on the project must comply with the requirements of the NZ Building Code.
	A PIM only document is not an approval to build. A Building Consent is required before building work commences.
	W.D.C will follow up on building work not completed within two years of building consent issue.
	A Building Consent lapses and is of no effect if the building work has not been started within 12 months of the date of issue.
	If the building is public premises it may not be occupied until either a code compliance certificate or certificate for public use has been issued.
	Please note [Electrical, and Gasfitting subtrades do not form part of the building consent inspection process. However, Council is required to receive 'Energy Certificates' from both of these trades before issue of a Code Compliance Certificate].
PIMconnect	Existing sanitary sewer connection at 0.59m off the left han dboundary (0.84m deep). Existing water connection at 1.4m off the left hand boundary. Stormwater disposal to on site soakage.

Building Consent Information

Code	***Information***

Your project's inspections are listed on the next page...

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Please Note: A minimum of 48 hours notice is required for the booking of an inspection. The inspection record sheet and accompanying building consent documentation must be on site for use by the inspector at the time of the inspection.

All inspections are to be carried out by BCA Building Inspectors unless prior arrangements have been made by the BCA to have an approved qualified person inspect specific items (eg. Engineer). Inspections shall be carried out in accordance with the attached schedule of inspection types. It is the owner's responsibility to ensure all necessary inspections are carried out as required. Please contact WDC if you are unsure what requires inspection – do not cover or enclose any building work without inspection.

Note: Further inspections may incur additional cost at time of Code Compliance Certificate issue.

Inspections Record For Building Consent Number BCon22/0511

Inspection	*When to Request*	*Date*	*Inspector*	*Complies with Code*	*Reinspect*	*Notes*		
CONCRETE SLAB INSPECTION	Prior to placing Concrete					Inspection and certification by a suitably qualified engineer is required for the site remediation as per the Geotechnical Report - this is to be supplied to the WDC inspector prior to pouring concrete.		
FRAMING INSPECTION	When all framing is complete.							
BRICK MASONRY INSPECTION	When bricks have been laid to sill height.							
EXTERIOR CLADDING PRELINE INSPECTION	Before covering up					Inspection of external ply bracing.		
BUILDING PRELINE INSPECTION	Before Internal linings are fixed.							
POST LINE INSPECTION	To inspect fixings. Prior to covering up.							
PLUMBING SUBFLOOR INSPECTION	Before covering up							

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PLUMBING PRELINE INSPECTION	Before covering up							
SANITARY DRAINS INSPECTION	Before backfilling drains							
STORMWATER DISPOSAL INSPECTION	Before backfilling drains							
FINAL BUILDING AND PLUMBING COMBINED INSPECTION	On Completion							
CONSTRUCTION REVIEWS (NO INSPECTION)	On Completion					Once the final inspection has been completed please apply for your Code Compliance Certificate and supply the following information: (Please note that the Code Compliance Certificate can be applied for online at www.whanganui.govt.nz) Memorandum of Restricted Building Work (RBW) for all required trades. As-Built Drainage plan. Energy certificate/s.		

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BUILDING CONSENT NUMBER BCon22/0511

Section 51, Building Act 2004

The building:

Street address of building:	***Legal description of land where building is located:***
55 Tawhero St WHANGANUI	Lot 24 DP 569376 0.0659 Ha
Building name:	***Location of building within site/block number:***
Level/unit number:	
1.000000	

The owner:

Name of Owner:	
Mr B Vijayan, Mrs S Sekharath	
Mailing address:	***Street Address/registered Office:***
45 Oxford Road Springvale Whanganui 4501	45 Oxford Road Springvale Whanganui 4501

Phone numbers:

Landline:		***Mobile:***	0224180588
Daytime:		***After hours:***	
Facsimile number:			
Email address:		***Website:***	

First point of contact for communications with the building consent authority:

Contact Person:	
G J Gardner Homes Ltd	
Mailing address:	***Street Address/registered Office:***
PO Box 695, Whanganui Mail Centre, Whanganui 4541	PO Box 695, Whanganui Mail Centre, Whanganui 4541

Phone number:

Landline:		***Mobile:***	0272460668
Daytime:		***After hours:***	
Facsimile number:			
Email address:		***Website:***	

Building Work

The following building work is authorised by this consent

Project
Construct a dwelling with attached garage.

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Intended Use	***Intended Life***
Single Detached Residential	50+ Years
Estimated Value ($)	
$484450.00	

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 of 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.

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CONDITIONS OF BUILDING CONSENT NUMBER BCon22/0511

Section 51, Building Act 2004

This Building Consent is issued Subject to the following conditions:

Building Act 2004, Section 90:

Inspections by Building Consent Authorities

Agents authorised by the building consent authority 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.

Compliance Schedule:

A compliance schedule (CS) is not required for this building.

‡Attachments

‡Copies of the following documents are attached to this building consent:
‡Project information memorandum number BCon22/0511
‡Inspection record
‡Informative notes

Signed for and on behalf of the Whanganui District Council

GJ Hoobin
Building Control Manager

Date: 16 September 2022

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BUILDING CONSENT NUMBER BCon22/0511

Informative notes:

- The Building Consent, conditions, inspection sheet, and approved plans must be kept on site at all times until completion of the project.
- Failure to request inspections will risk the non-issuing of a code compliance certificate and the structure may be deemed non-complying.
- Any inspection time required over and above that allowed may incur a further charge.
- Under Section 52, a building consent lapses and is of no effect if the building work to which it relates is not commenced within 12 months after the date of issue.
- Under Section 93, if the owner has not made application within 24 months, the BCA (Building Control Authority), must decide whether or not to issue a CCC (Code Compliance Certificate).

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PROJECT INFORMATION MEMORANDUM NUMBER BCon22/0511

Section 35, Building Act 2004

G J Gardner Homes Ltd
PO Box 695
Whanganui Mail Centre
Whanganui 4541

Project Location	***Assessment Number/Legal Description***
55 Tawhero St WHANGANUI	Lot 24 DP 569376 0.0659 Ha
Category	***Description of Work***
General Building Consents	Construct a dwelling with attached garage.
Intended Life	***Estimated Value ($)***
50+ Years	484450.00

This Project Information Memorandum is confirmation that the proposed work may be undertaken, subject to the provisions of the Building Act 2004 and any requirements of the Building Consent (number BCon22/0511), which has been granted.

This Project Information Memorandum is subject to the following conditions:

- **Existing sanitary sewer connection at 0.59m off the left hand boundary (0.84m deep).**
- **Existing water connection at 1.4m off the left hand boundary.**
- **Stormwater disposal to on site soakage.**
- **All work on the project must comply with the requirements of the NZ Building Code.**

Signed for and on behalf of the Whanganui District Council

GJ Hoobin
Building Control Manager **Date**: 16 September 2022

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WHANGANUI DISTRICT COUNCIL
Te Kaunihera a Rohe o Whanganui

8 September 2022

G J Gardner Homes Ltd
PO Box 695
Whanganui Mail Centre
Whanganui 4541

Dear Applicant

First Request for further information on Application.

Project Number:	**BCon22/0511**
Project Location:	**55 Tawhero St WHANGANUI**
Project Description:	**Construct a dwelling with attached garage.**

The above application has been assessed and further information is required in order for Council to be satisfied on reasonable grounds that the proposed building work meets the requirements of the Building Act and Building Code.

Please supply the answers to the questions below in a specific covering letter cross-referencing our questions and ensure that the altered drawings are also cross-referenced and have appropriate **'clouding'** or **highlighting** etc. to clearly identify changes. All **RBW** questions **MUST** be addressed by the **LBP** responsible for the design and confirmation of this supplied. Please ensure that you quote this Project Number BCon22/0511 on all changes made to the documents.

Council has also undertaken a check for compliance with Council's District Plan, bylaws and other legislation. Based on this assessment the following information is requested.

1. The Redjacket geotech report LTR-3485-B-02 notes that the soil conditions on this property are not good ground, review the Remediation Design noted on Sheet 4 and provide details of the option to be used.
   Refer to letter from Red Jacket Engineer.
2. Show the location of Brace Element P3 on the bracing plan.
   Refer to updated drawing sheet A07
3. Specify the glazing to the showers, Grade A safety glass is required by NZS 4223:2016.
   Refer to updated drawing sheet A04
4. Provide engineers design of the soak pit as noted & detailed on Sheet A03.
   Refer to letter and soakage calculations from Red Jacket Engineer.

We appreciate the importance of your application. On receipt of the requested information we will endeavour to process your application without delay. Please send your response to onlinebcapps@whanganui.govt.nz
This information requires to be supplied within **two** months from the date of this letter or this consent maybe refused without further notice.
Should you have queries regarding the above requested information please contact the officer referenced at the end of the requested item or contact this office and quote your Project Number **BCon22/0511**.

Yours sincerely

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Kim Glentworth
Building Control Technical Officer

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RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**1026491**
Land Registration District	**Wellington**
Date Issued	10 February 2022

Prior References
WN39D/108

Estate	Fee Simple
Area	659 square metres more or less
Legal Description	Lot 24 Deposited Plan 569376

Registered Owners
Bibin Vijayan and Sandhya Sekharath

Estate	Fee Simple - 1/5 share
Area	379 square metres more or less
Legal Description	Lot 41 Deposited Plan 569376

Registered Owners
Bibin Vijayan and Sandhya Sekharath

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 27B State-Owned Enterprises Act 1986 (which provides for the resumption of land on the recommendation of the Waitangi Tribunal and which does not provide for third parties, such as the owner of the land, to be heard in relation to the making of any such recommendation)

Subject to Section 3 Geothermal Energy Act 1953

Subject to Part IV A Conservation Act 1987

Subject to Sections 6 and 8 Mining Act 1971

Subject to Sections 5 and 261 Coal Mines Act 1979

Subject to Section 241(2) Resource Management Act 1991 (affects DP 569376)

12350266.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 10.2.2022 at 12:17 pm (affects Lot 24 DP 569376)

Subject to a right (in gross) to convey electricity over Lot 41 DP 569376 marked O on DP 569376 in favour of Powerco Limited created by Easement Instrument 12350266.8 - 10.2.2022 at 12:17 pm

Fencing Covenant in Transfer 12406703.1 - 30.3.2022 at 3:05 pm

12406703.2 Mortgage to ASB Bank Limited - 30.3.2022 at 3:05 pm

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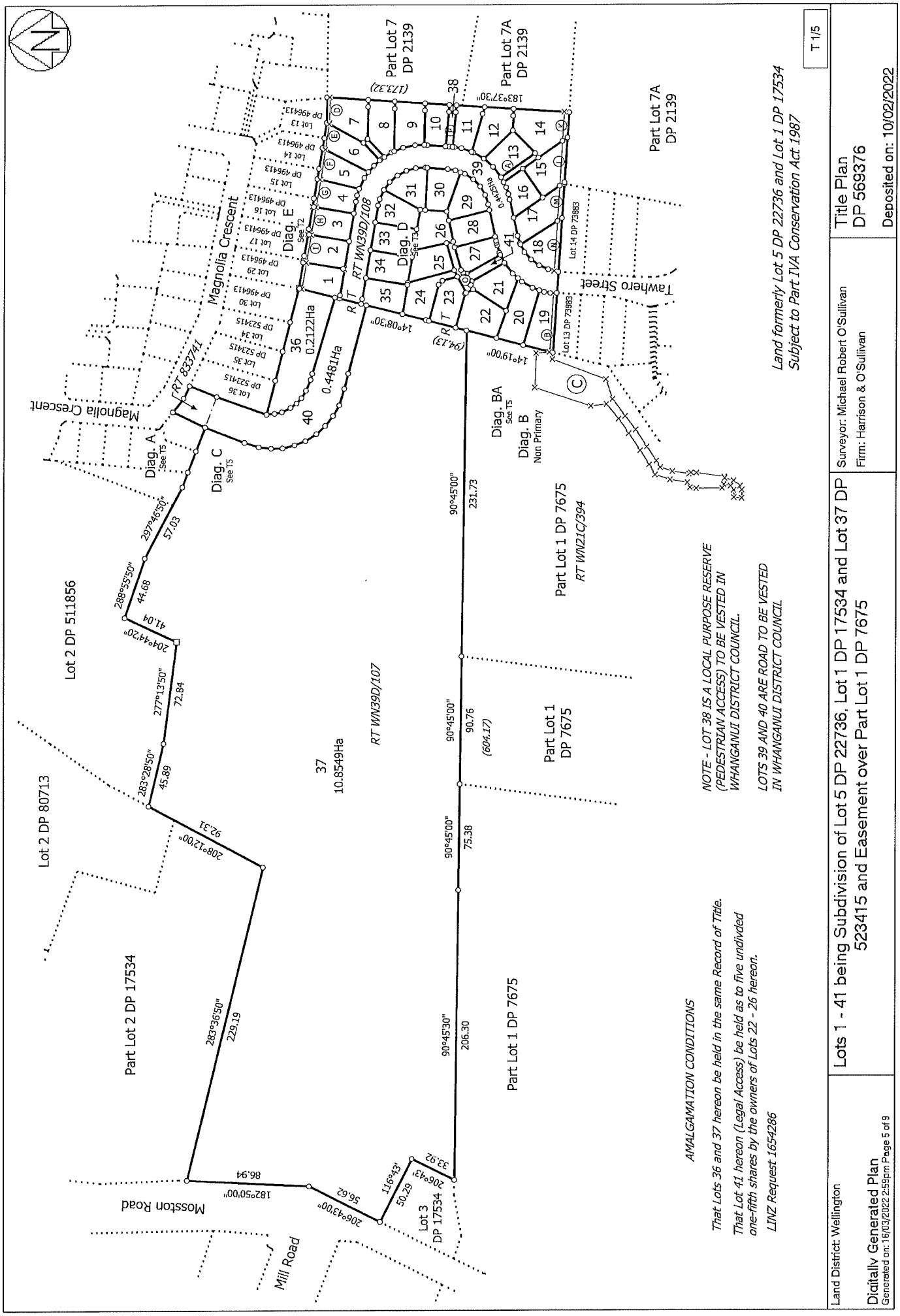

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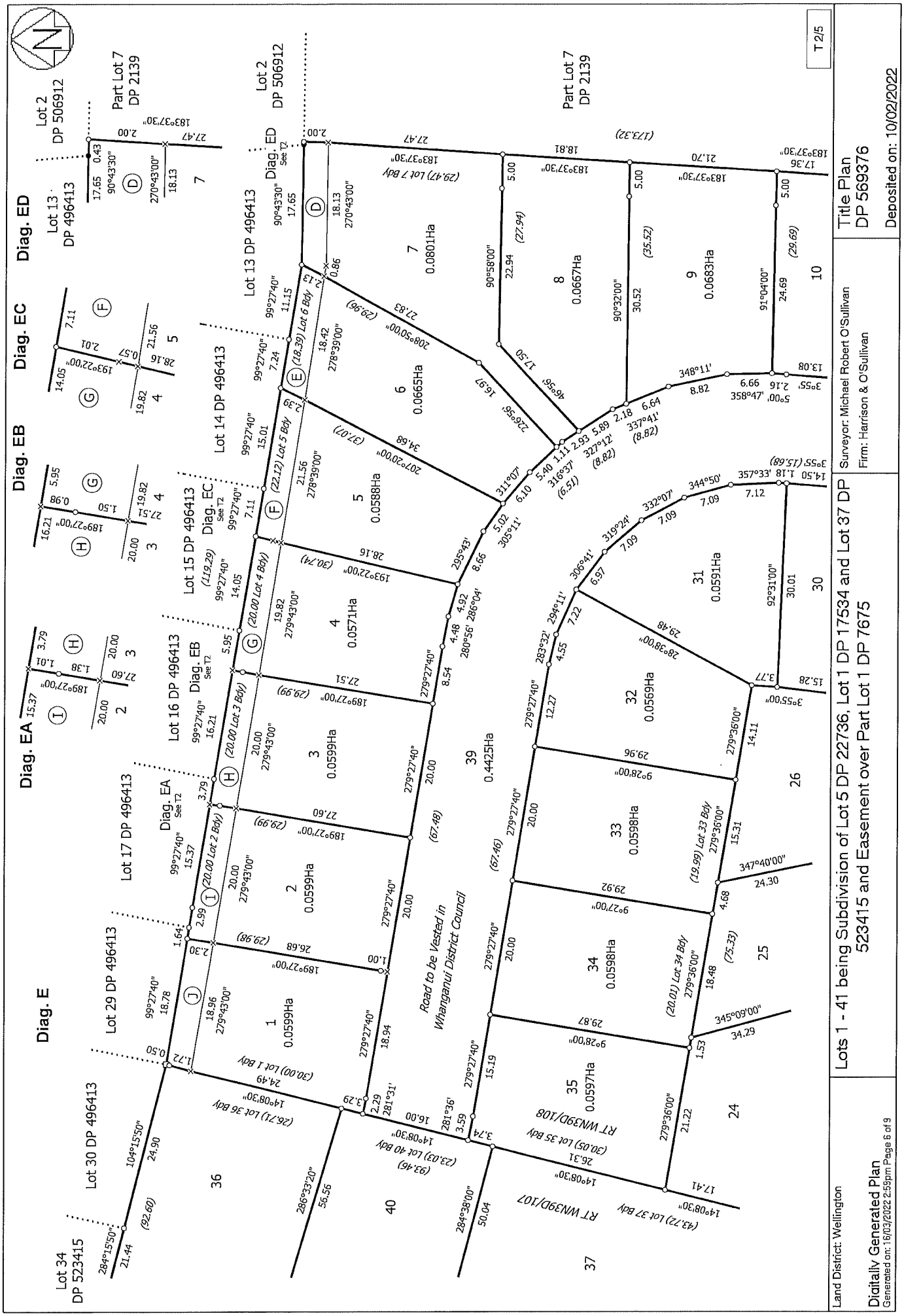

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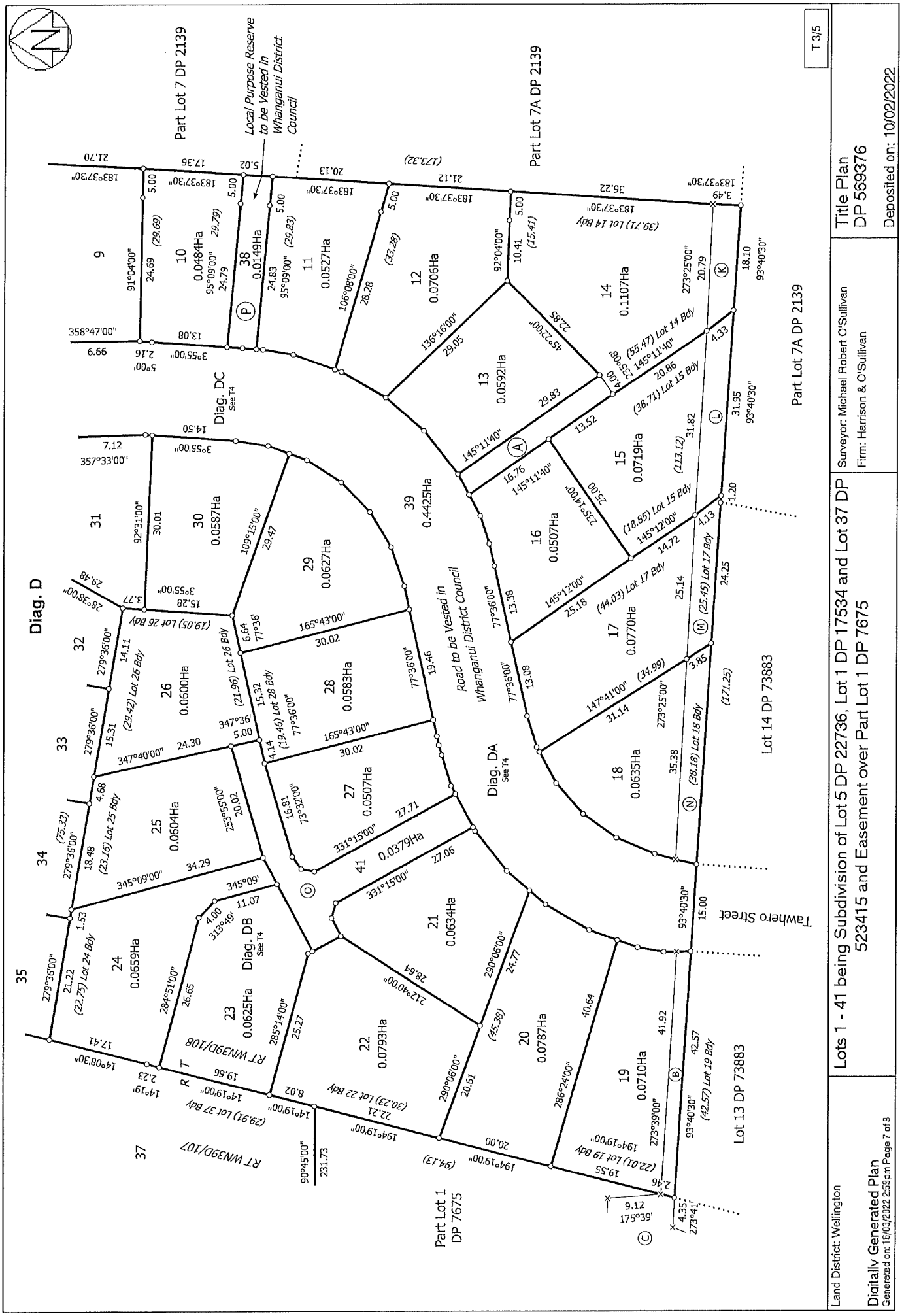

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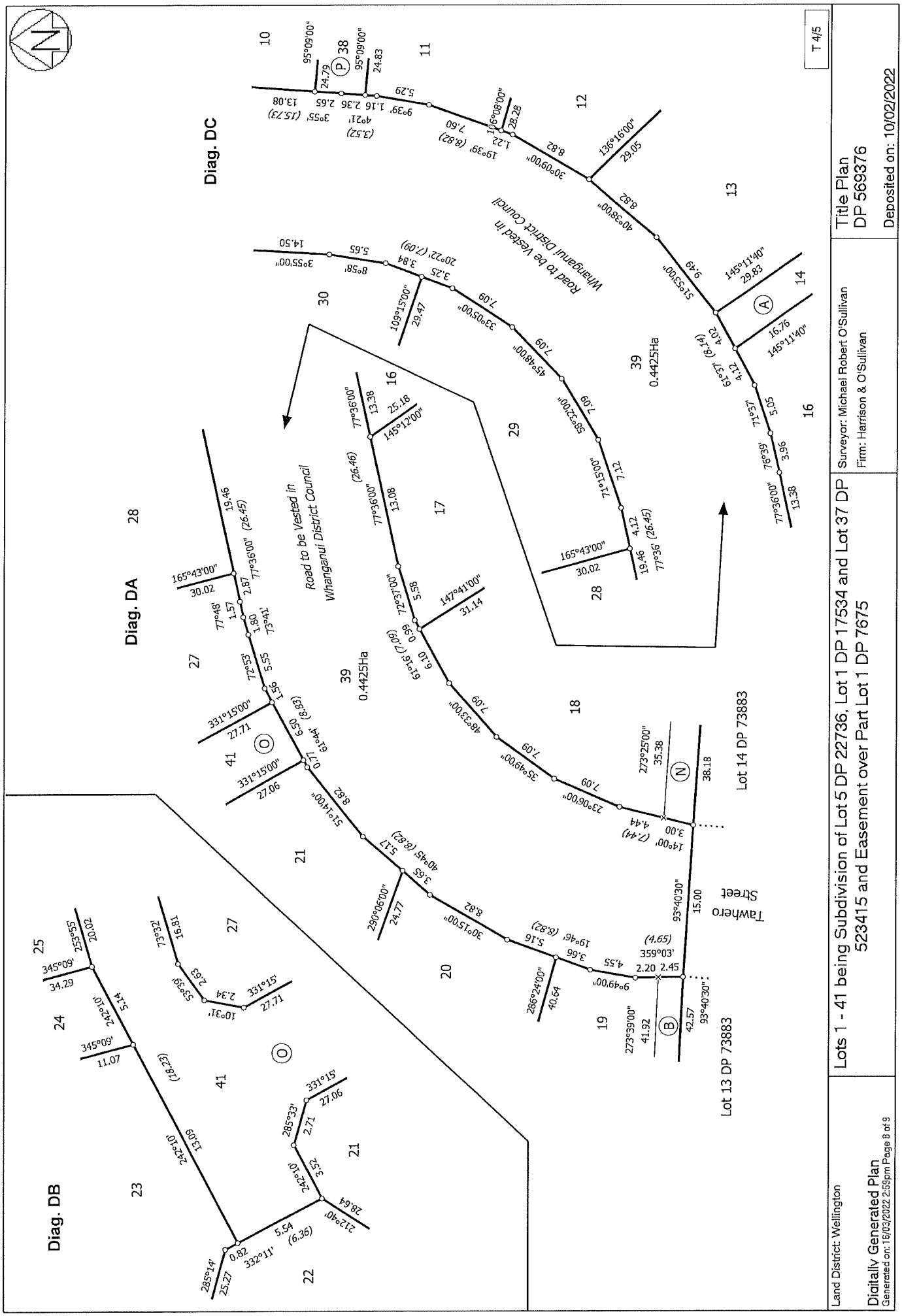

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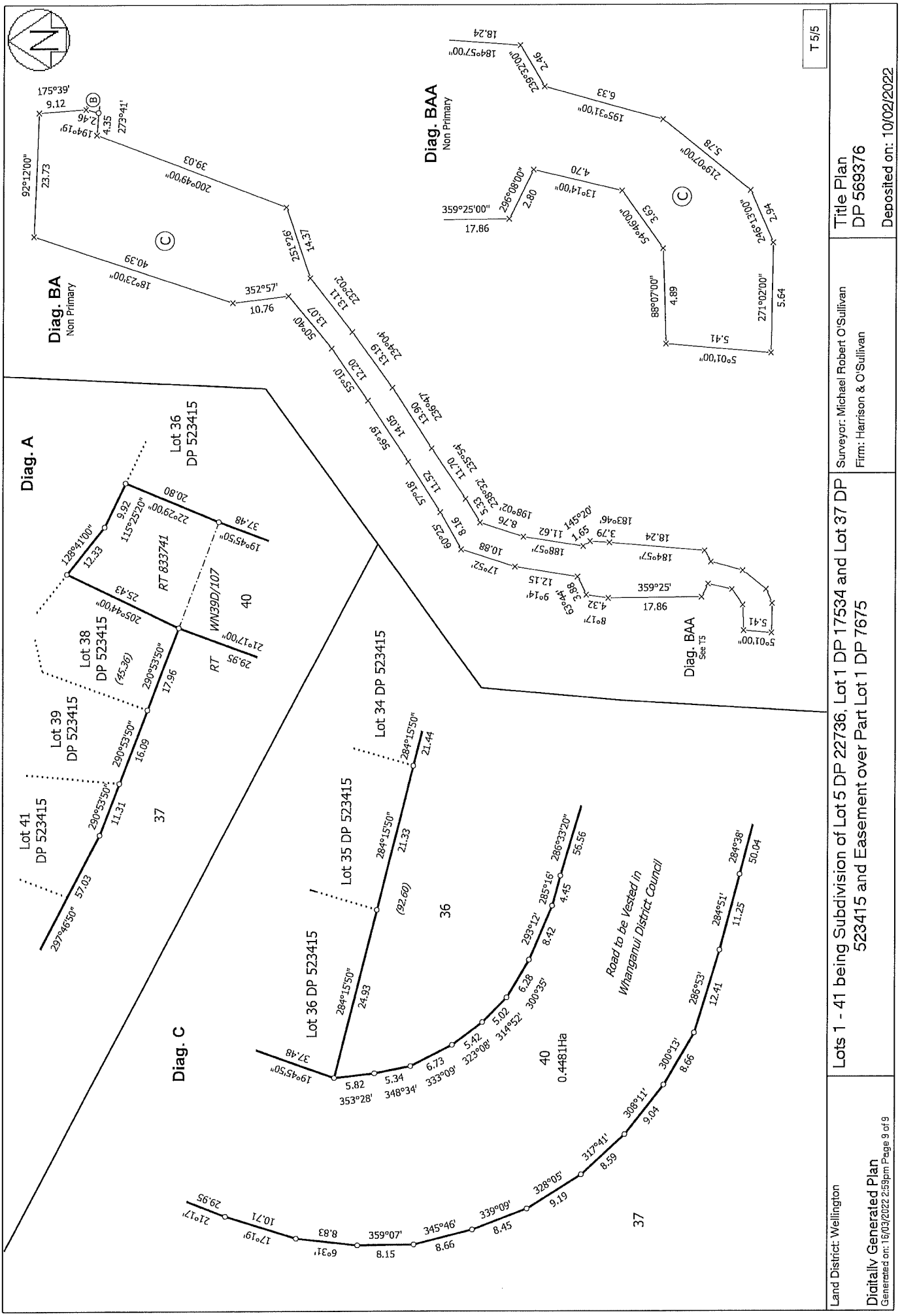

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A SIGLEY DEVELOPMENTS LTD, 30 TAWHERO STREET, 86 MOSSTON ROAD, 45 MAGNOLIA CRESCENT, WHANGANUI: LT 569376

CERTIFICATE PURSUANT TO SECTION 221 OF THE RESOURCE MANAGEMENT ACT 1991

The Wanganui District Council has granted a Resource Consent under the Resource Management Act 1991 to A Sigley Developments Limited being a subdivision of Record of Titles 833741, WN21C/394, WN39D/107, WN39D/108 (Council Ref: Sub20/029).

Lots 1 - 35 are subject to the following conditions:

"1. All future occupants of the lot shall not discharge to the stormwater network or the street any products (e.g. moss or mould removers) which may be harmful to the environment.

2. Development on the lot shall achieve hydrological neutrality.

3. Refer to Table 4 – 1 'Engineering Schedule' of the Geotechnical Completion Report for Magnolia Crescent/Tawhero Street Subdivision, Tawhero Street, Whanganui (RPT-3485-03) prepared by Red Jacket dated December 2021 and held in Council Subdivision File Sub20-029 labelled 'Earthwork completion report-3485-03 Rev A' for conditions around building platform and stormwater and overland flow path requirements."

This consent notice shall be registered as appropriate against the Record of Titles for Lots 1 - 35 in terms of the Land Transfer Act 2017.

Dated at Whanganui this 20th day of December 2021.

Carolyn McIntyre
Senior Planner
(Acting Pursuant to a delegated authority from the Principal Administrative Officer)

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G.J. Gardner HOMES

Michelle Christison <michelle.christison@gjgardner.co.nz>

Re: Council Authorisation

1 message

Bibin Vijayan <bibinvijayan9@gmail.com> 28 July 2022 at 14:41
To: Michelle Christison <michelle.christison@gjgardner.co.nz>

Yes, please go ahead. We are giving you authority to act on our behalf
Thanks
Bibin Vijayan & Sandhya Sekharath

On Thu, 28 Jul 2022 at 2:32 PM, Michelle Christison <michelle.christison@gjgardner.co.nz> wrote:

> Good Afternoon
>
> I am in the process of submitting your plans to the council but they need to see that you give Castle Homes Wanganui permission to act on your behalf to apply for the building consent.
>
> Can you please reply back to this email to say you give me authorisation to act on your behalf.
>
> *Regards*
> ***Michelle Christison***
>
> Administrator | Castle Homes Wanganui Ltd – Whanganui Franchisee for G.J. Gardner Homes
> Ph: (06) 345 3563 | Web: www.gjgardner.co.nz
>
> G.J. Gardner HOMES
>
> This email, including attachments, may contain information which is confidential or subject to legal privilege or copyright. If you are not the intended recipient, please notify us immediately and then please delete all copies of this email from your system. You must not use, disseminate, distribute or reproduce this email, any attachments, or any part thereof if you are not the intended recipient.
>
> Email communications are not secure and are not guaranteed by us to be free of unauthorised interference, error or virus. Anyone who communicates with us by email is taken to accept this risk. To the maximum extent permitted by law we are not liable for any virus or other defect in this email or in any attachment (or for any unauthorized changes made to or other interference with this email or to any attachment).
>
> Please note that this communication does not designate an information system for the purposes of the Electronic Transactions Act 2002.

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Infrastructure Bond and Acceptance of Liability Agreement

Streets Infrastructure Bylaw 2015
Form IG-001

WHANGANUI DISTRICT COUNCIL
Te Kaunihera a Rohe o Whanganui

Agreement details

Building Consent ✓ **Resource Consent** ◯ *(Please tick)*

I Michelle Christson
(applicant's full name)

Castle Homes Wanganui
Company name (if applicable)

of 53b Wilson Street Wanganui
(address of applicant)

06345 3563 *Phone*

michelle.christson@gjgardner.co.nz *Email*

give notice that I will be undertaking work at:

55 Tawhero St Wanganui
(address of where work is to be carried out)

and that I agree to abide fully with the following conditions:

1. Prior to any work being undertaken I will request Council to undertake an initial inspection of its infrastructure assets located in the road corridor to identify any pre-existing damage;
2. At the completion of the scheduled work I will request Council to undertake a final inspection of its infrastructure assets to determine whether any damage has occurred since the initial inspection;
3. To take responsibility for the building related care of infrastructure assets for the duration of the above building and/or resource consents;
4. To pay a non-refundable inspection and administration fee of **$200.00**;
5. To pay a refundable Infrastructure Bond of **$1,500.00**;
6. That the refundable Infrastructure Bond can be used by Council to offset the cost of damaged assets relating to other building or resource consents that I am also responsible for;
7. To pay the full cost of making good any damage caused to Council's infrastructure assets to an appropriate standard as determined by Council;
8. The refund of the Infrastructure Bond is subject to the making good of any damage to Council's infrastructure assets (as determined by Council) within a period of 4 (four) weeks from the date of Council's written notification to above address.

Note: Council should be contacted at the completion of the building work so that it may undertake an inspection of its infrastructure assets to confirm that no damage has occurred. *(Please telephone 06 349 0001 to book an inspection)*

Christson
Signature

Michelle Christson — 28 / 7 / 22
Name of person signing: *(please print clearly)* — Dated

OFFICE USE ONLY

Preferred Applicant Yes ◯ No ◯ *(Please tick)*

Whanganui District Council, 101 Guyton Street, PO Box 637, Whanganui 4540
Phone 06-3490001, Fax 06-3490000
Email: wdc@whanganui.govt.nz, web: www.whanganui.govt.nz

Please turn over

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Please Read IMPORTANT INFORMATION ON THE INFRASTRUCTURE BOND

Explanation

1. The Whanganui District Council has significant infrastructure assets in its road corridor. Damage to those assets from building works can come at a cost to the ratepayers of the Whanganui District.
2. The purpose of the Infrastructure Bond is to encourage the applicant to ensure that the infrastructure assets are not damaged. Further, in the event of damage, the infrastructure bond will ensure that the cost of repairing rests with the party responsible for its damage.
3. **Damage includes but is not limited to the following**: damage to footpaths, kerbing and channel, road surface, street furniture, tobies, trees, berms and other Council assets in the road corridor.
4. The Infrastructure Bond applies to all building consents (and/or resource consents) for demolition, removal, relocation and construction of buildings, and structures (including commercial) in the urban zone.

Review of Bond Amount

5. Pursuant to a Resolution of the Whanganui District Council (17 June 2008) a builder who is a preferred applicant may apply for an exemption from paying an infrastructure bond on each consent. The resolution states: *"That the Chief Executive has delegated authority to waiver the refundable bond amount for builders with multiple consents".*
6. An application for waiver of the Bond amount can be made on the appropriate form obtainable from the Council building at 101 Guyton Street, Whanganui.
7. To find out if you are eligible for a waiver of the bond amount, please talk to a member of the Customer Services team in the first instance.

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Date received		*IBR No:*	
Receipt No:		*Received by:*	
			(print name)

COMMENTS

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Vehicle Crossing Permit

Whanganui District Council — Streets Infrastructure Bylaw 2015

WHANGANUI DISTRICT COUNCIL
Te Kaunihera a Rohe o Whanganui

Permit No.

1. Property owner details

1a. Name: Bibin Vijayan

1b. Contact Person/agent (If owner is a corporation, partnership or trust):

1c. Postal address: 45 Oxford Rd, Wanganui

1d. Contact numbers: Phone | Mobile: 0224180588 | Fax

1e. Email: bibinvijayan9@gmail.com

2. Property details

2a. Site Address (Specify unit/level number, location of building within site/block number, building name and street name): 55 Tawhero Street, Wanganui

2b. Currently lawfully established use: Bare Land

2c. Legal description: Lot 24 DP569376

2d. Rapid number (rural):

3. Description of project

3a. Detailed description of the development/ project (tick one)

- [x] Urban
- [ ] Rural
- [ ] Commercial
- [ ] Other (please specify)

3b. Width of proposed vehicle crossing: 4.5m

3c. Estimated value of the work: $ 4500-00 including GST.

4. Council approved contractor undertaking the work

4a. (Refer to list of approved contractors provided in the guide): Tartek

OFFICE USE ONLY

Date received		*Application #*		*Document #*		*Other*	
Property ID		*Legal ID*		*Receipt #*		*Amount Paid*	$

Whanganui District Council, 101 Guyton Street, PO Box 637, Whanganui 4540
Phone 06-3490001, Fax 06-3490000
Email: wdc@whanganui.govt.nz, web: www.whanganui.govt.nz

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5. Diagram for vehicle crossing location

5a. Provide a site plan to show the location of the proposed vehicle crossing, and, if applicable, location of water toby, trees, streetlights or poles, stormwater sump and other services/street furniture, such as bus stops, signs etc.

6. Applicant's declaration

PRIVACY STATEMENT
Information on this form is required to be provided under the acts, regulations and bylaw administered by the Council and is required to process your application. This information has to be made available to members of the public, including business organisations. In appropriate circumstances, it may also be made available to other units of the council, council's approved contractors and other government agencies.

Under the Privacy Act 1993, you have the right to access the personal information held about you by the council and you can also request that the council correct any personal information it holds about you.

I understand that as the applicant, all correspondence related to this application will be made to me.

I confirm that I have read and understood the Privacy Statement and that the information provided on the application form is true and correct.

M Christson
Signature

Michelle Christson — 28 / 7 / 22
Name of person signing: *(please print clearly)* — Dated

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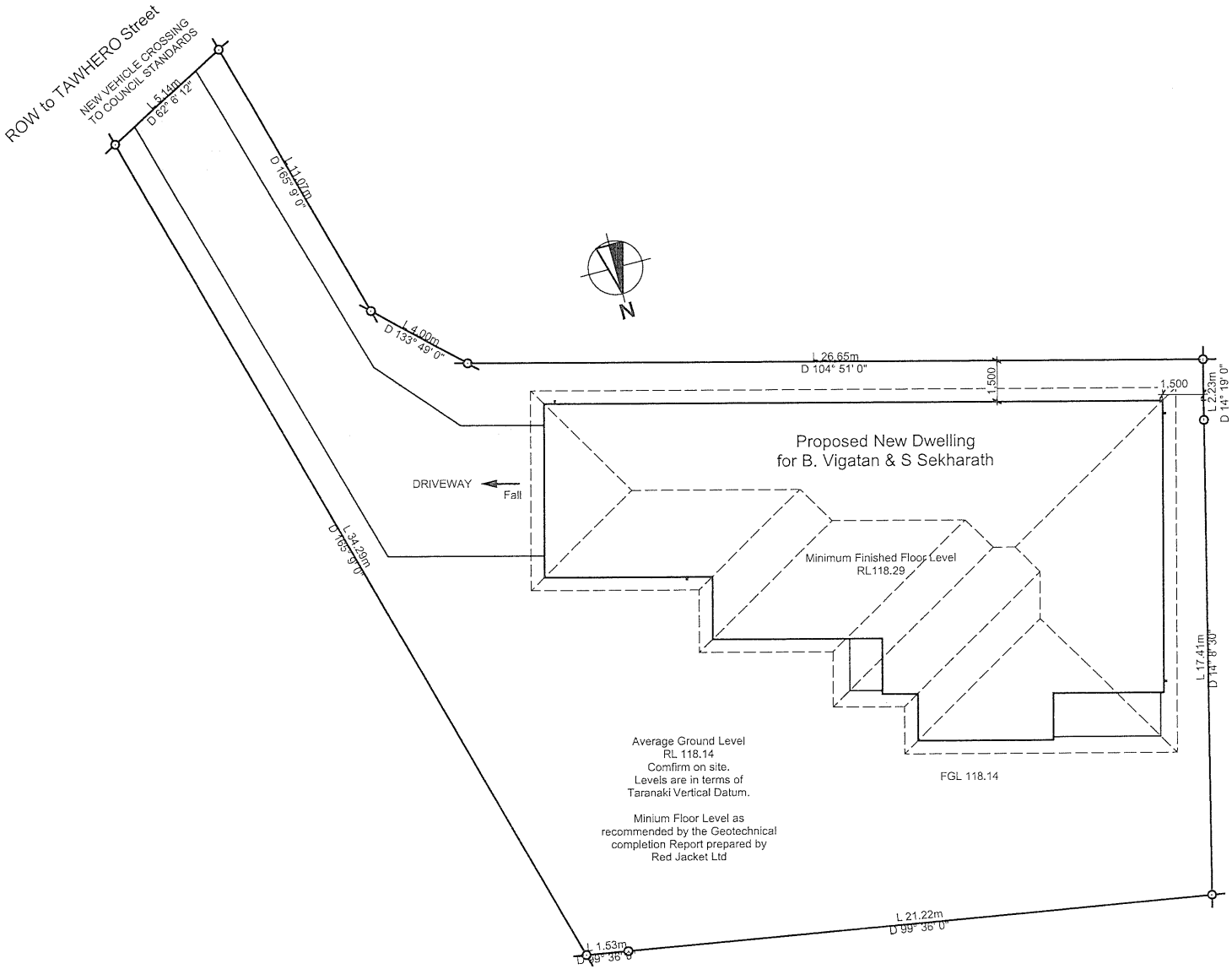
OFFICE USE ONLY

Reference no:		*Owner ID:*	
Parcel Prop ID			
Tax Invoice GST No: 51 700 449 Credit No: 778030.921 VX			
Date Received:		*Fee Payable (incl. GST)*	$
Received by:		*Receipt no:*	
Loaded by:		*Date Paid:*	
Date Loaded:			

Roading and Assets

Approved by WDC:	
Logged:	
First inspection date:	
Final inspection date:	

Notes:



1 Site Plan 1:150

Bulk & Location		
55 Tawhero Street, Gonville, Whanganui. Lot 24, DP569376, Area 659m²		
Wind Zone:	High	(NZS:3604)
Earthquake Zone:	2	
Topographical Class	T1	
Soil Class:	E	
Durability Zone:	C	
Climate Zone:	2	

Building Coverage	
Lot 24	= 659m²
Building Area over Frames	=201.18m²
Alfresco	= 6.19m²
Entry	= 2.25m²
Cladding	= 8.30m²
Building Coverage	=217.29m²
Coverage	= 33 %

NZBC F5: Construction and Demolition Hazards Acceptable Solution F5/AS1

1.0 Work Site Barriers.
The necessity for barriers will depend mainly on the site location. The need will be greater in areas with high levels of pedestrian traffic (i.e. in Central Business Districts), than in industrial or rural areas. Barriers are not necessary for domestic dwellings up to 2 storeys above ground level unless specific hazards exist.
At all work-sites hazard evaluation will take account of:
1. Pedestrian counts adjacent to the site.
2. Car parking adjacent to the site.
3. Location of neighbouring buildings.
4. Presence of neighbouring work-sites or recreation areas.
5. Proximity to schools or early childhood centres.
6. Proximity to housing.
7. The depth of a water hazard.
8. The period of time for which ponded water will be present.
9. The accessibility and 'visibility' of the site
1.0.2 If a work-site is not completely enclosed, and unauthorised entry by children is likely, it is acceptable for specific hazards to be fenced only when workers are absent from the immediate vicinity.
1.1 Site fences and hoardings
1.1.1 Fences and hoardings shall extend at least 2.0 m in height from ground level on the side accessible to the public.
1.1.2 An acceptable fence may be constructed with galvanised chainlink netting having a maximum sized grid of 50 mm x 50 mm. Post spacing shall be a maximum of 2.5 m, and the gap between the bottom of the fence and ground no greater than 100 mm.

Erosion & Sediment Control Plan
Provide silt fencing and other methods of sediment control like muching straw as determined necessary and applicable on site.
Use erosion control techniques to prevent sediment generation such as:
-Revegetation
-Minimization of earthworks
-Timing
-Staging of earthworks operations.

G.J. Gardner. HOMES

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Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Site Plan			Sheet:
Drawn: Shane Taylor	Status: Consent Plans		A02
	Date Plotted: 28/07/2022		
	Drawing scale: 1:150	@A3	Job: 270568

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Memorandum from licensed building practitioner: Certificate of design work

Section 45 and section 30c, Building Act 2004

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

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

THE BUILDING	
Street address: 55 Tawhero Street	
Suburb: Gonville	
Town/City: Whanganui	Postcode:

THE OWNER(S)		
Name(s): Bibin Vijayan & Sandhya Sekharath		
Mailing address:		
Suburb:	PO Box/Private Bag:	
Town/City: Whanganui		Postcode:
Phone number:	Email address:	

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IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK

I Adrian Egbers carried out/supervised the following design work that is restricted building work

PRIMARY STRUCTURE

Design work that is restricted building work	Description of restricted building work	Carried out or supervised	Reference to plans and specifications
Tick ✓	If appropriate, provide details of the restricted building work	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Foundations and subfloor framing ☑	Concrete floor and concrete foundations to NZS3604	○ Carried out ✓ Supervised	Drawings A06, A15
Walls ☑	Timber Framing to NZS3604	○ Carried out ✓ Supervised	Drawings A04
Roof ☑	Roof Framing/Truss layout by Carters	○ Carried out ✓ Supervised	Drawings A10
Columns and beams ☑	Entry & Alfresco Columns & beams	○ Carried out ✓ Supervised	Drawing A14
Bracing ☑	Wall & Roof bracing to NZS3604	○ Carried out ✓ Supervised	Drawings A07
Other ☐		○ Carried out ○ Supervised	

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EXTERNAL MOISTURE MANAGEMENT SYSTEMS			
Design work that is restricted building work	**Description of restricted building work**	**Carried out or supervised**	**Reference to plans and specifications**
Tick ✓	If appropriate, provide details of the restricted building work	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Damp proofing ☑	DPM & DPC to NZS 3604	○ Carried out ✓ Supervised	Drawings A06
Roof cladding or roof cladding system ☑	Pressed Metal Tile roofing to NZS3604.	○ Carried out ✓ Supervised	Drawings A09
Ventilation system (for example, subfloor or cavity) ☑	Brick Veneer cavity to E2	○ Carried out ✓ Supervised	Drawing A17
Wall cladding or wall cladding system ☑	Brick veneer claddings to E2 & Manufacturers details and specifications.	○ Carried out ✓ Supervised	Drawings A05, A17
Waterproofing ☐		○ Carried out ○ Supervised	
Other ☐		○ Carried out ○ Supervised	

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FIRE SAFETY SYSTEMS			
Design work that is restricted building work	**Description of restricted building work**	**Carried out or supervised**	**Reference to plans and specifications**
Tick ✓ if appropriate	If appropriate, provide details of the restricted building work	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Emergency warning systems ☐ Evacuation and fire-service operation systems Suppression or control systems Other		◯ Carried out ◯ Supervised	

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

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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

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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: Adrian Egbers	LBP or Registration number: 114110
The practitioner is a: (●) Design LBP ( ) Registered architect ( ) Chartered professional engineer	
Mailing address (if different from below): PO Box 2021	
Street address/Registered office: 57 HeuHeu Street	
Suburb: Town Centre	Town/City: Taupo
PO Box/Private Bag:	Postcode:
Phone number: 378 4546	Mobile:
After hours:	Fax:
Email address: adrian.egbers@gjgardner.co.nz	Website:

DECLARATION

I Adrian Egbers certify that the design work that is restricted building work identified on this form:

- 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: 25/07/2022

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SCHEDULE 2A
STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development ….TAWHERO STREET EXTENSION RESIDENTIAL SUBDIVISION……

Developer …. A SIGLEY DEVELOPMENTS LIMITED……

Location … TAWHERO STREET, WHANGANUI, EXISTING LOT 5 DP 22736…

I … CHRISTOPHER SCOTT MILLER…… of …… RED JACKET LIMITED ……..……..
(*Full name*) (*Name and address of firm*)

Hereby confirm that:

1. I am a geo-professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo-professional on the above development.

2. The extent of my preliminary investigations are described in my Report(s) number …RPT-3485-01 REV C……., dated …JUNE 2020……., and the conclusions and recommendations of that/those document(s) have been re-evaluated in the preparation of this report. The extent of my inspections during construction, and the results of all tests and/or re-evaluations carried out are described in my geotechnical completion report dated …9/12/2021……..……

3. In my professional opinion, not to be construed as a guarantee, I consider that (delete as appropriate):

   (a) the earth fills shown on the attached Plan No …H&O ASBUILT CONTOURS PLAN AND DWG-100-365 REV 2…. have been placed in compliance with the requirements of the …WHANGANUI DISTRICT…Council and my specification.

   (b) The completed works take into account land slope and foundation stability considerations, subject to the appended foundation recommendations and earthworks restrictions, (which should read in conjunction with the appended final site contour plan).

   ~~(c) Subject to 3(a) and 3(b) of this Schedule, the original ground not affected by the filling is suitable for the erection of buildings and designed according to NZS 3604 provided that:~~

   ~~(i)……~~

   ~~(ii)……~~

   (d) Subject to 3(a) and 3(b) of this Schedule, the filled ground is suitable for the erection of buildings designed According to NZS 3604 provided that:

   (i)…BUILDING RESTRICTIONS AS SET OUT IN THE GEOTECHNICAL COMPLETION REPORT RPT-3485-03 ARE COMPLIED WITH……..

   (ii)…….

   (e) The original ground not effected by the filling and the filled ground are not subject to erosion, subsidence, or slippage in accordance with the provisions of section 106 of the Resource Management Act 1991 provided that:

   (i)… RECOMMENDATIONS FOR VEGETATED SLOPES OUTLINED IN THE GEOTECHNICAL COMPLETION REPORT RPT-3485-03 ARE COMPLIED WITH……

   (ii)…….

NOTE – These subclauses may be deleted or added to as appropriate, to include such considerations as expansive soils where excluded from NZS 3604, and site seismic characteristics as covered in clause 3.1.3 of NZS 1170.5.

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4. This professional opinion is furnished to the TA and the developer of their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time or erection of any building.

5. This certificate shall be read in conjunction with my geotechnical report referred to in clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

Signed ..... Date .....9/12/2021.....

.....

.....

... CHRISTOPHER SCOTT MILLER, SENIOR CIVIL ENGINEER, CPENG, CMEngNZ .....

(*Name, title, and professional qualifications*)

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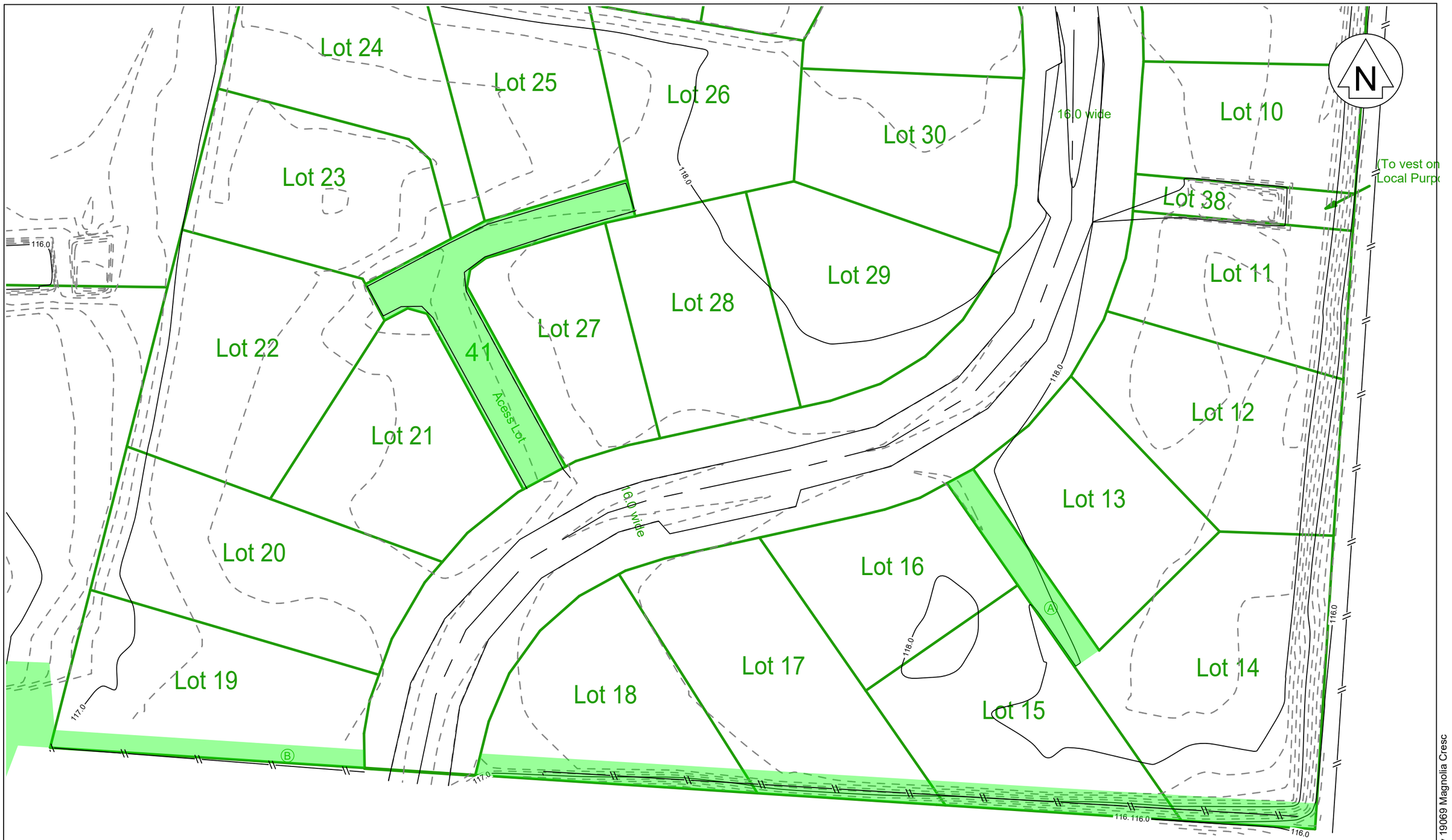

Email: admin@nzsurveyor.co.nz
PO Box 4136 Wanganui
Ph 06 345 8828
Harrison&O'Sullivan Ltd
LICENSED CADASTRAL SURVEYORS • LAND DEVELOPMENT CONSULTANTS

DATE	REV RECORD	BY	VER

Asbuilt Contours
Sigley - Tawhero Street
Lots 1 - 37 DP 569376

Drawn by:		Date: 09 Dec 2021
Scale: (A3)	1:500	Drawing No.
Project No.		

Note: All areas and dimensions are subject to final survey. The Contractor shall check all dimensions on site.

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Z:\12d\Sigley 19069 Magnolia Cresc\Sigley 19069 Magnolia Cresc

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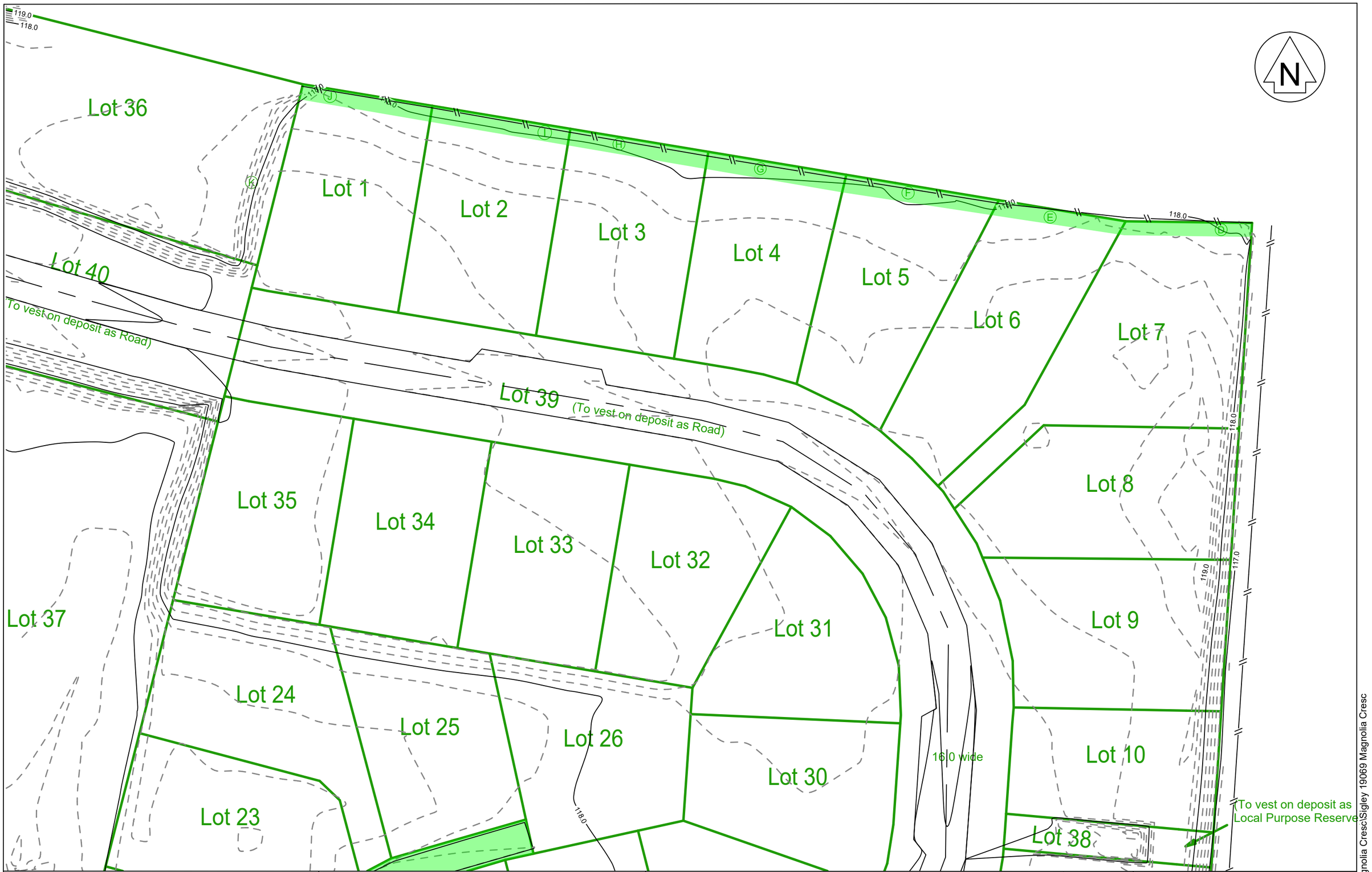

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DATE	REV RECORD	BY	VER

Asbuilt Contours
Sigley - Tawhero Street
Lots 1 - 37 DP 569376

Drawn by:		Date:	09 Dec 2021
Scale: (A3)	1:1000	Drawing No.	
Project No.			

Note: All areas and dimensions are subject to final survey. The Contractor shall check all dimensions on site.

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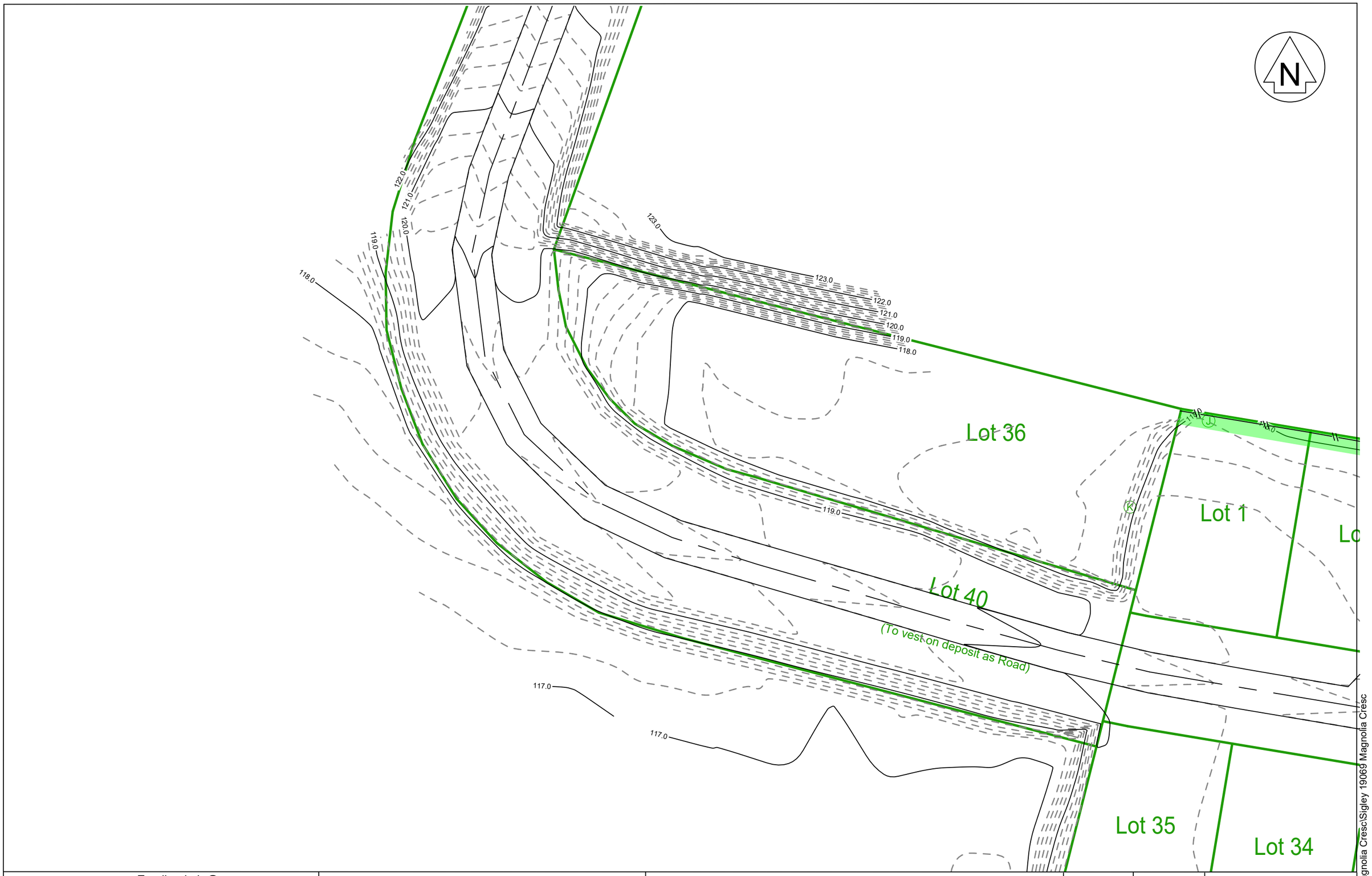

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DATE	REV RECORD	BY	VER

Asbuilt Contours
Sigley - Tawhero Street
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Scale: (A3)	1:1000	Drawing No.	
Project No.			

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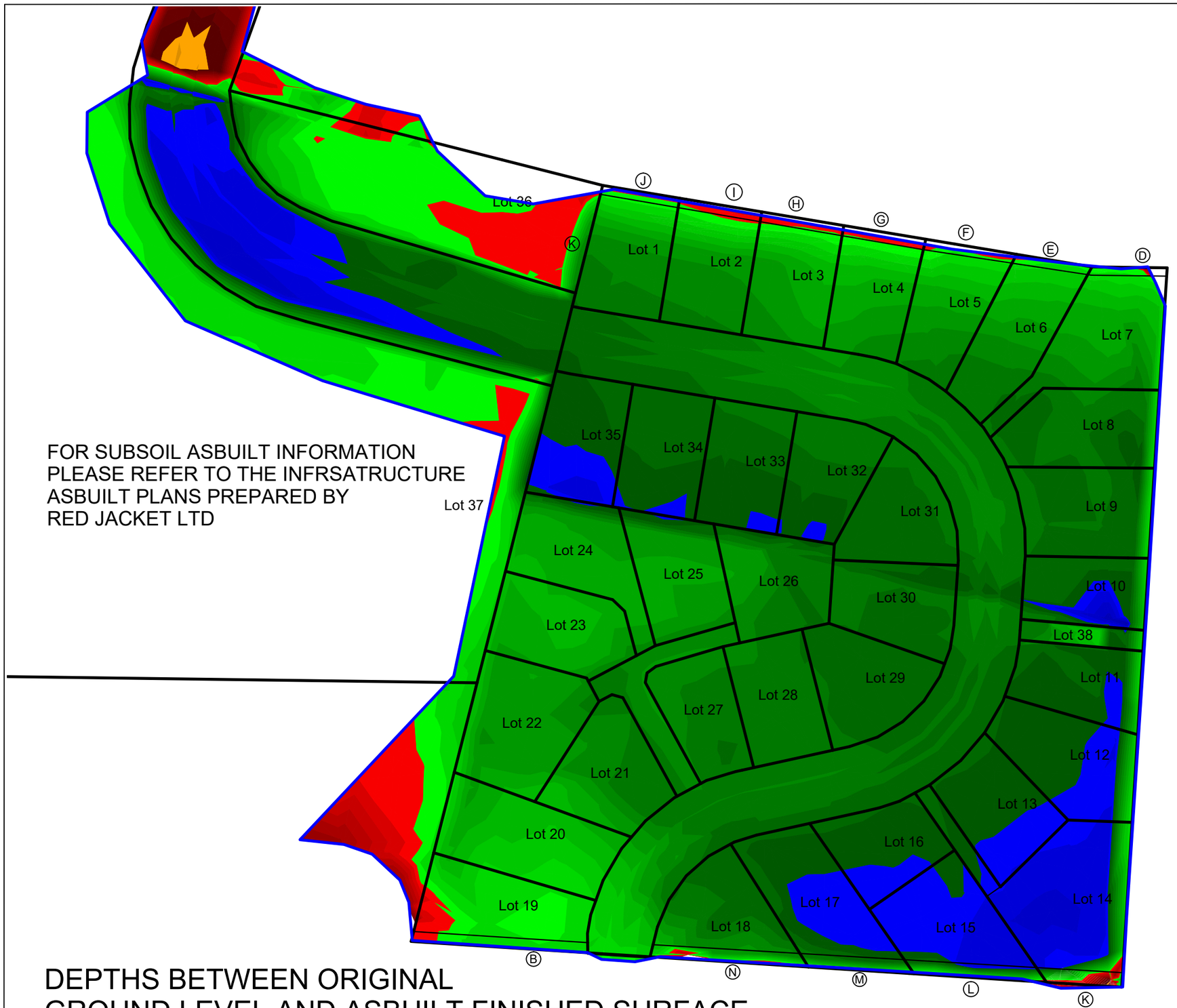

Final cut and fill depths

Lower_value		Upper_value	Colour
-2.4	to	-2.2 m	
-2.2	to	-2.0 m	
-2.0	to	-1.8 m	
-1.8	to	-1.6 m	
-1.6	to	-1.4 m	
-1.4	to	-1.2 m	
-1.2	to	-1.0 m	
-1.0	to	-0.8 m	
-0.8	to	-0.6 m	
-0.6	to	-0.4 m	
-0.4	to	-0.2 m	
-0.2	to	0.0 m	
0.0	to	0.2 m	
0.2	to	0.4 m	
0.4	to	0.6 m	
0.6	to	0.8 m	
0.8	to	1.0 m	
1.0	to	1.2 m	
1.2	to	1.4 m	
1.4	to	1.6 m	
1.6	to	1.8 m	
1.8	to	2.0 m	
2.0	to	2.2 m	
2.2	to	2.4 m	
2.4	to	2.6 m	
2.6	to	2.8 m	
2.8	to	3.0 m	
3.0	to	3.2 m	
3.2	to	3.4 m	
3.4	to	3.6 m	
3.6	to	3.8 m	
3.8	to	4.0 m	

FOR SUBSOIL ASBUILT INFORMATION
PLEASE REFER TO THE INFRSATRUCTURE
ASBUILT PLANS PREPARED BY
RED JACKET LTD

DEPTHS BETWEEN ORIGINAL GROUND LEVEL AND ASBUILT FINISHED SURFACE

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DATE	REV RECORD	BY	VER

Asbuilt Contours
Sigley - Tawhero Street
Lots 1 - 37 DP 569376

Drawn by:		Date: 09 Dec 2021
Scale: (A3)	1:1000	Drawing No.
Project No.		

Note: All areas and dimensions are subject to final survey. The Contractor shall check all dimensions on site.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

(project)

Proposed Dwelling

(project location)

55 Tawhero Street, Gonville,,

Whanganui

Lot 24 DP569376, Area 659msq

(client)

Bibin Vijayan & Sandhya Sekharath

G.J. Gardner. HOMES

Consent Drawings	
	Cover
A01	Building Notes
A02	Site Plan
A03	Drainage Plan
A04	Floor Plan
A05	Elevations
A06	Foundation Plan
A07	Bracing Plan
A08	Bracing Details
A09	Roof Plan
A10	Truss Plan
A11	Lintels & Fixing type
A12	Lintel Fixings
A13	Sections
A14	Beam connection Details
A15	Foundation Details
A16	Roof & Soffit Details
A17	Brick Details
A18	Window Schedule 1of2
A19	Window Schedule 2of2
A20	H1 Insulation Plan
A21	E3 Details & Hotwater

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Timber Treatment Requirements:

Level:	Building Element:
Enclosed roof framing & trusses	
H1.2	Sarking & framing not protected from solar-driven moisture through absorbent cladding materials
H3.1	Valley boards & boards supporting flashings or box gutters, & flashings to roof penetrations & upstands to roof decks
H1.2	All roof trusses, including gable end trusses, roof framing, ceiling & eaves framing, purlins & battens
Enclosed wall framing protected from the weather	
H3.1	Battens used behind cladding to form a cavity
H1.2	All other exterior wall framing & other members including exterior & boundary joists
H1.2	Bottom plates of exterior walls.

Internal wall framing	
H1.2	Internal walls
Other framing	
H3.2	Framing exposed to the weather & above ground
H4	Framing such as fence posts & landscape timbers that is exposed to the weather & is in contact with the ground
H5	Framing such as house piles, poles & crib walling that is exposed to the weather & is in contact with the ground

Exterior timber cladding	
H3.2	Unpainted Weatherboards, Fascia, Plywood Cladding,
H3.1	Painted Weatherboards, Painted fascia

Durability protection requirements:

Corrosion Zone Category C

Building Element:	Protection:	
Steel Fixings & Fastenings:		
Nail Plates:	Continuously coated galvanised steel	
Wire Dogs/ Bolts:	Hot-dip galvanised steel	
All other structural fixings:	Mild steel (uncoated non-galvanised)	
All other structural fixings, except fabricated brackets:	Sheltered	Hot-dip galvanised steel
	Exposed	Type 304 Stainless Steel
Fabricated brackets:	5mm min. Hot-dip galvanised mild steel	
Nails & Screws:		
Cladding that acts as bracing:	galvanised steel	
Non structural cladding:	galvanised steel	
Framing in 'closed' areas including roof spaces:	Mild Steel	
All Framing	galvanised steel	
Flashings:		
All flashings:	-Zincalume 0.7 bmt -type 304 or 316 stainless steel, -Aluminium	

Timber Frames:

Exterior Wall Framing:

Load bearing walls: (2.40m max height)	
Studs:	90mm x 45mm @ 600crs. max
Bottom Plates:	90mm x 45mm
Top Plates:	2/90mm x 45mm

Interior Wall Framing:

Load bearing walls: (2.40m max height)	
Studs:	90mm x 45mm @ 600crs. max
Bottom Plates:	90mm x 45mm
Top Plates:	2/90mm x 45mm

Non Load bearing walls: (2.40m max height)	
Studs:	90mm x 45mm @ 600crs. max
Bottom Plates:	90mm x 45mm
Top Plates:	90mm x 45mm

All timber framing to be **SG8** Radiata Pine (unless otherwise specified), Refer timber treatment chart for all connection & fixing requirements, & timber durability notes for durability protection to connections & fixings
Joints in top plates shall be made only over supports being either a stud of blocking. Allow for 6kn connection plate over joint.
Holes thru top plate greater than 25mm require additional support in accordance with 8.8.1. NZS3604.

Prefabricated timber trusses

Prenailer to supply certification with NZBC for all frames & trusses & supply certificate to council & a copy to designer itemising full compliance, job address & client, before fabrication

Framing connection chart:

Fixing type:	Description:	Alternative fixing:
Roof Framing:		
Trusses to top plate:		
E	2/90 x 3.15 skew nails + 2 wire dogs	*CT400 Lumberlok cyclone ties* ***4.7kN min. fixing capacity)***
F	2/90 x 3.15 skew nails + strap fixing	*CT400 Lumberlok cyclone ties* ***7.0kN min. fixing capacity)***
Purlins to rafters/ Top chord:		
S	2/90 x 3.15 gun nails	*1/80 x 10g Lumberlok Blue Screw*
Wall Framing:		
Top Plates of load bearing walls:		
B	2/90 x 3.15 end nails + 2 wire dogs/ staples	*2/90x3.33 plain steel wire nails driven vertically into stud, plus Bowmac Stud-Lok.* ***(4.7kN min. fixing capacity)***
Lintels:		
Jack stud to lintel:		
25 x 1 strap taken over plate & 150mm on each side of lintel with 6/30 x 2.5mm nails into each side of lintel		
Lintel to doubling stud		
25 x 1 strap with 6/30 x 2.5mm nails on one side into both lintel & stud		
Lintel doubling stud to Bottom plate (Concrete)		
25 x 1 strap taken under plate & 150mm up each side of stud with 6/30 x 2.5mm nails into each side of stud		
Lintel doubling stud to Bottom plate (Timber)		
25 x 1 strap with 6/30 x 2.5mm nails on one side into both floor joist or blocking & stud		

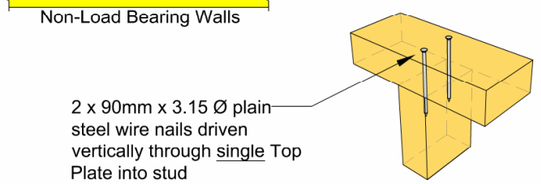
BOWMAC® STUD-LOK

STUD TO TOP PLATE FIXING OPTIONS

*Images are indicitive only. Timber sizes may vary.

TYPE A - 0.7 kN

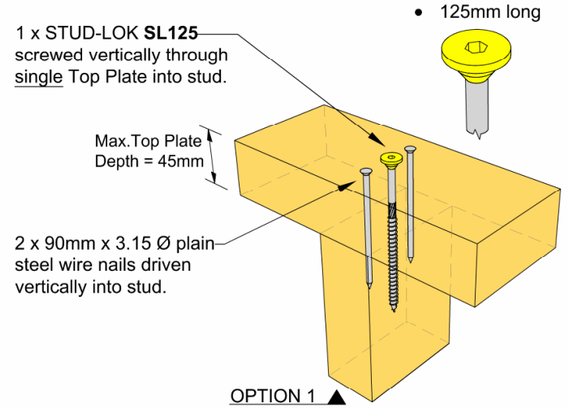
Non-Load Bearing Walls



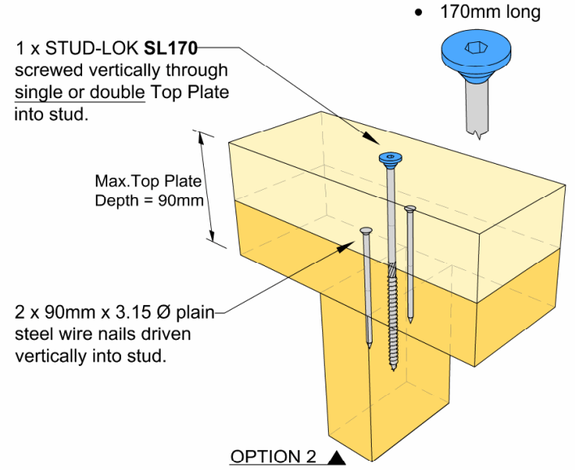
TYPE B - 4.7 kN

Load Bearing Walls

STUD-LOK SL125
- Yellow Head
- 125mm long



STUD-LOK SL170
- Blue Head
- 170mm long



(Alternative to NZS 3604:2011 Section 8)

Building Notes:

Floor Slab:
100mm thick 20Mpa concrete floor slab reinforced with Hurricane grade 500E SE62 mesh with 35mm min top cover, over 0.25mm polythene DPM on compacted sand binding & basecourse

Foundation:
240mm wide cast-insutu perimeter strip footing 300mm min into firm original ground. Reinforced with 3/D12 along & R10 starters @ 600mm crs lapped 400mm with slab mesh.

Roofing: 25º Pitch, 2455 to under side of Trusses
Gerard pressed Metal Tile roofoing on 50x40 H1.2 timber tile basttern @ 370crs max over Pauloid Bituminous roofing underlay

Spouting:
Colorcote Magnaflow 147 Multifit Facia with 1/4 round ColorCote Magaflow gutters and 80mmØ pvc downpipes.

Claddings: Exterior
Brick Veneer 70mm thick - selected size.
Brick Ties shall be spaced at maximum 600mm crs horizontally and 400mm crs vertically.

Building Wrap:
Marshall Tekton absorbant and breathable wall cladding underlay.

Internal Linings - WALLS:
10mm Winstone Gib Board Standard, Aqualine, Braceline.

Internal Linings - CEILING:
10mm Winstone Gib Board Standard, Aqualine.
70x35mm timber ceiling battens @450crs.

Scotia:
Gib Cove or Square Stopped

Arcitrave:
40x12 MDF single bevel.
Bathroom 40x10mm RAD single bevel.

Skirting:
60x12 single bevel MDF.
Bathroom 60x10mm RAD single bevel.

Insulation - WALLS:
Pink Batts 90mm R2.2 Fibreglass Batts.

Insulation - CEILING:
Pink Batts R3.2 Ultra Fibreglass Batts.

Interior doors:
Door sizes shown are **leaf** size. Height 1980mm plain paint quality. Internal Garage Door to be EPS solid core with 1 steel insert.
Architraved jambs. Allow for jambs & packing when framing for rough opening as req'd.
Unless stated otherwise all internal doors to have 2/90x45 lintel
Refer to floor plan for opening direction

Wet Area Flooring:
Ceramic Tiling with timber skirting.

Shower Enclosures:
Main Bathroom - 1m x 1m Acrylic base & moulded wall, glass door and side panel shower cubicle installed to manufacturers specifications & details.

Exterior Doors & Windows:
Refer Door & Window schedule/ List for Door & Window & Lintel Sizes, & Opening Sash locations

Air extraction & venting:

Allow for air extraction fans in bathroom & ensuite to be installed to manufacturers instructions and taken to exterior as req'd.

Fans must be sized to provide a minimum air change of 25 litres per second & wired to light switch with a minimum 5 minute run-on period

Allow for laundry dryer to be ducted to manufacturers instructions and taken to exterior as req'd.

Allow for range hood above kitchen hobs to be installed to manufacturers instructions and taken to exterior as req'd.
Provide protective cowl for wall outlet.

Provide Extractor fan in Scullery off kitchen.
Switch with light and provide run-on period 2 minutes minimum.

Domestic smoke alarms: - (s)

Allow for smoke alarms on or near ceiling in accordance with as 1670.6 & manufacturers instructions. Smoke alarms to be located on the escape routes within the household unit./s. On levels containing the sleeping spaces, the smoke alarms shall be located within:

A) every sleeping space, or

B) 3.0m of every sleeping space door. Ie., smoke alarms must be audible to sleeping occupants on other side of closed doors.

Lighting:

Artificial Lighting shall be provided to comply with G8 & G9 NZBC to a minimum of 20 lux illuminance per sq/m of flooring.

G8 & G9, Artificial Light & Electricaly

Spaces within buildings used by people, shall be provided with adequate artificial lighting which, when activated in the absence of sufficient natural light, will enable safe movement to comply with G8.
Electrical supply and fittings to be provided to comply with G9.
Location of lighting and electrical fittings to be confirmed with the owners

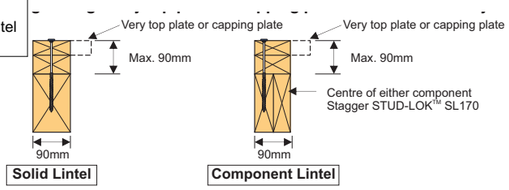
Barriers:

Temporary Construction Barriers are to be installed at time of and during construction to comply with F5 NZBC.

Access Routes:

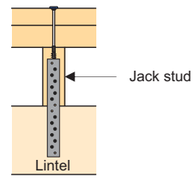
Timber entrance deck, path and driveway shall comply with D1 NZBC for slip resistance and falls.
MAximum step down from floor level to outside entrance deck or paving shall be no more than 190mm.

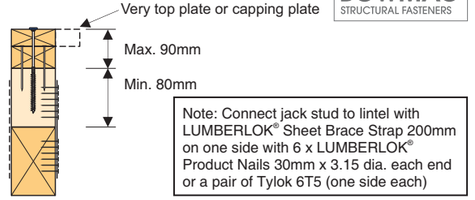
Water supply G12/AS1
Water supply pipe work to comply with G12/AS1
Provide insulation to pipe work as required
to comply with G12/AS1 and H1/AS1



Fixing through very top plate or capping plate to lintel with jack stud arrangement

BOWMAC® STRUCTURAL FASTENERS





Note: Connect jack stud to lintel with LUMBERLOK® Sheet Brace Strap 200mm on one side with 6 x LUMBERLOK® Product Nails 30mm x 3.15 dia. each end or a pair of Tylok 6T5 (one side each)

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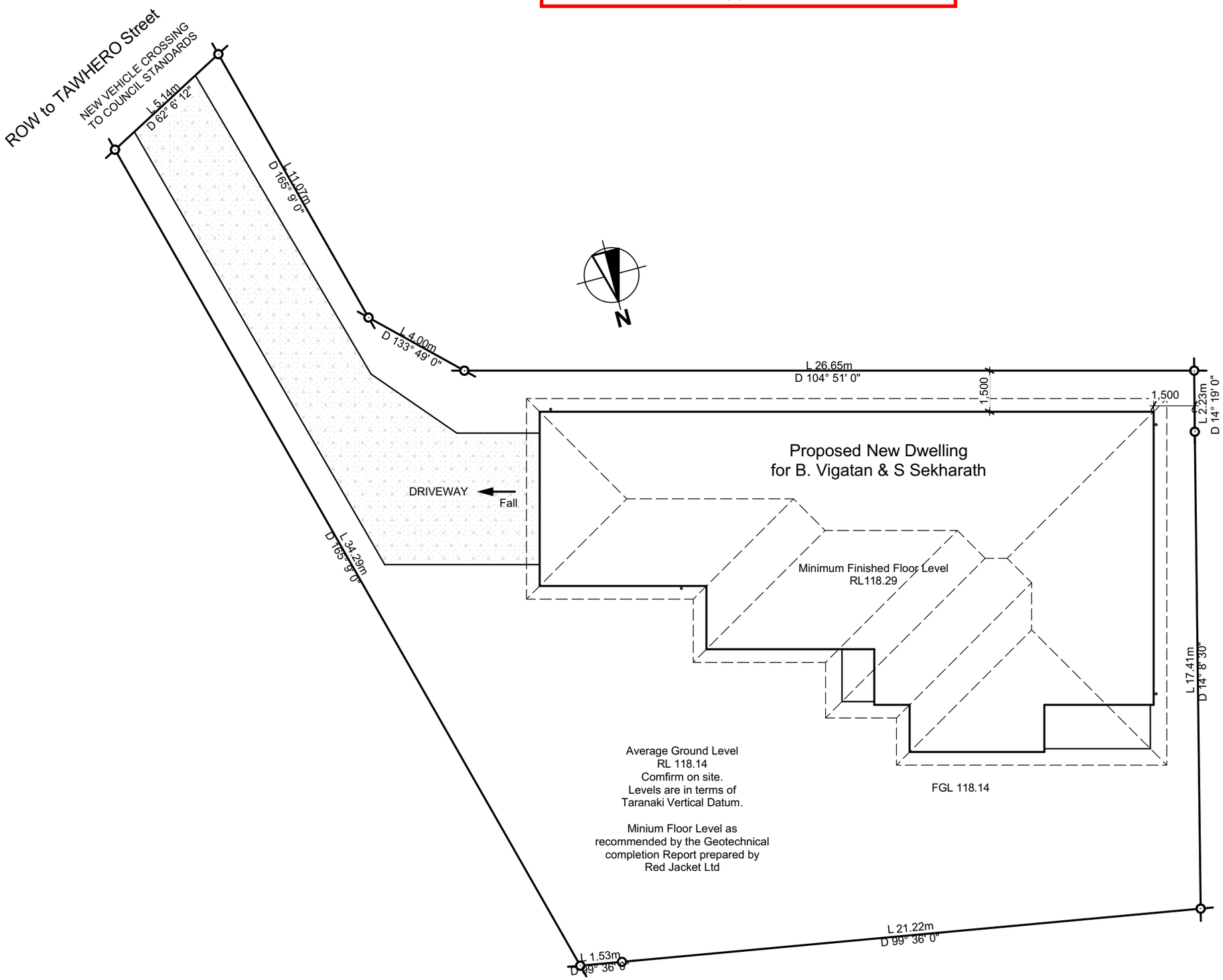
Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Building Notes		Sheet:
Drawn: Shane Taylor	Status: Consent Plans	A01
	Date Plotted: 28/07/2022	
	Drawing scale: NTS @A3	Job: 270568



1 Site Plan 1:150

Bulk & Location

55 Tawhero Street, Gonville, Whanganui.
Lot 24, DP569376, Area 659m²

Wind Zone:	High	(NZS:3604)
Earthquake Zone:	2	
Topographical Class	T1	
Soil Class:	E	
Durability Zone:	C	
Climate Zone:	2	

Building Coverage

Lot 24	= 659m²
Building Area over Frames	=201.18m²
Alfresco	= 6.19m²
Entry	= 2.25m²
Cladding	= 8.30m²
Building Coverage	=217.29m²
Coverage	= 33 %

NZBC F5: Construction and Demolition Hazards Acceptable Solution F5/AS1

1.0 Work Site Barriers.
The necessity for barriers will depend mainly on the site location. The need will be greater in areas with high levels of pedestrian traffic (i.e. in Central Business Districts), than in industrial or rural areas. Barriers are not necessary for domestic dwellings up to 2 storeys above ground level unless specific hazards exist.
At all work-sites hazard evaluation will take account of:
1. Pedestrian counts adjacent to the site.
2. Car parking adjacent to the site.
3. Location of neighbouring buildings.
4. Presence of neighbouring work-sites or recreation areas.
5. Proximity to schools or early childhood centres.
6. Proximity to housing.
7. The depth of a water hazard.
8. The period of time for which ponded water will be present.
9. The accessibility and 'visibility' of the site
1.0.2 If a work-site is not completely enclosed, and unauthorised entry by children is likely, it is acceptable for specific hazards to be fenced only when workers are absent from the immediate vicinity.
1.1 Site fences and hoardings
1.1.1 Fences and hoardings shall extend at least 2.0 m in height from ground level on the side accessible to the public.
1.1.2 An acceptable fence may be constructed with galvanised chainlink netting having a maximum sized grid of 50 mm x 50 mm. Post spacing shall be a maximum of 2.5 m, and the gap between the bottom of the fence and ground no greater than 100 mm.

Erosion & Sediment Control Plan
Provide silt fencing and other methods of sediment control like muching straw as determined necessary and applicable on site.
Use erosion control techniques to prevent sediment generation such as:
-Revegetation
-Minimization of earthworks
-Timing
-Staging of earthworks operations.

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Title: Site Plan			Sheet:
Drawn: Shane Taylor	Status: Consent Plans		A02
	Date Plotted: 28/07/2022		
	Drawing scale: 1:150	@A3	Job: 270568

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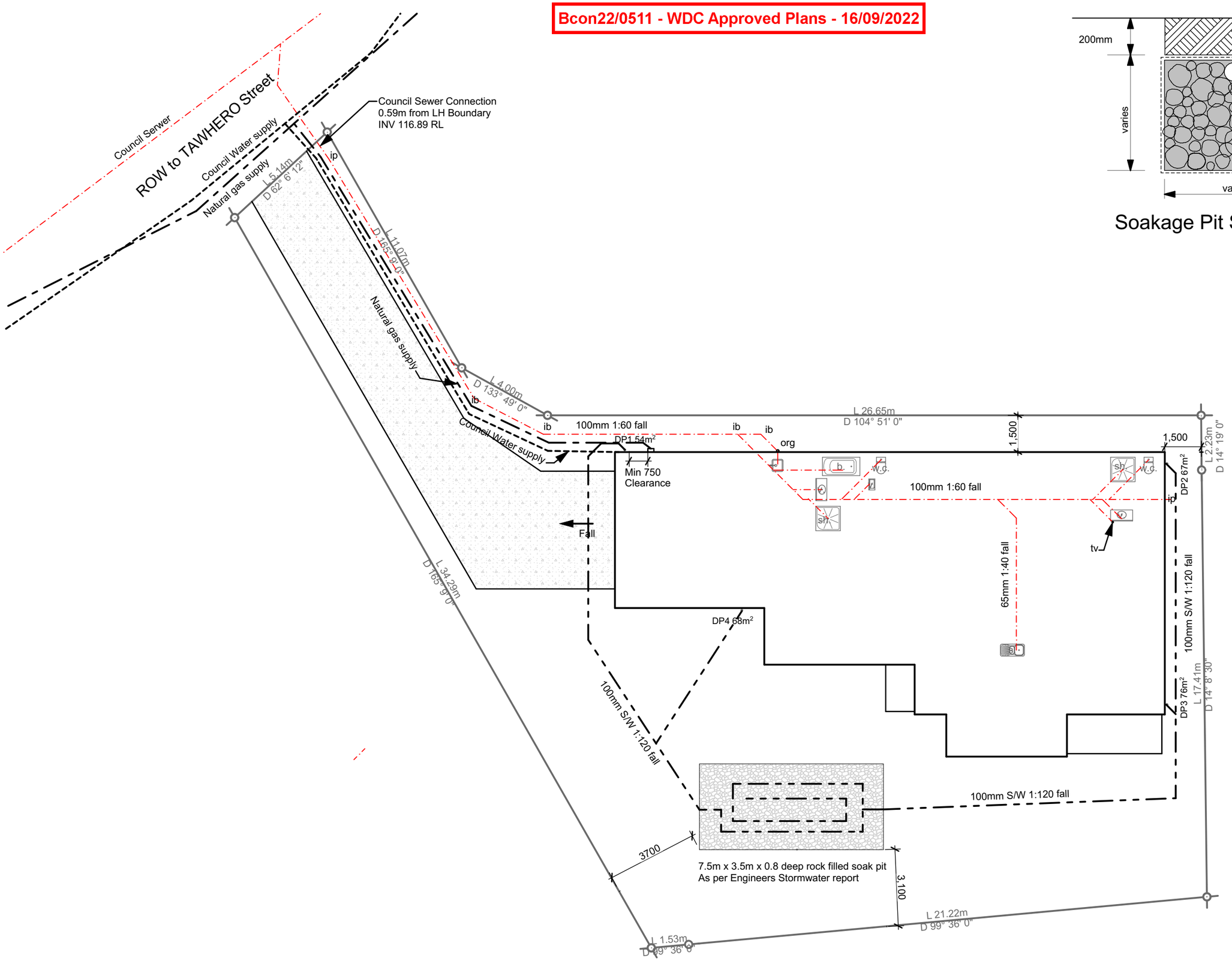
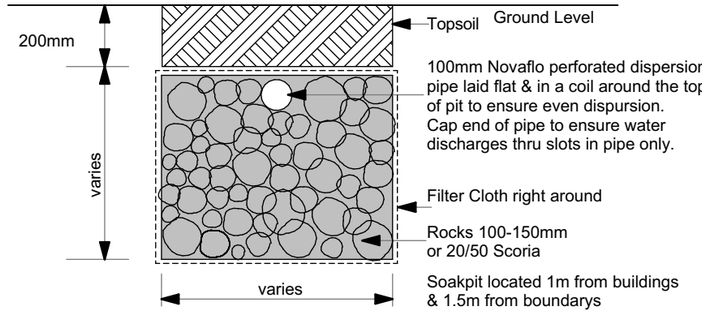


1 Site Services 1:150



Soakage Pit Stormwater

Piped services:

All piped services from the building to be upvc material manufacturered in accordance to **AS/NZS1260**

Stormwater Drainage:
Drainlayer to confirm design before construction & provide as-built drawing upon completion of works.

All new s/w drainage pipes to be installed to existing connection

Minimum s/w pipe gradients:
100mm - 1:120

All dp's to be 80mm upvc unless otherwise stated

Minimum sewer pipe gradients:
65mm - 1:40

100mm - 1:60

All plumbing to be installed to **AS/NZS 3500.5**, section 4 with pipe locations as shown on services plans.
Services Plan is schematic only Plumber to confirm plan before construction & ensure all connections, bends & falls to comply with standard

Allow to sleeve all piped services thru conc. Footings as req'd, refer detail.

All tv's to be 50mm upvc unless otherwise stated

All sanitary sewer lines to be 100mm upvc unless otherwise stated

Inspection openings to be at major junctions on main drains and at least one (i.o.) should be raised to ground level

Minimum fixture pipe sizes:

WC	- 100Ømm
Kitchen sink	- 65Ømm
Basin/ Vanity	- 65Ømm
L'dry tub	- 65Ømm
Bath/ shower	- 65Ømm

Fixtures (excluding WC) with an overall pipe length of less than 2.5m can be 50Ømm

Overflow Relief Gully:
Overflow relief gully (org) to be placed as shown on plan set 150mm below lowest fixture & 75mm above surrounding ground level. Hose tap required above ORG to be able to charge the gully.

Key:

ORG	Overflow relief gully
DP	Downpipe
IB	Inspection Bend
IJ	Inspection Junction
RE	Rodding Eye

Note:
Drainalyer is to confirm the invert level of all drain connections before construction begins and ensure connection depths are adequate to acheive minimum drainage falls required.

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Title: Drainage Plan		Sheet: A03
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:150 @A3	Job: 270568

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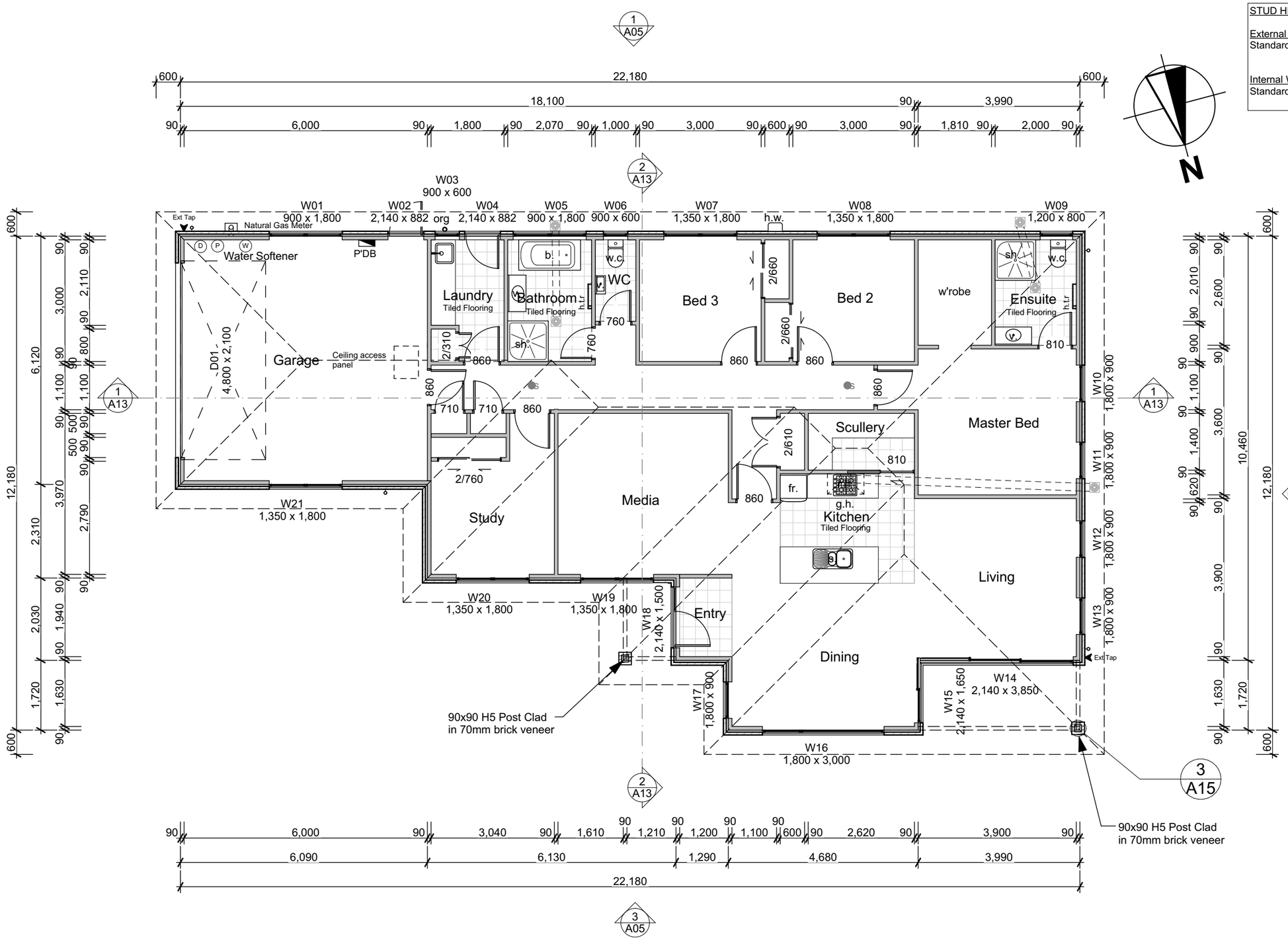

STUD HEIGHT: 2,455 to u/s of Trusses. -

External Wall Framing:
Standard walls up to 2.455m Stud Ht:
- 90x45 SG8 H1.2 studs @600crs. - 2 rows of nogs 800crs.

Internal Wall Framing:
Standard walls up to 2.455 Stud Ht:
- 90x45 SG8 H1.2 studs @600crs - 2 rows of nogs 800crs.

Wall Cladding 01:
Selected 70mm ClayBrick o 50mm drained and vented cavity over building wrap

D1: Compliance for entries/exits, maximum step down from floor level to outside paving or deck shall be no more than 190mm.
Access route material shall comply with minimum slip resistance for walking surface - applies to main entrance only.

NZBC H1 Water Heater Compliance:
The volume of hot water travelling from the gas water
heater to the kitchen sink shall not be greater than 2.0 litres.
Size the feed pipe to suit the selected direction and length of run.
Example: PB-1 Pipe volume in Litres:
12mm at run length of 10m = 0.73litres
15mm at run length of 10m = 1.3litres
(Confirm volume with selected pipe manufacturer)

G3: Compliance for Cooking facilities - Surface linings adjacent to kitchen appliances and facilities shall be impervious and easily cleaned, e.g. high pressure laminates, tiles & impervious coatings.

Shower Enclosures:
1000 x 1000 Acrylic base & moulded wall, glass door and side panel shower cubicle installed to manufacturers specifications & details.
Grade A safety glass to the showers to comply with NZS4223:2016

SYMBOL LEGEND:

P'DB	Power Distributon Board
Data	Data Distribution Board
	Manrose Inline Extraction Fan kit.
D	Data/Telecom Entry Point.
P	Power Electical Entry Point.
S	Domestic Smoke Alarm
Ext Tap	Exterior Hose Tap.
F/Tap	Fridge Water Supply
ORG	Overflow Relief Gully

AREAS:

Slab Area (over framing)	201.18m²
Entry	2.25m²
Alfressco	6.19m²
Cladding	8.30m²
Total	217.29m²
(Excludes soffit overhang)	

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Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Floor Plan		Sheet: A04
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 9/09/2022	
	Drawing scale: 1:100 @A3	Job: 270568

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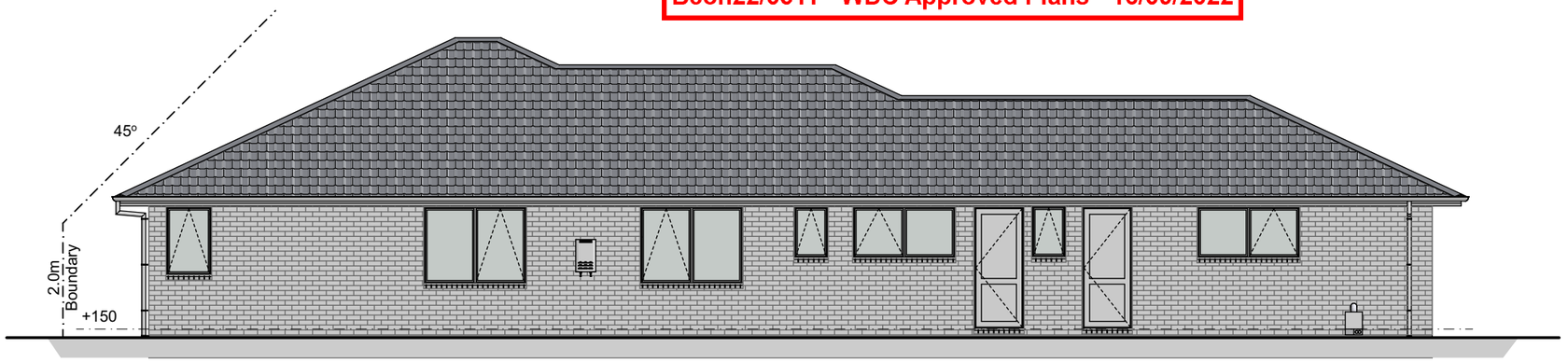


1 SouthElevation 1:100

Building Notes:

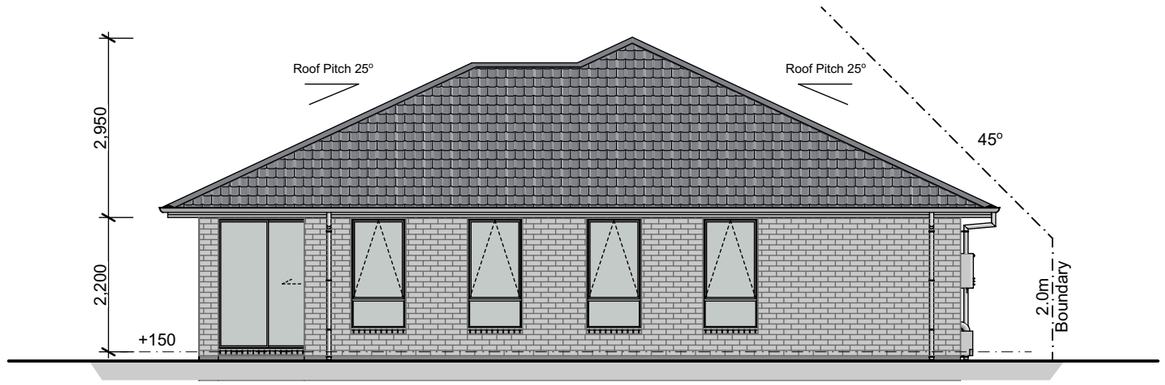
Floor Slab:
100mm thick 20Mpa concrete floor slab reinforced with Hurricane grade 500E SE62 mesh with 35mm min top cover, over 0.25mm polythene DPM on compacted sand pinding & basecourse

Foundation:
240mm wide cast-insutu perimeter strip footing 300mm min into firm original ground. Reinforced with 3/D12 along & R10 starters @ 600mm crs lapped 400mm with slab mesh.

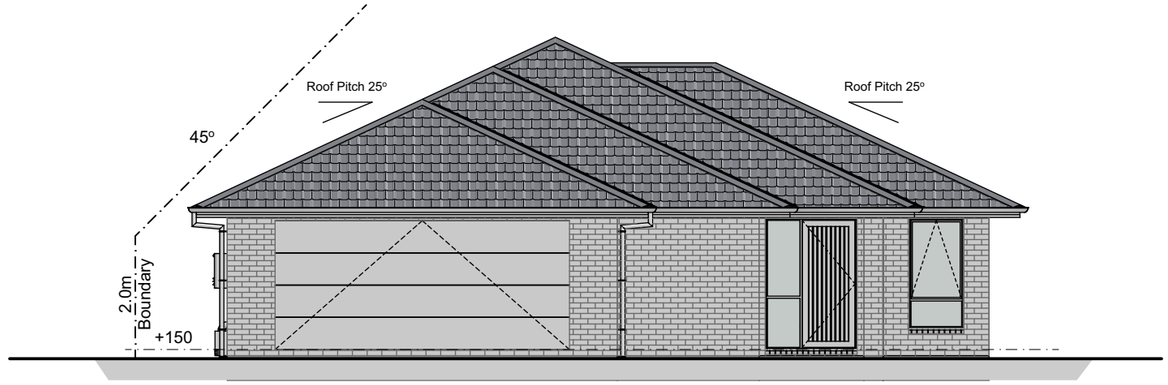
Roofing: 25º Pitch, 2455 to under side of Trusses
Gerard pressed Metal Tile roofoing on 50x40 H1.2 timber tile basttern @ 370crs max over Pauloid Bituminous roofing underlay

Spouting:
Colorcote Magnaflow 147 Multifit Facia with 1/4 round ColorCote Magaflow gutters and 80mmØ pvc downpipes.

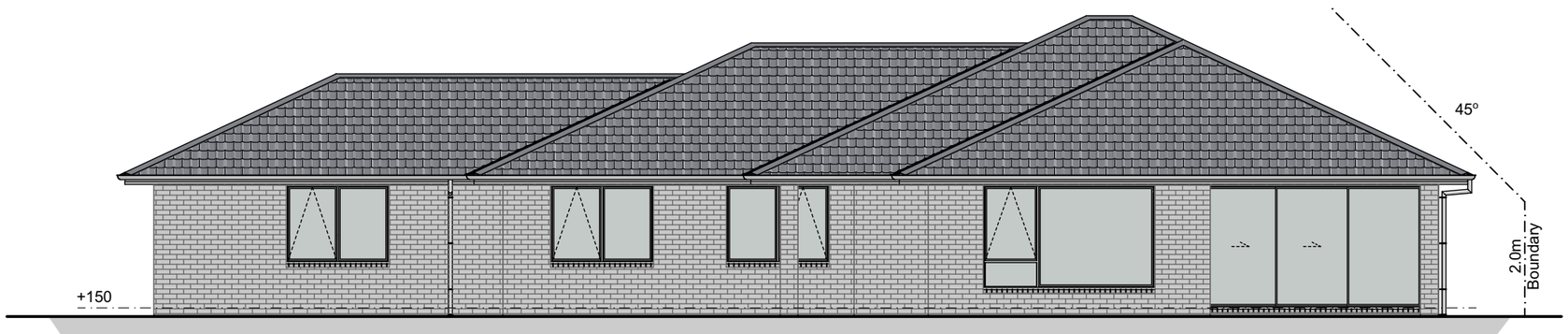
Claddings: Exterior
01: Brick Veneer 70mm thick - selected size.
Brick Ties shall be spaced at maximum 600mm crs horizontally and 400mm crs vertically.



2 West Elevation 1:100



4 East Elevation 1:100



3 NorthElevation 1:100

Risk Factor	Description	Risk	Score
Wind Zone	High	M	1
Number of Storeys	Single Storey	L	0
Roof/Wall Intersection Design	Fully protected (e.g. hip and gable roof with eaves)	L	0
Eaves Width	450mm - 600mm wide	M	1
Envelope Complexity	Moderately complex shape with no more than 2 cladding types.	M	1
Deck Design	None	L	0
			Total Score: 3
Selected Cladding:	Masonry veneer over minimum 40mm drained cavity		

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Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Elevations
Drawn: Shane Taylor
Status: Consent Plans
Date Plotted: 28/07/2022
Drawing scale: 1:100 @A3
Sheet: A05
Job: 270568

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Foundation notes:

FL to be 225mm min. above unsealed areas.

FL to be 150mm min. above sealed areas.

Ensure site is free of topsoil or organic material. Excavate as req'd to achieve min. Clearances to finished floor level (ffl)

All topsoil to be removed & replaced with approved hardfill & compacted to 95% of nz standard specification

All concrete footings to be compacted with a vibrator

Minimum 28 days concrete compression strength to be 20mpa

It is recommended that the curing of concrete with continuous sprinkling, be adhered to for a minimum of 4 days & to NZS: 3109 requirements

Bottom plate fixings to be installed to perimeter walls, 28 days min. After conc. has been poured. Refer bottom plate notes for centers.

Foundation dimensions are shown to match wall framing, reduce foundation dimensions as req'd to allow for 6mm bottom plate overhang

Coordinate with drainlayer & plumber as required to sleeve pipe penetrations through footings & slab

Ground Bearing:

The minimum foundation depth for buildings within the scope of NZS3604:2011 is 200mm minimum below *cleared ground level* into *good ground*.

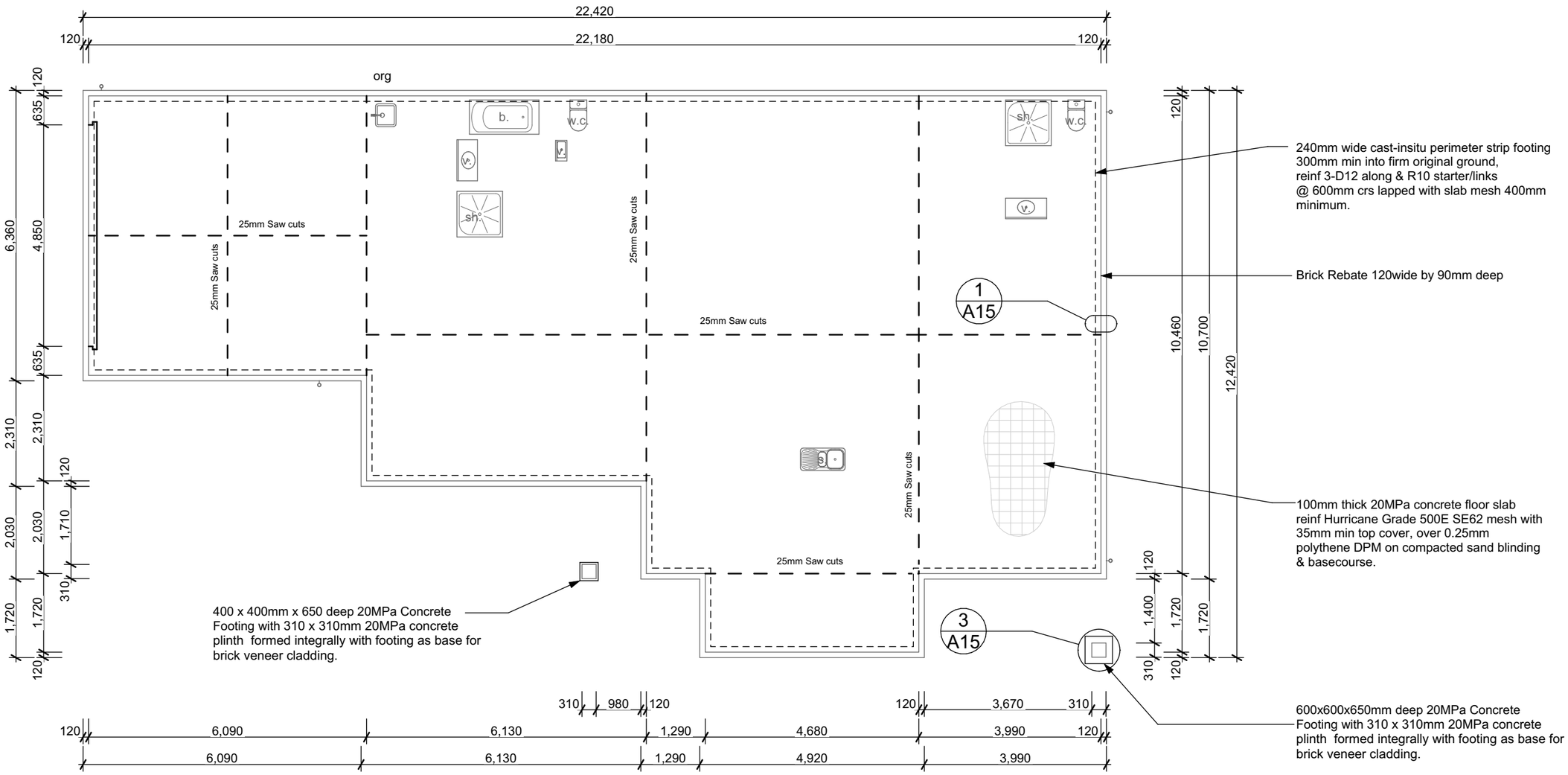
Good Ground:

- means any soil or rock capable of permanently withstanding an ultimate bearing capacity of 300 kPa (i.e. an allowable bearing pressure of 100 kPa using a safety factor of 3.0), but excludes:

A. Potentially compressible ground such as topsoil, soft soils such as clay which can be moulded easily in the fingers, and uncompacted loose gravel which contains obvious voids

B. Expansive soils being those that have a liquid limit of more than 50% when tested in accordance with NZS4402 Test 2.2 and a linear shrinkage of more than 15% when tested from the liquid limit in accordance with NZS4402 Test 2.6; and

C. Any ground which could forseeably experience movement of 25mm or greater for any reason including one or a combination of land instability, ground creep, subsidence, seasonal swelling and shrinking, frost heave, changing groundwater level, erosion, dissolution of soil in water and effects of tree roots



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Proposed Dwelling
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Title: Foundation Plan		Sheet: A06
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:100 @A3	Job: 270568

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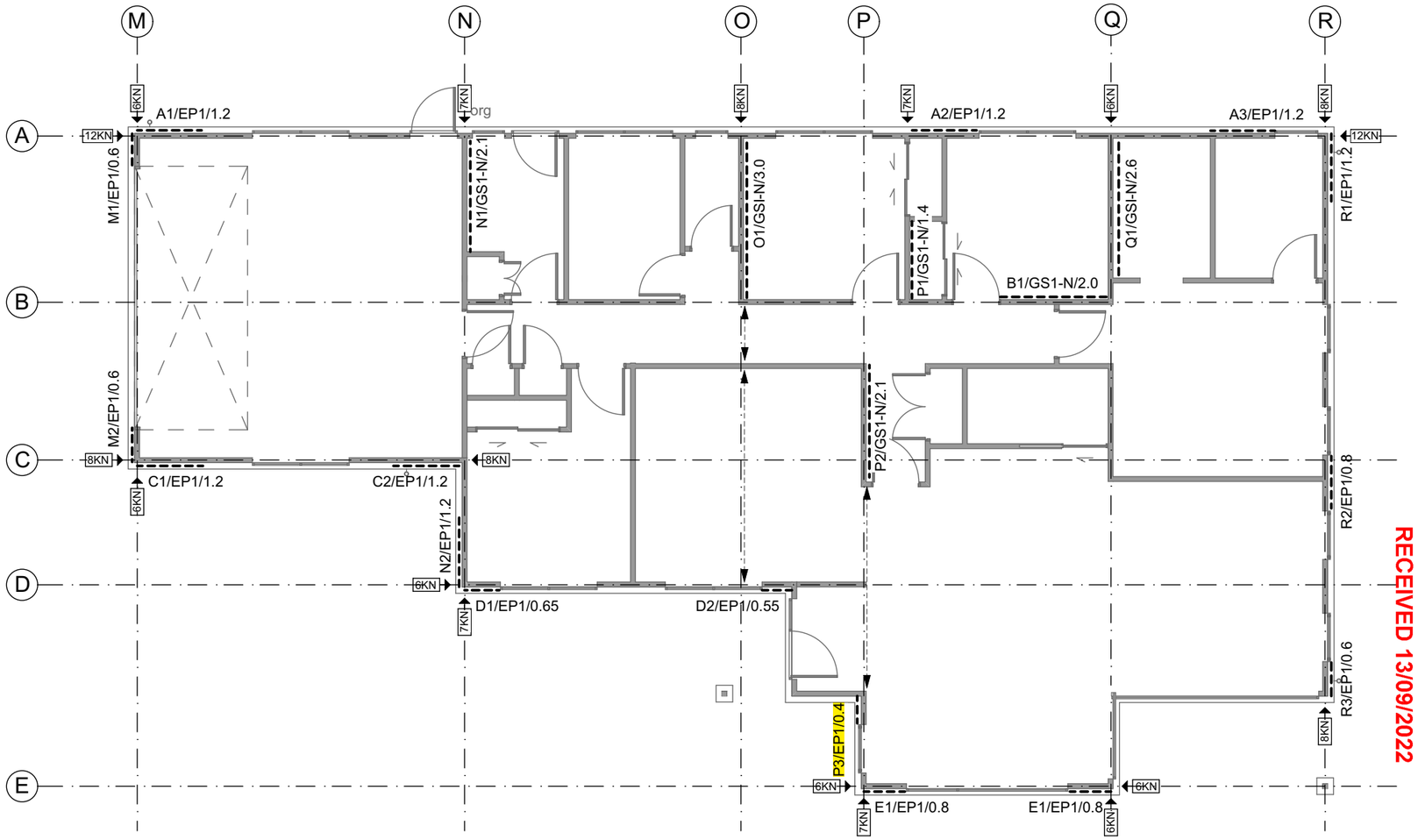
Job Name: B Vijayan & S Sekharath Job

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	Wind 1116 166%	EQ 1219 104%
									Demand 673	1175
									Achieved	
a	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	3	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 22.18								432 OK	486 OK
b	1	2.00		2.4	GS1-N	GIB®	138	120		
									138 OK	120 OK
c	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 6.09								288 OK	324 OK
d	1	0.65		2.4	EP1 0.6	CHH	62	68		
	2	0.55		2.4	EP1 0.4	CHH	44	52		
	External Length = 6.1								106 OK	121 OK
e	1	0.80		2.4	EP1 0.6	CHH	76	84		
	2	0.80		2.4	EP1 0.6	CHH	76	84		
	External Length = 7.5								152 OK	168 OK

Job Name: B Vijayan & S Sekharath Job

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	Wind 1435 106%	EQ 1395 119%
									Demand 1357	1175
									Achieved	
m	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 6.1								114 OK	126 OK
n	1	2.10		2.4	GS1-N	GIB®	145	126		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 2.3								289 OK	288 OK
o	1	3.00		2.4	GS2-N	GIB®	294	258		
									294 OK	258 OK
p	1	1.40		2.4	GS1-N	GIB®	97	84		
	2	2.10		2.4	GS1-N	GIB®	145	126		
	3	0.50		2.4	EP1 0.4	CHH	40	48		
	External Length = 1.7								282 OK	258 OK
q	1	2.60		2.4	GS1-N	GIB®	179	156		
	External Length = 1.7								179 OK	156 OK
r	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	0.80		2.4	EP1 0.6	CHH	76	84		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 10.46								277 OK	309 OK



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

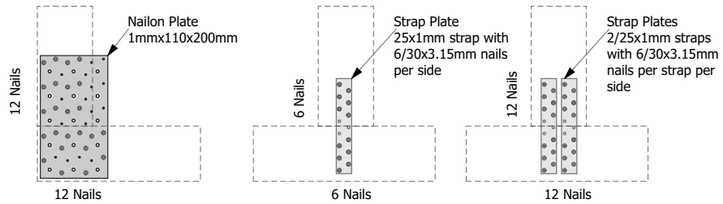
Table 10: Singled Sided Structural Plywood Brace

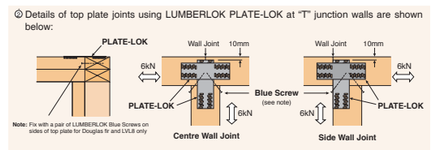
Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake	Other Requirements
EP1_0.4	0.4 m	Ecoply one side	80	95	Hold downs
EP1_0.6	0.6 m	Ecoply one side	95	105	
EP1_1.2	1.2 m	Ecoply one side	120	135	

Braced Walls Top Plate Fixing:
At the end of each wall containing a wall brace, provide a connection to an external wall at right angles as per NZS3604 (clause 8.7.3.2)

Corner Junctions:
Top Plate Packer lapping corner top plate and fixed with 1/90x3.15 nail per kN (ie 8kN = 8 nails each side of joint).
OR:
(Lumberlok Nailon Plate 1mmx110x200mm long with 12/30x3.15mm nails per side - 24 total).

Isolated Braced Walls Top Plate Fixing:
Provide extended connecting timber member to outside walls each end and fix to top plate of outside wall.





TOP PLATE CONNECTION

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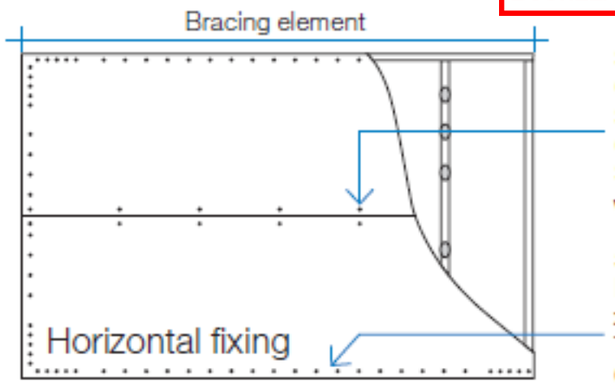
Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

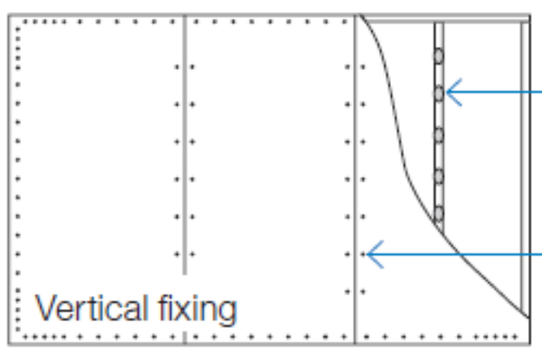
Title: Bracing Plan
Drawn: Shane Taylor
Status: Consent Plans
Date Plotted: 9/09/2022
Drawing scale: 1:100
Sheet: A07
270568

Bcon22/0511 - WDC Approved Plans - 16/09/2022



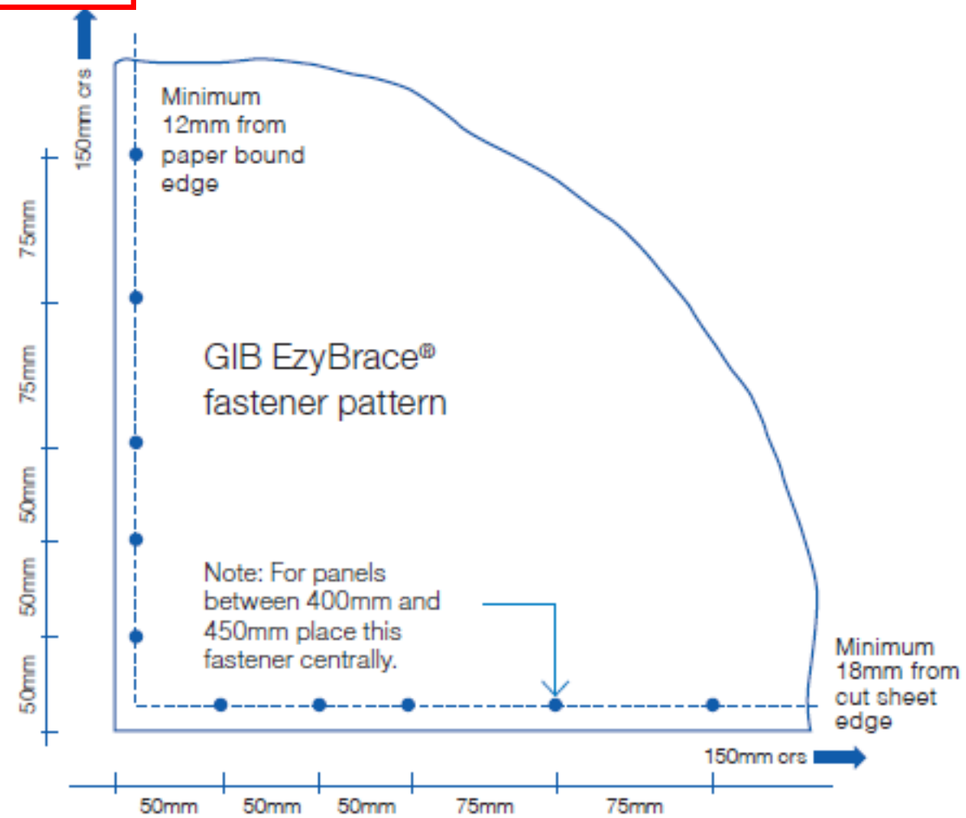
Single 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails where sheets cross studs.

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails where sheets cross studs at 150mm centres to perimeter of bracing element.



Daub of GIBFix® adhesive at 300mm centres to intermediate studs and nogs.

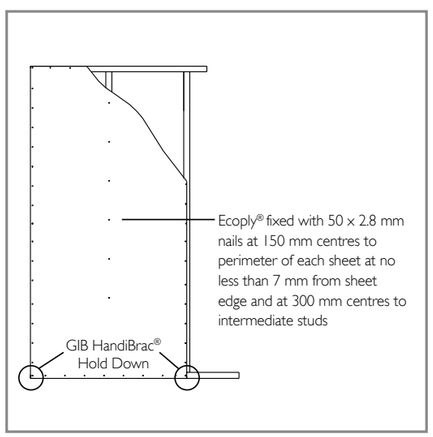
Single 32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails where sheets cross studs at 300mm centres.



Unless stated all fastener spacings are maximums.

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.

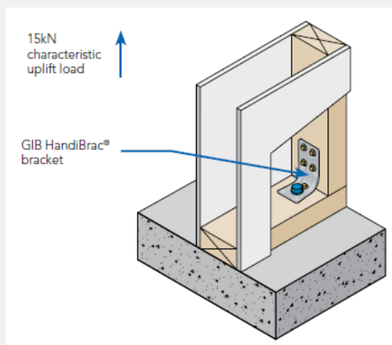


EP1 Brace

GS1-N Fixings

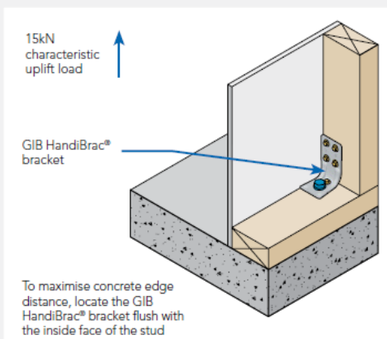
CONCRETE FLOOR – INTERNAL WALL

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



CONCRETE FLOOR – EXTERNAL WALL

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



Panel Hold Down Fixings - Handibrac

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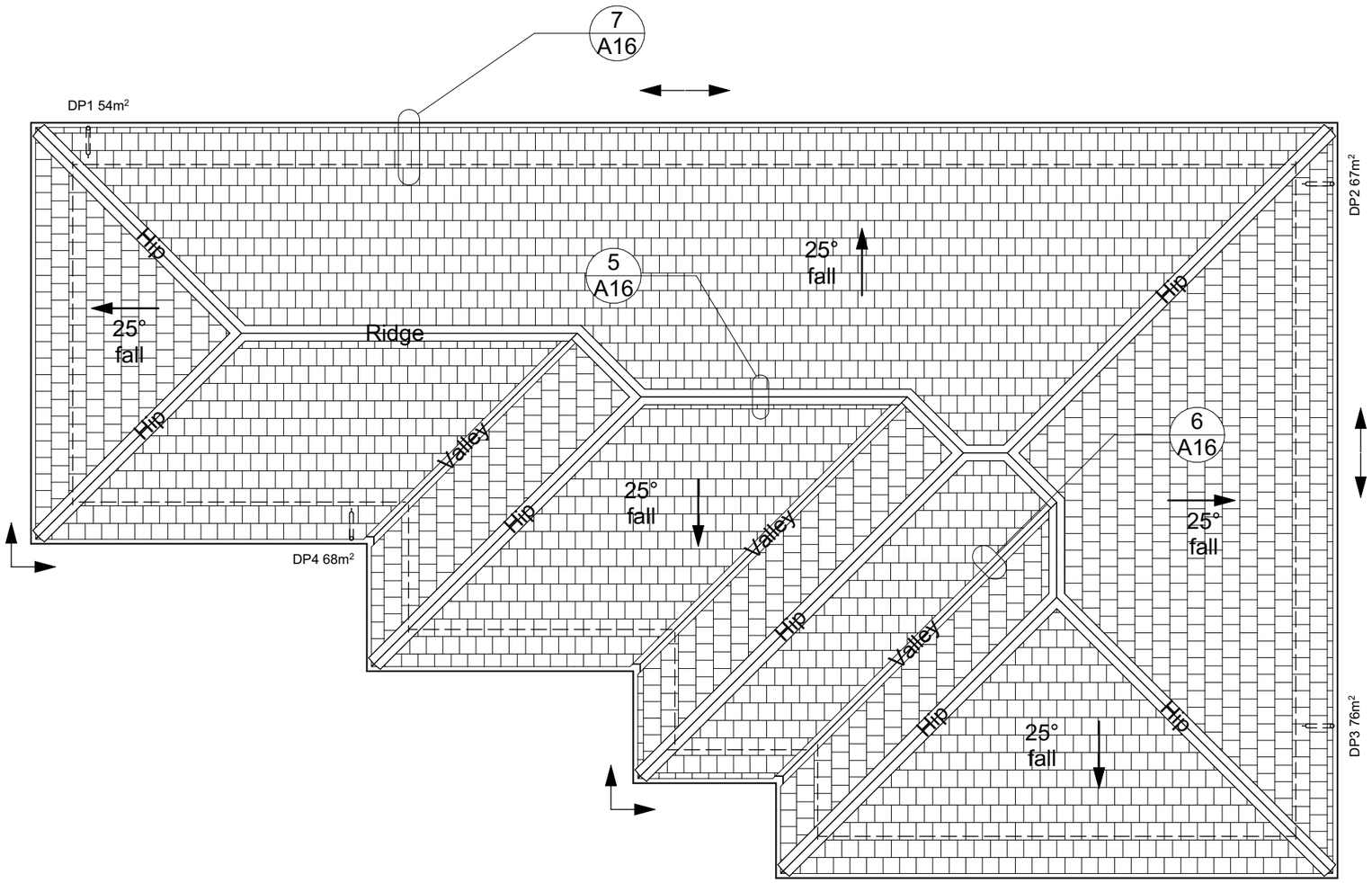
Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Bracing Details		Sheet: A08
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: NTS @A3	Job: 270568

Bcon22/0511 - WDC Approved Plans - 16/09/2022



1 Roof Plan 1:100

Building Notes:

Roofing: 25° Pitch, 600mm soffits
Gerard pressed Metal Tile roofoing on 50x40 H1.2 timber tile basttern @ 370crs max over Pauloid Bituminous roofing underlay

Spouting:
Colorcote Magnaflow 147 Multifit Facia with 1/4 round ColorCote Magaflow gutters and 80mmØ pvc downpipes.

DOWNPIPE CALULATION AS PER E1/AS1
Largest Roof Catchment 76m²
Table 5 E1/AS1-74mm dia=85m²
All downpipes to be 80mm pvc

Metal Roofing Tiles.

Dektite Aluminium proprietary pipe penetration flashing, size to suit pipe.

Cut and fold flashing as per Dektite installation instructions.

Pipe Penetration Detail

Roof Bracing
NZS3604:2011-10.3.2 Light pitched roofs
Light *pitched roofs* shall be *braced* by one *brace* complying with 10.4 for each 50 m2, or part thereof, of plan area including overhangs, with a minimum of 2 *braces* for each ridge line.
Roof Plan area = 265m² / 50 = 5.3 therefore 6 braces required.
Provided 7 Hip Braces & 3 Valley Braces

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Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Roof Plan		Sheet: A09
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:100 @A3	Job: 270568

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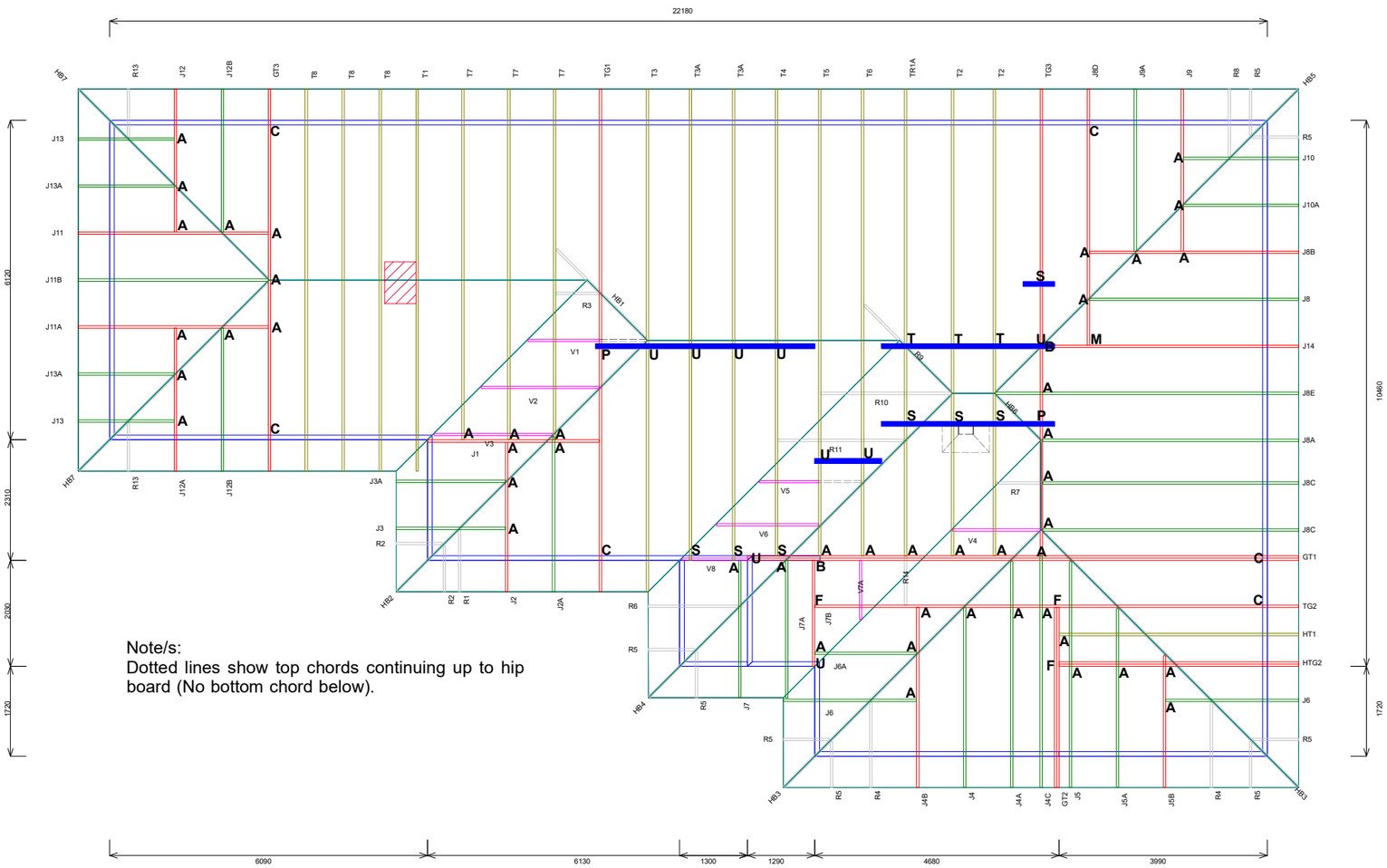
Buildable Consent Layout

FTMA NEW ZEALAND

For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone. Or a pair of CT200's at 900mm centres for extra high wind zone.This fixing is to meet the minimum requirements as per NZS3604.

CARTERS Your Building Partner



Note/s:
Dotted lines show top chords continuing up to hip board (No bottom chord below).

Beams
Loadbearing Internal Walls
Ceiling Access
Rangehood

Truss Fixings

A = 47x90 Joist Hanger
B = 47x120 Joist Hanger
C = CT200 (pair)
D = 47x190 Joist Hanger
E = 95x165 Joist Hanger
F = SH-140 Split Hanger
G = SH-180 Split Hanger
H = SH-220 Split Hanger
J = 2x6kN Strap (12kN)
K = 6kN Strap
L = Multigrip (single)
M = Multigrips (pair)
N = Nailon Plate (240x110x1)
P = 16kN Pack
Q = 9kN Pack
S = CPC 40 Single Cleat
T = CPC 40 Short (pair)
U = CPC 80 Single Cleat
V = 16kN Uplift
Z = Engineers Design

Unless otherwise indicated, all specified truss fixings are to use L/Lok product nail fasteners or Type 17 - 14g Hex Head Screws (as per the MiTek On-site Guide)

All truss to frame fixings require 2 additional 2/90x3.15dia skew nails.

All truss fixings not indicated as above must have 2 wire dogs for cross joints and 2/90x3.15dia nails for butt joins.

Fixings shown are for fixing trusses to the top plate. Any other point load uplift fixings down through the framing stud to top plate, stud to bottom plate, bottom plate to floor remain the responsibility of the architect / draughtsman.

Any roof loads as stated on this layout over 16kN lift are outside the scope of NZS3604, and the architect / draughtsperson is responsible for the design to transfer the loads to the ground.

Snow Zone:	Other [User Defined] (N1)
Wind Area:	High
TC Restraints:	370 mm
Roof Material:	Metal Tiles
Roof Pitch:	25.00 °
Snow Altitude:	100.000 m
Design Wind Speed:	44.0 m/s
BC Restraints:	400 mm
Ceiling Material:	Standard Plaster Board 10mm
Ground Snow Load:	0.000 kPa
Truss Centres:	900 mm

MiTek SAPPHIRE™ Every Facet an Advantage.

Drawn:	Jolaign Villanueva
Date:	14/07/2022

Job No: **WN1370931C1**
Customer: CASTLE HOMES WANGANUI LTD
Job Name: Sekharath New Home
Address: 55 TAWHERO STREET
Gonville, WHANGANUI 4501

If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.
The truss fixings can be substittuted for other fixings of the same or greater capacity.
All verge framing to be fixed according to the MiTek On-Site Guide if not covered by NZS3604.
If bottom chord restraints are 35mm Metal battens, then they must be fixed with either two nails or screws.
If the metal battens are fixed with a single nail or screw then 90x45mm bottom chords restraints will be required at 1800mm centres

All loads shown on this page regarding the truss fixings are characteristic loads

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Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Truss Plan			Sheet:
Drawn: Shane Taylor	Status: Consent Plans		A10
	Date Plotted: 28/07/2022		
	Drawing scale: NTS	@A3	Job: 270568

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Buildable Consent Layout

FTMA NEW ZEALAND

All internal walls shown on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson

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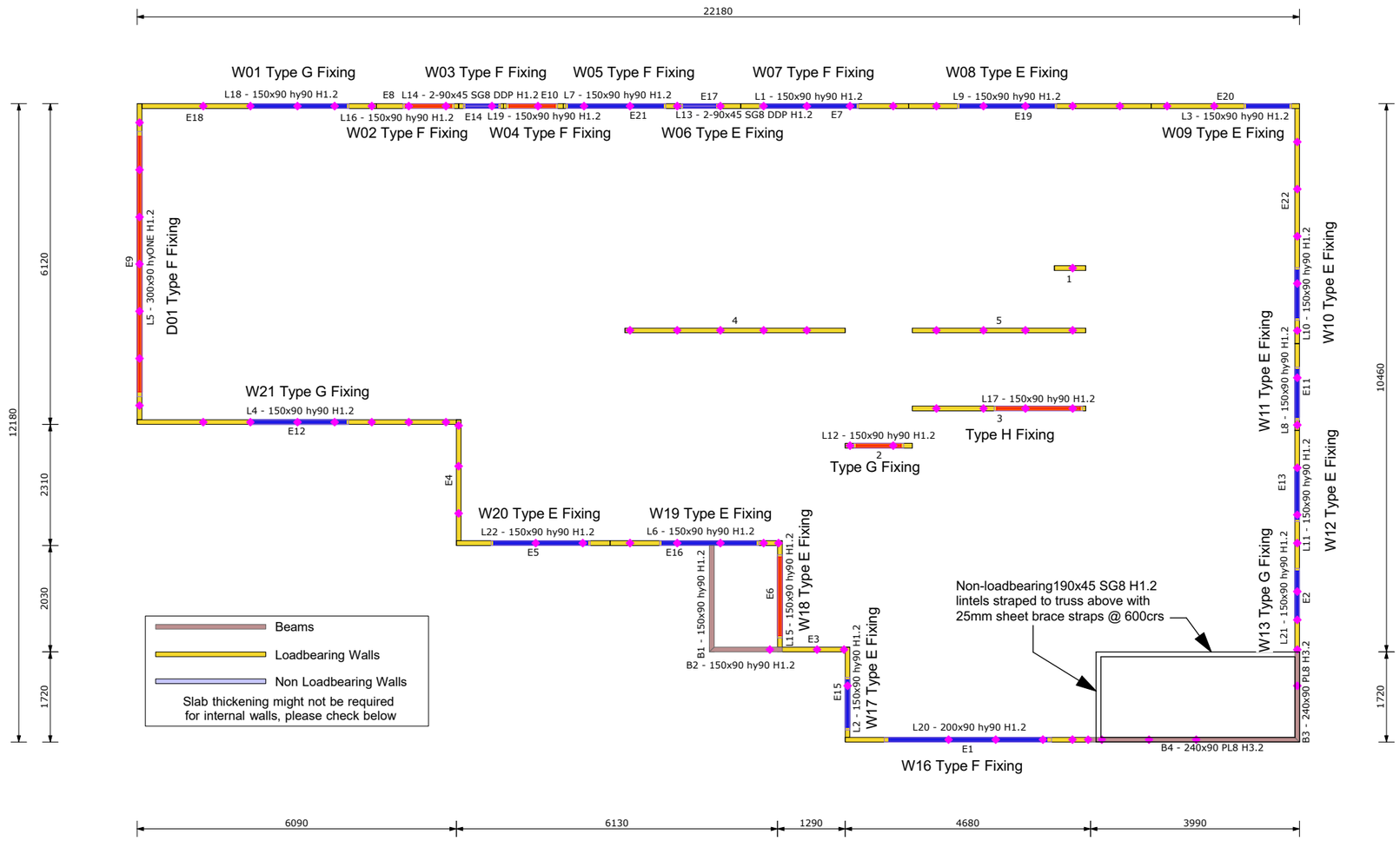
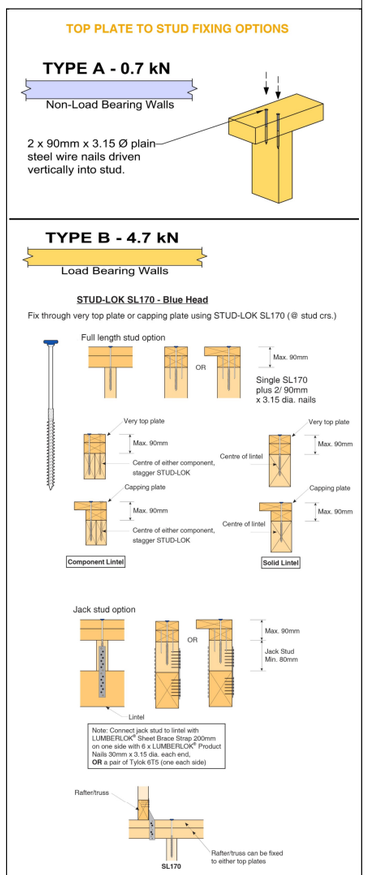


Lintel Fixings are as per the included reports.



Note: These top plate to stud fixing options do not apply to walls under floors, just walls with trusses or rafters attached.

MiTek SAPPHIRE™ Every Facet an Advantage.

Drawn:	Jolaign Villanueva
Date:	14/07/2022

Job No: **WN1370931C1**
Customer: CASTLE HOMES WANGANUI LTD
Job Name: Sekharath New Home
Address: 55 TAWHERO STREET
Gonville, WHANGANUI 4501

Notification of point loaded lintels or point loads on internal walls where the downward load is higher than 8kN (85mm raft type slab) or 10kN (100mm standard slab), or the upward load is greater than 10kN. These loads are Ultimate Limit State Loads

If no loads are shown, no thickening is required.

The lintels have been sized using one of the following:

The MiTek SAPPHIRE Component Design Software.
hy90, hyONE and hySPAN lintels have been sized using the designIT for houses - New Zealand series 6 software.
GANGLAM and FLITCH BEAMS have been sized using the MiTek Beam Program V1.10 June 2011.

Unless otherwise stated the timber grade for all lintels is SG8. Lintels not shown are to be selected as per NZS3604: 2011 or designed by an engineer as required. The lintels have not been designed to support brick shelf angles. The Architect or Engineer is required to design all lintels supporting brick shelf angles.

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Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Lintels & Fixing type			Sheet:
Drawn: Shane Taylor	Status: Consent Plans		A11
	Date Plotted: 28/07/2022		
	Drawing scale: NTS	@A3	Job: 270568

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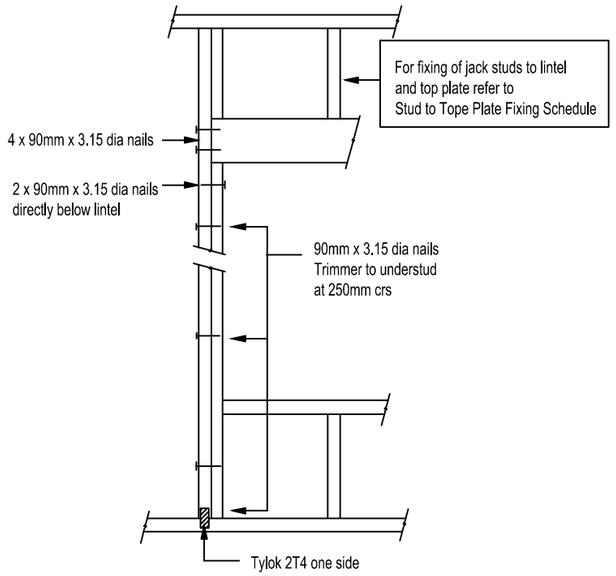
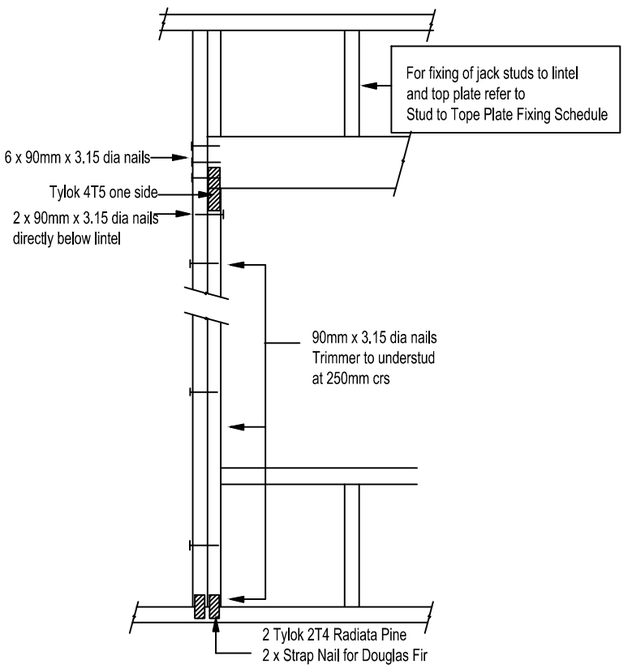
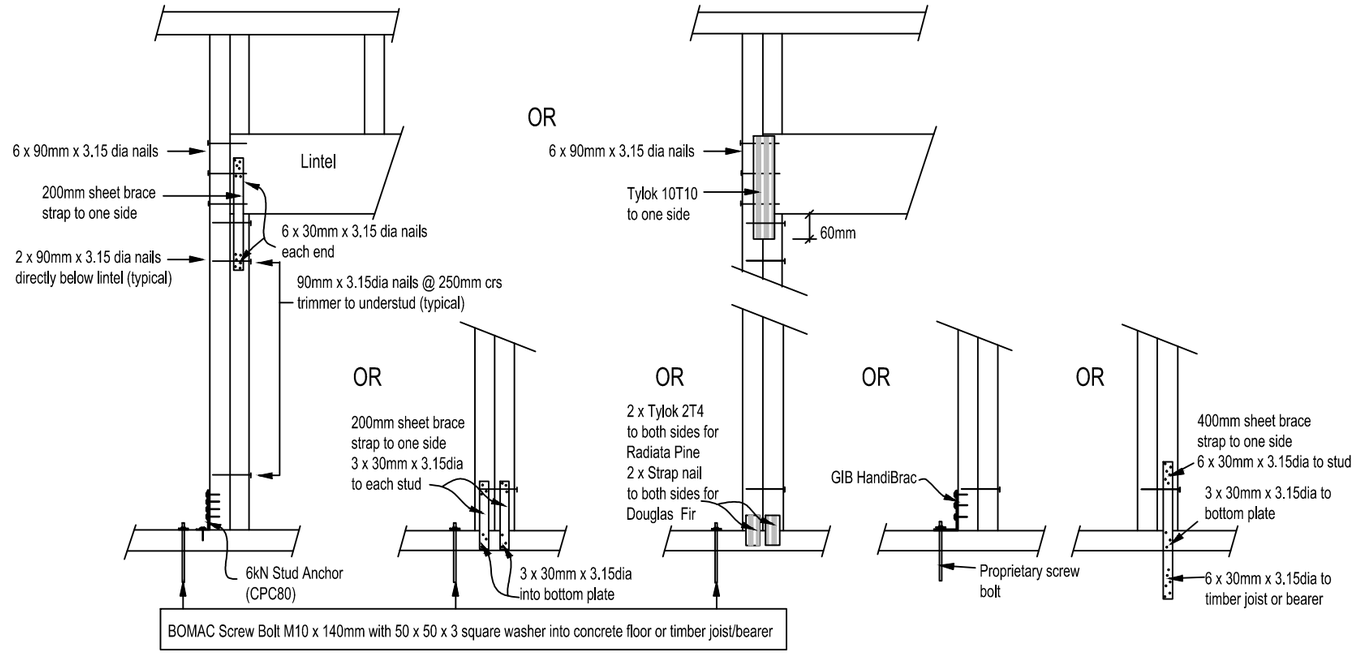
TYPE E
1.4kN



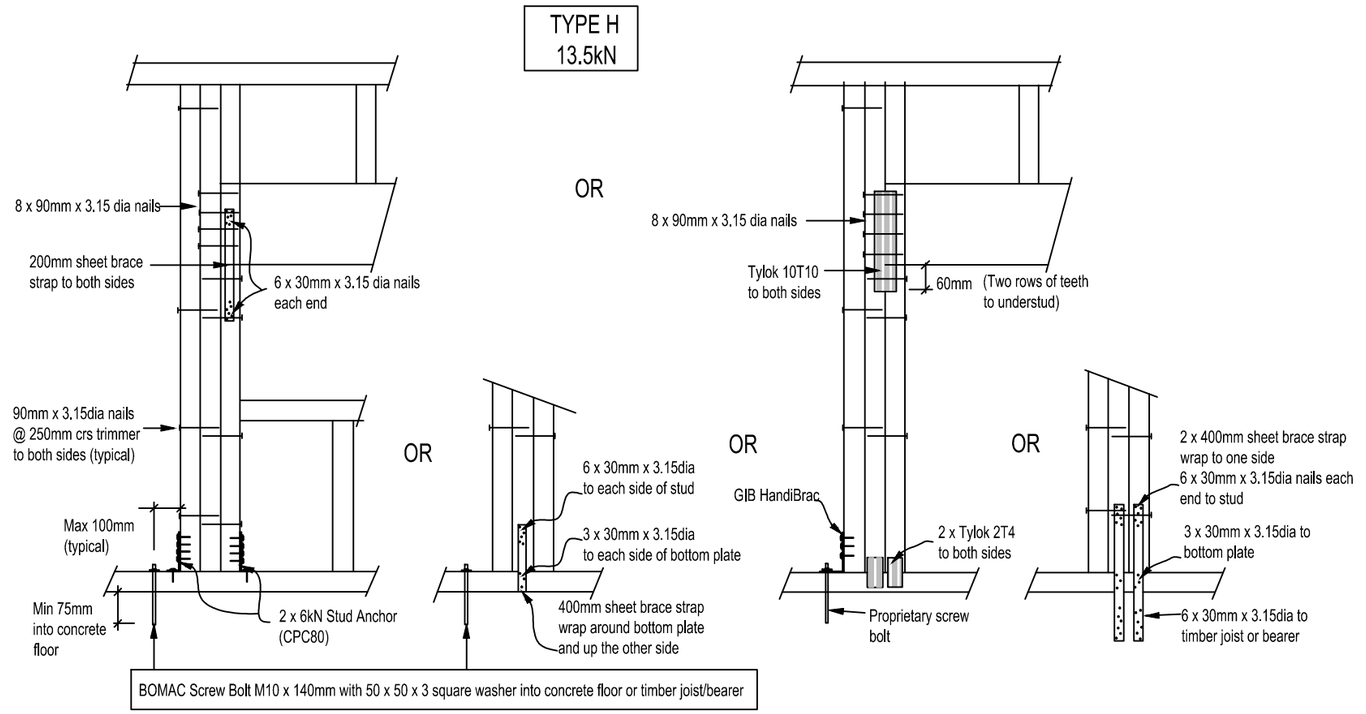
TYPE F
4.0kN



TYPE G
7.5kN



TYPE H
13.5kN



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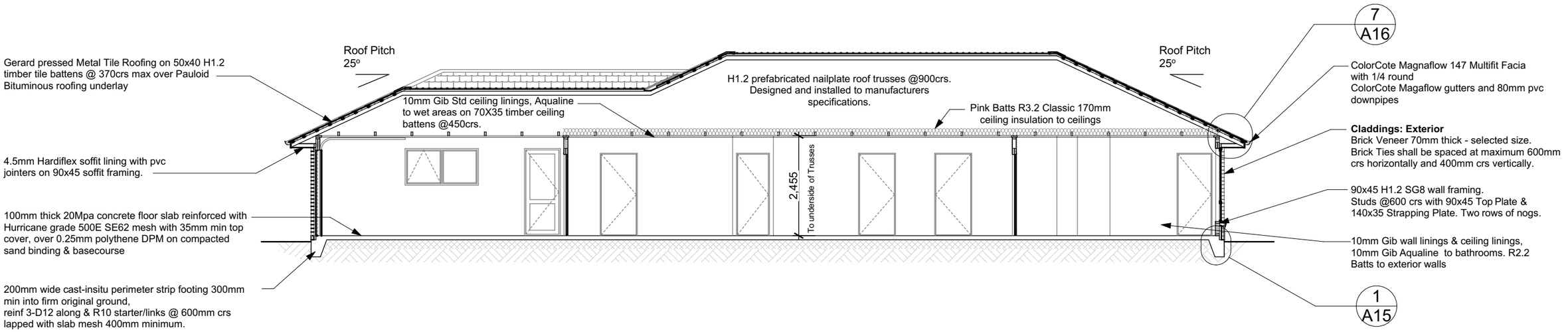
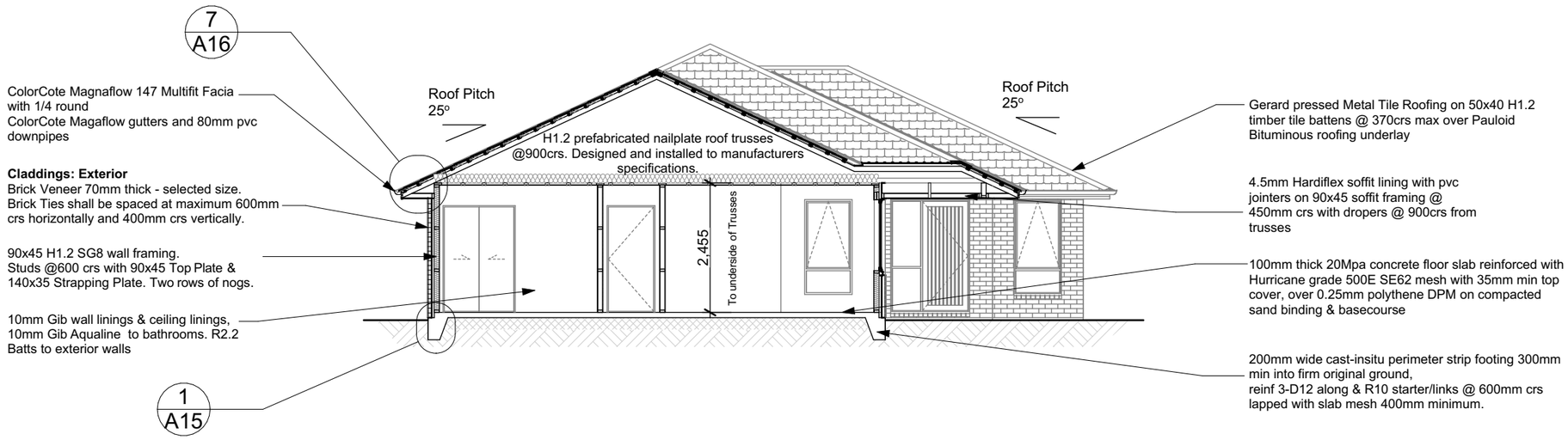
Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Lintel Fixings		Sheet: A12
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: NTS @A3	Job: 270568

Bcon22/0511 - WDC Approved Plans - 16/09/2022



1 Section AA 1:100



2 Section BB 1:100

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55 Tawhero Street, Gonville,, Whanganui

Title: Sections		Sheet: A13
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:100 @A3	Job: 270568

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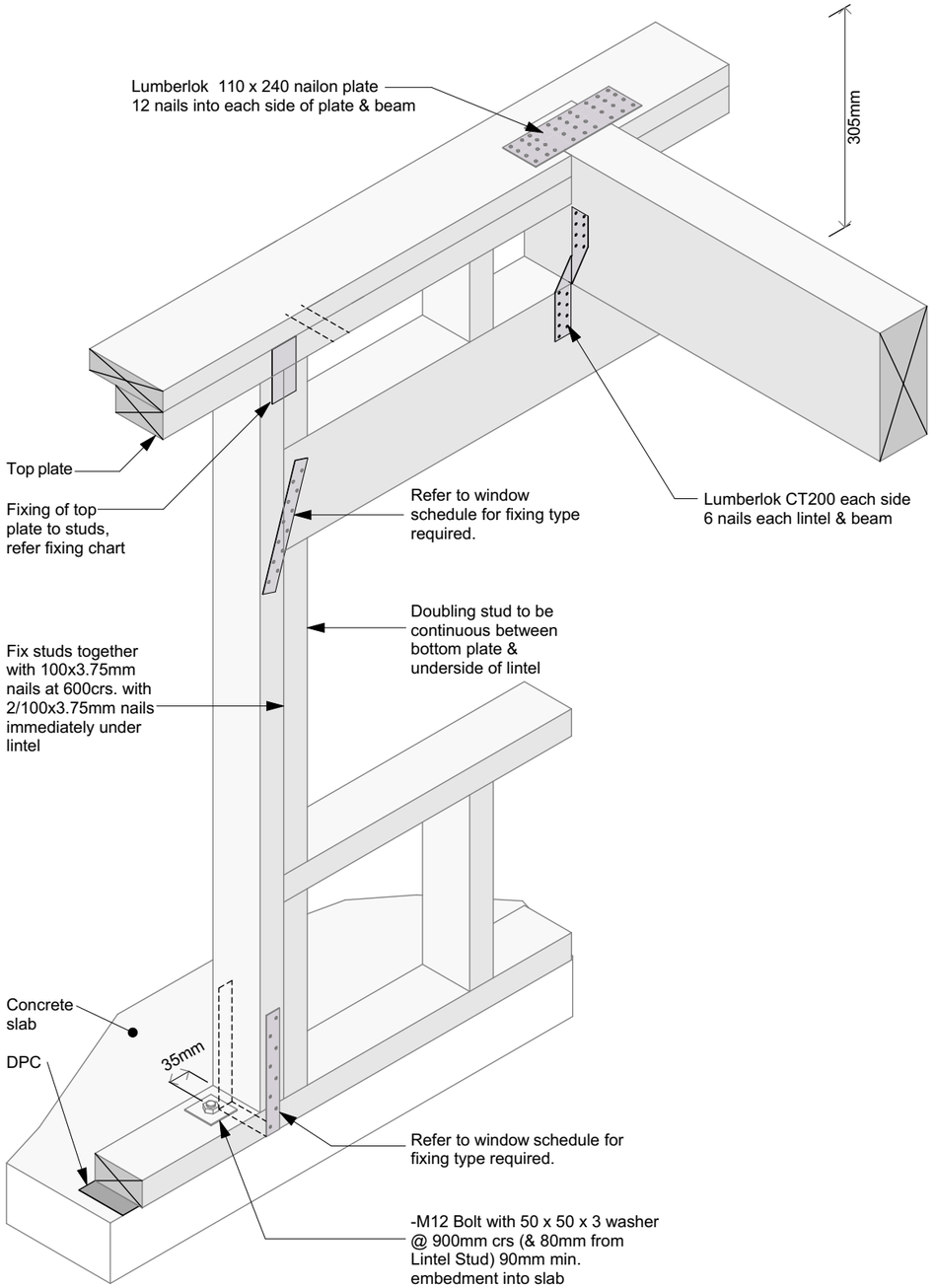
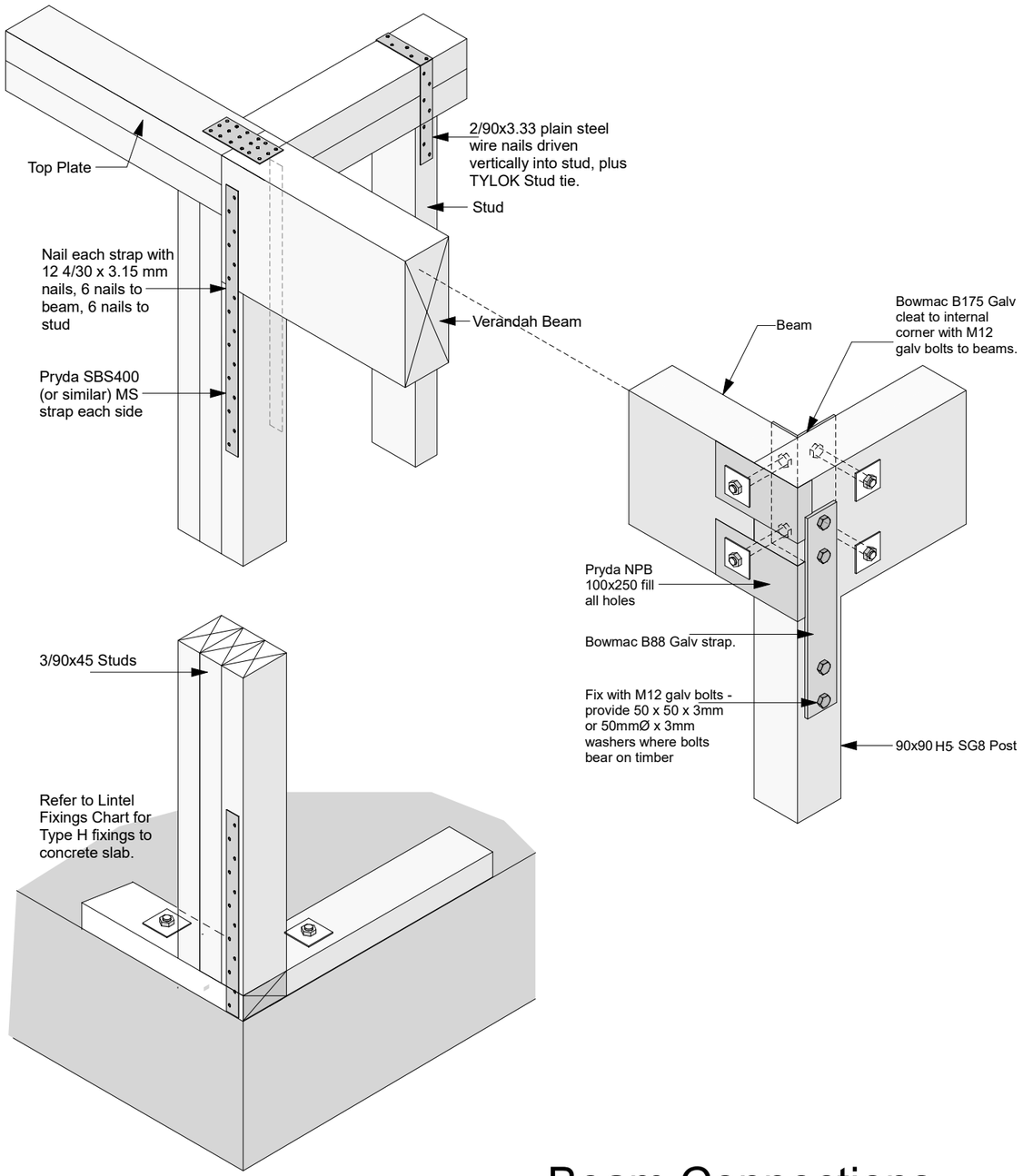


Entry Porch Beam Connections



Beam Connections

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Sheet: A14

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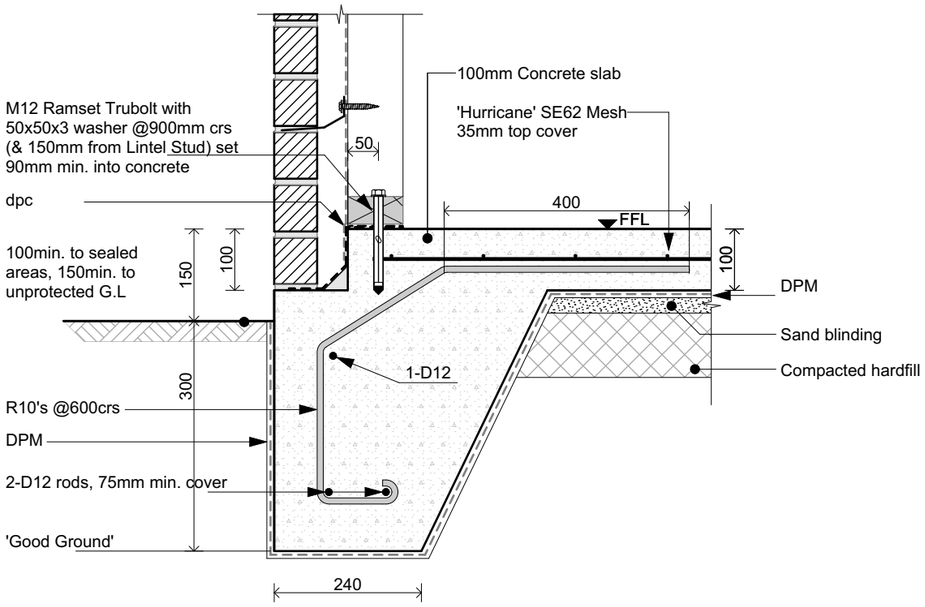
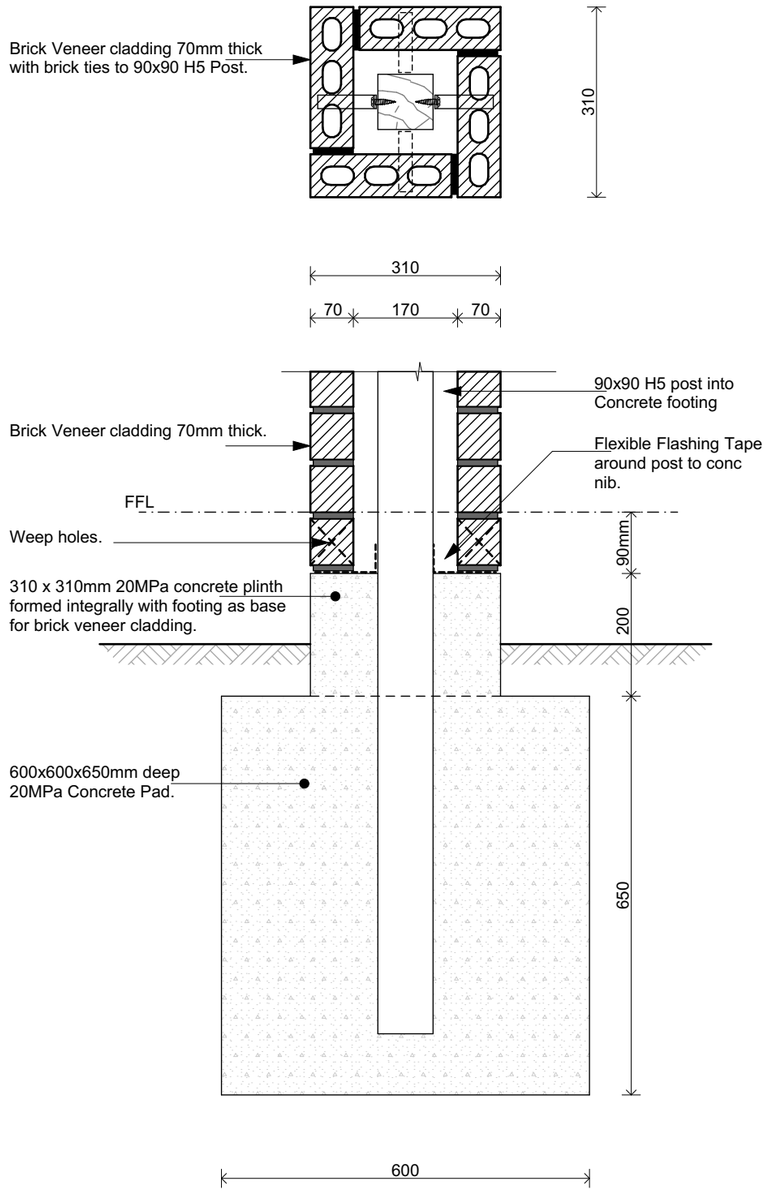


1 Edge Footing 1:10



3 Post Detail 1:10

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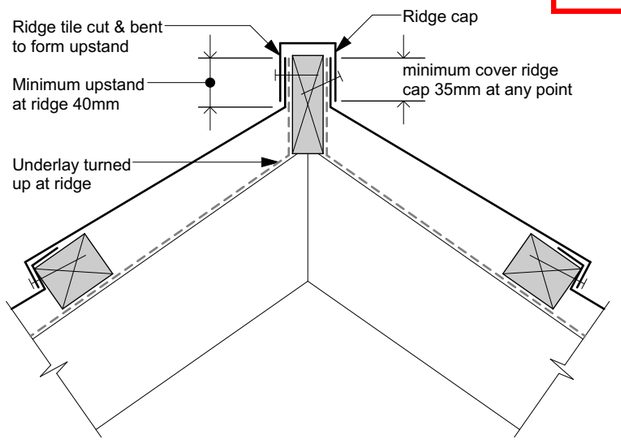
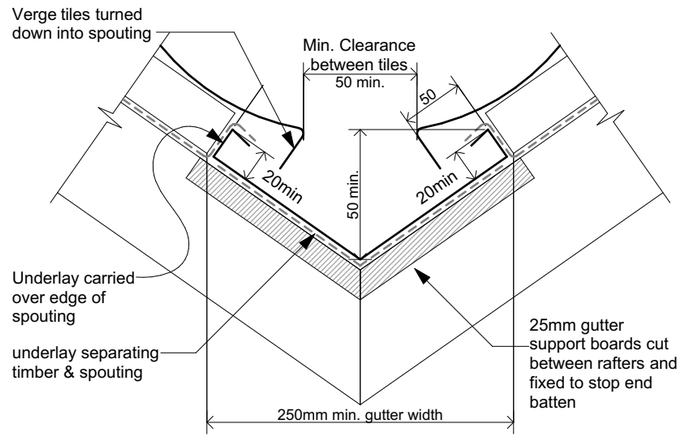
Bibin Vijayan & Sandhya Sekharath
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Foundation Details		Sheet: A15
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:10 @A3	Job: 270568

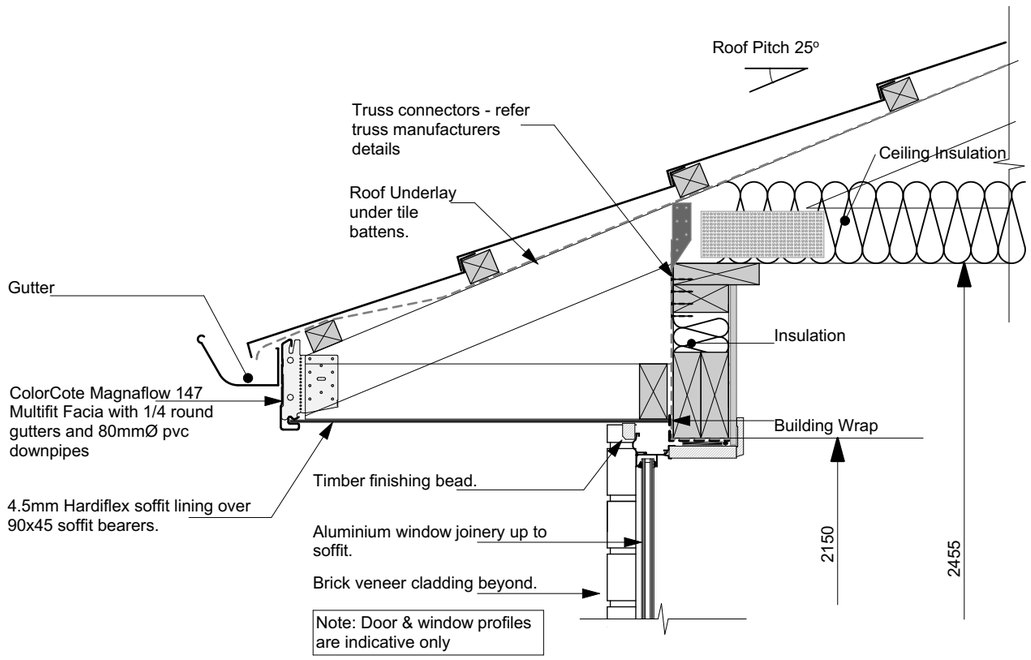
Bcon22/0511 - WDC Approved Plans - 16/09/2022



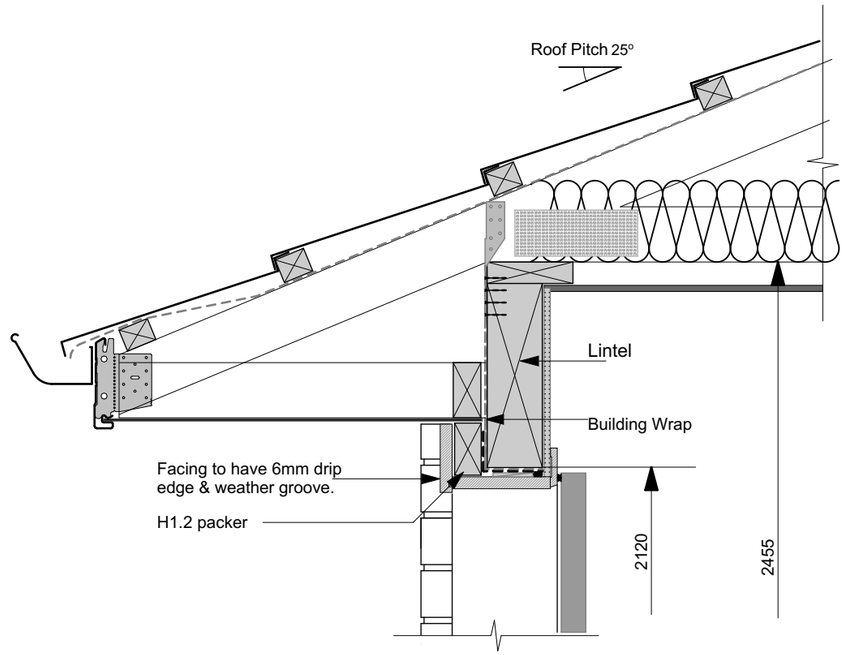
5 Ridge Detail 1:5



6 Valley Detail 1:5



7 Facia Detail 1:10



8 Garage door head 1:10

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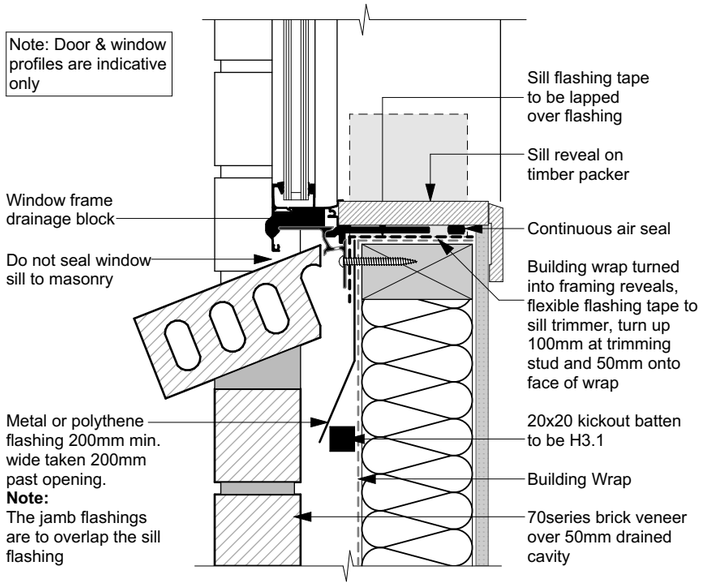
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

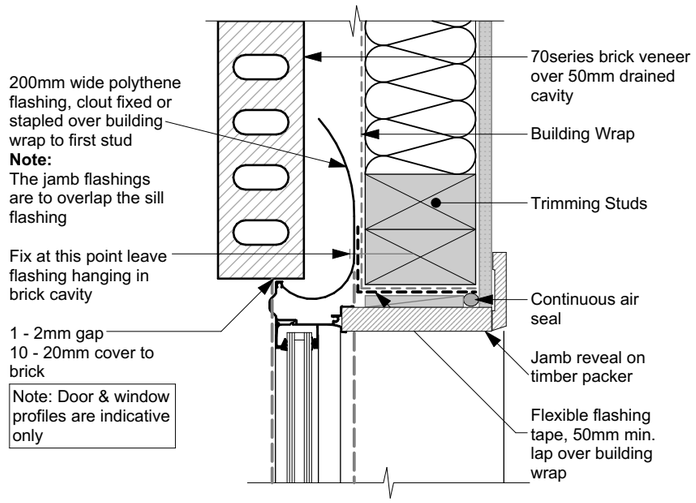
Title: Roof & Soffit Details		Sheet: A16
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:5, 1:10 @A3	Job: 270568

Bcon22/0511 - WDC Approved Plans - 16/09/2022

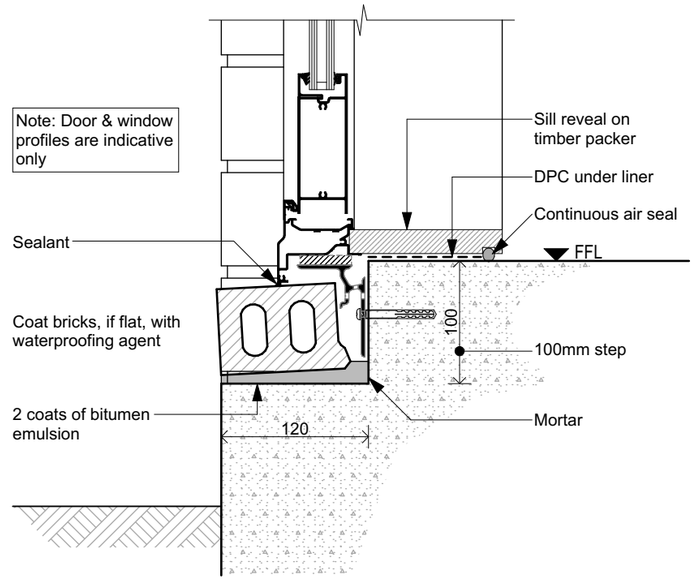


Note: Where support brackets are required by the window manufacturer to carry the frame & glazing loads they must be supplied as an integral part of the window installation & installed to the window manufacturers recommendations	Note: Building wrap & new flashing tape around new window & door openings as per NZBC E2 details	Note: Air seal to consist of sealant or self expanding foam over PEF backing rod

9 Brick Sill Detail 1:5

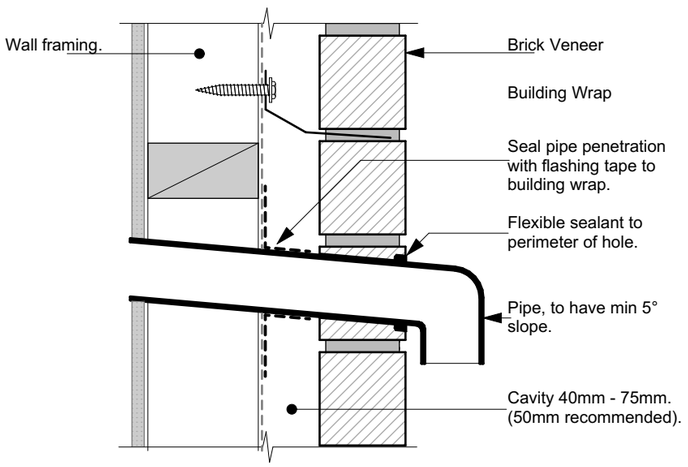


10 Brick Jamb Detail 1:5

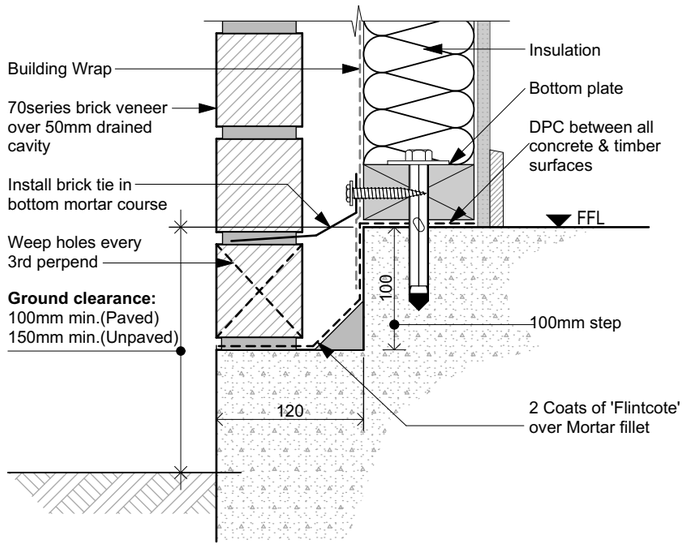


Note:
If brick is to be sloped further, either increase the depth of the step or reduce the thickness of the brick.

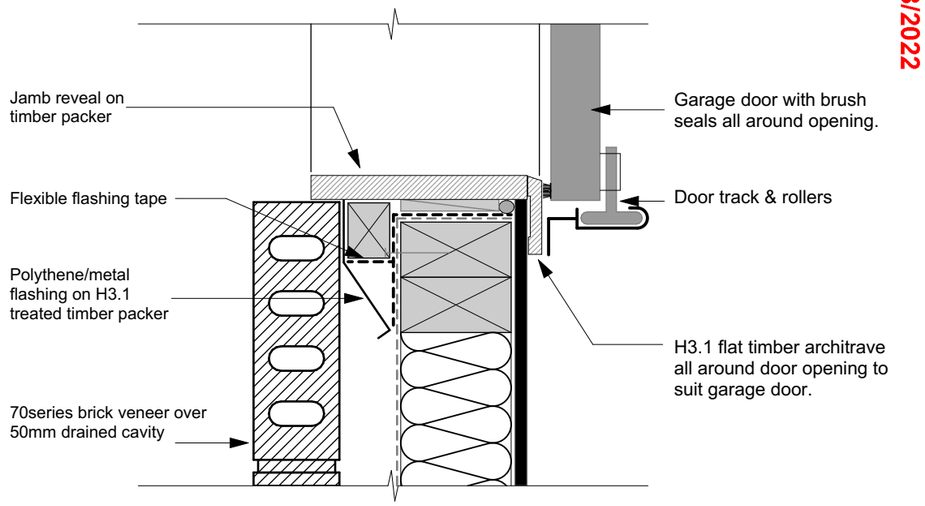
11 Brick Door Detail 1:5



12 Brick Penetration Detail 1:5



14 Brick Base Detail 1:5



15 Garage door jamb 1:5

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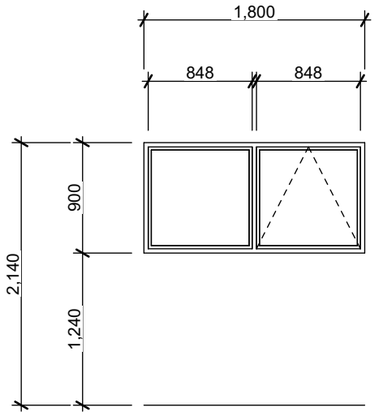
Proposed Dwelling
55 Tawhero Street, Gonville,, Whanganui

Title: Brick Details		Sheet: A17
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:5 @A3	Job: 270568



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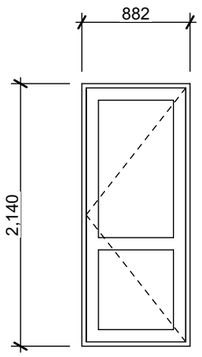

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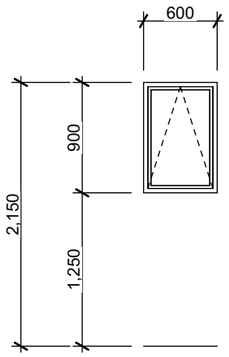

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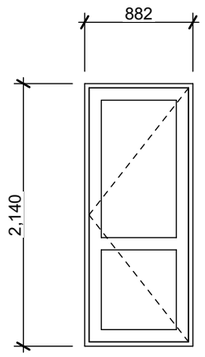

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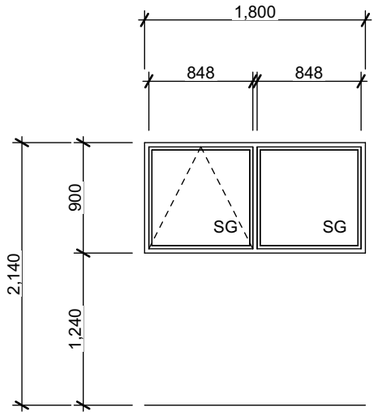

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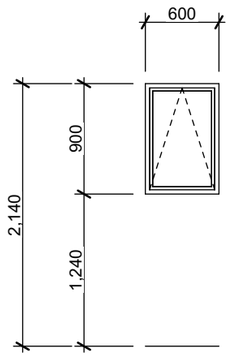

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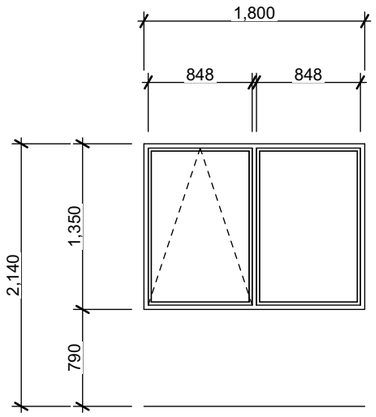

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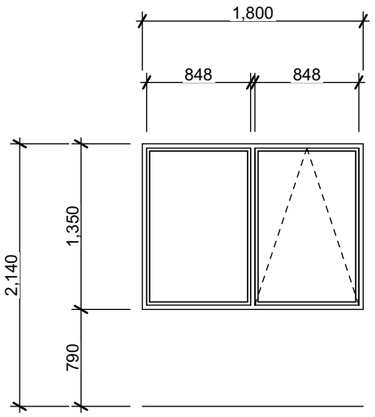

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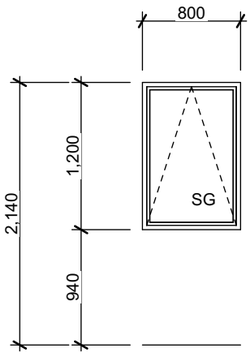

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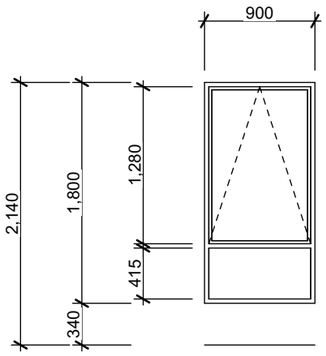

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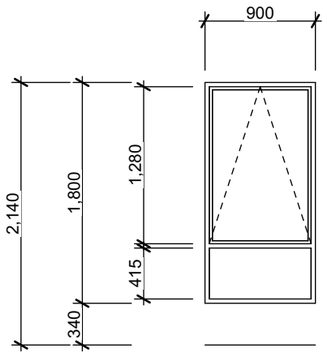

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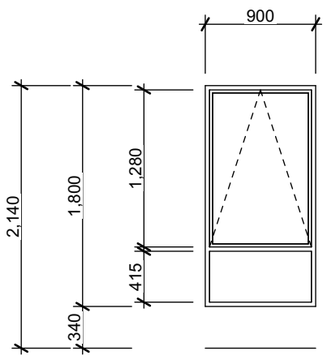

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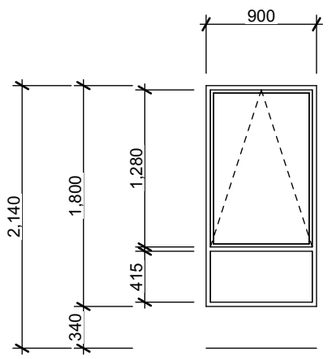

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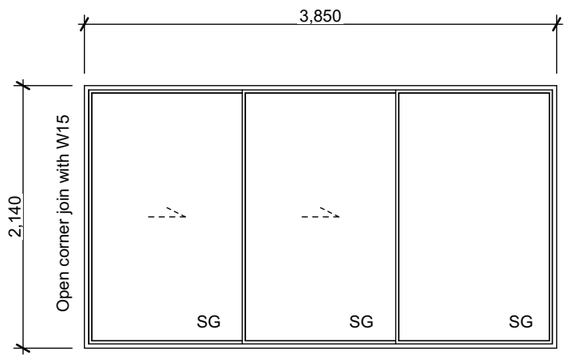

W14

Aluminium doors & windows:

Powder coated aluminium frames, colour to be selected and approved by owner prior to fabrication.
Glazing to be STANDARD double glazed.

SIZES SHOWN ARE 'BOX' SIZE FROM OUTSIDE TO OUTSIDE OF JAMBLINER. ALLOW SUITABLE CLEARANCE ALL AROUND WHEN MAKING WALL FRAMES.
WINDOWS ARE SHOWN VIEWED FROM OUTSIDE.

- Architraved pine jambes
- Colour matching Hardware
- lintel sizes, Refer window list
  (All standard Lintels have been sized from NZS3604, Others are Engineer design
- check all openings on site before fabrication
- obscure glass to bathroom, wc & ensuite
- all windows to be double glazed unless stated otherwise, including garage.

On delivery, windows should be inspected and checked to ensure that;
- they are in satisfactory condition i.e. No damage
- the installation position of each window is identified
- the joints in the frames are backsealed
- flashings have been supplied
- each window has been labeled to show the manufacturers name, the wind zone, air leakage level and compliance with **nzs4211:1985**

Safety glass locations:
All glazing meeting the following requirements must be grade A safety glass sized in accordance with **NZS4223.3:2016**

Enterior doors:
Door sizes shown are opening size.
Refer to floor plan for opening direction
Labels are to be removed after the windows & doors have been inspected.

Flashings:
It is the window manufacturers responsibility to supply all head and sill flashings. Site measure all openings. Establish appropriate corrosion zone and compatibility with aluminium joinery.

Support Brackets:
Where support brackets are required by the window manufacturer to carry frame & glazing loads, they must be supplied as an integral part of the window installation and installed to the window manufacturers recommendations.

Safety from fall F4:
Window restrictors to be provided to opening window where required to comply with F4 section 2

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55 Tawhero Street, Gonville,, Whanganui

Title: Window Schedule 1of2		Sheet: A18
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:50 @A3	Job: 270568

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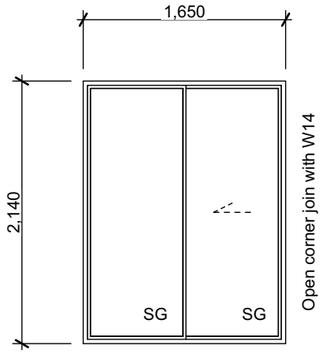

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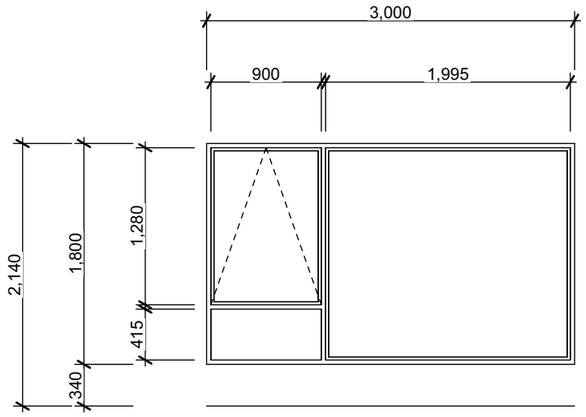

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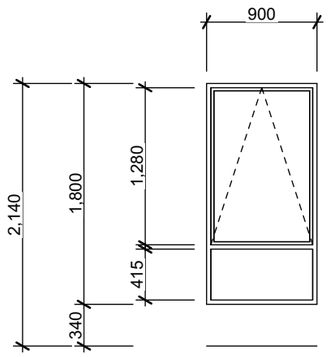

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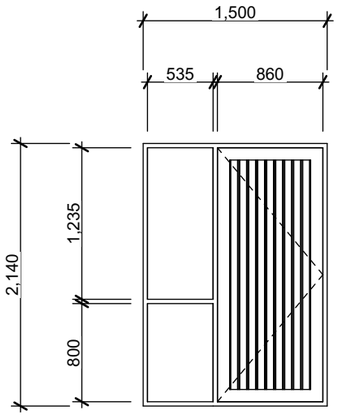

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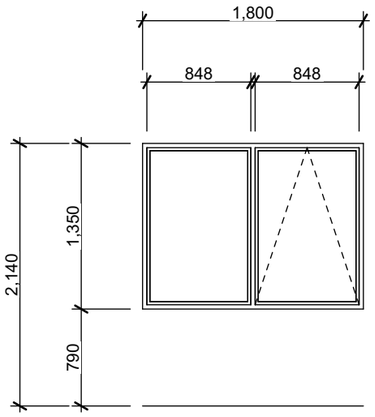

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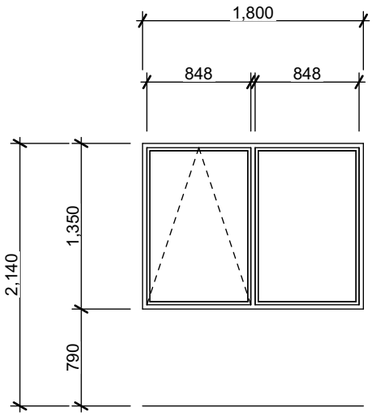

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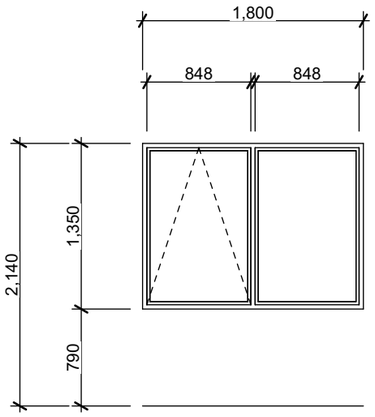

W21

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Title: Window Schedule 2of2		Sheet: A19
Drawn: Shane Taylor	Status: Consent Plans	
	Date Plotted: 28/07/2022	
	Drawing scale: 1:50 @A3	Job: 270568

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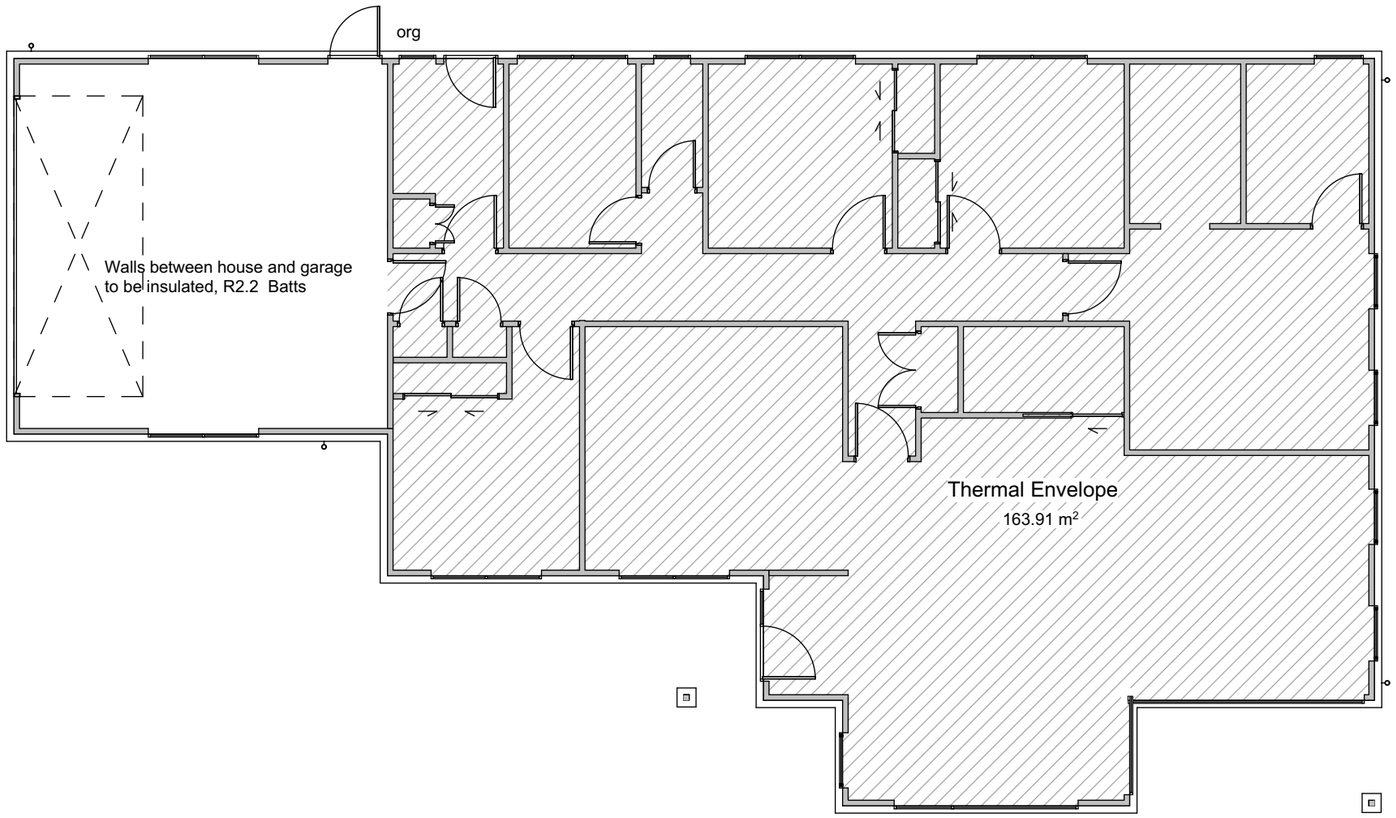

H1/AS1 Calculation method:

H1 Energy Efficiency Calculations

Building Data:

Climate Zone	Zone 2
A_{Roof} (Total Roof Area)	164.00 m²
Total Wall Area (including glazing)	135.70 m²
30% of Total Wall Area	40.71 m²
A_{Wall} (Total Wall Area - Total Glazing Area)	91.85 m²
$A_{Glazing}$ (Total Glazing Area)	43.85 m²
Glazing Ratio	32.31 %
A_{Floor} (Total Floor Area)	164.00 m²

Reference Building Heat Loss:

$$HL_{REF} = \frac{A_{Roof}}{2.9} + \frac{A_{Wall}}{1.9} + \frac{A_{30\% \text{ Total Wall Area}}}{0.26} + \frac{A_{Remaining\ Glazing}}{0.31} + \frac{A_{Floor}}{1.3}$$

$$= \frac{164.00}{2.9} + \frac{91.85}{1.9} + \frac{40.71}{0.26} + \frac{3.14}{0.31} + \frac{164.00}{1.3}$$

= 56.55 + 48.34 + 156.58 + 10.13 + 126.15

= 397.8 W/°C

Proposed Building Heat Loss:

Building Element		R (m² °C/W)	A (m²)	HL
Roof	Metal roofing over R3.2 fibreglass batts insulation	3.20	164.0	51.3
Wall	Brickcladding over 90mm framing with R2.2 fibreglass batts insulation	2.20	91.9	41.8
Glazing	Double-glazed windows	0.26	43.9	168.7
Floor	100mm concrete slab on vapour barrier	1.30	164.0	126.2

Total Heat Loss = 387.8 W/°C

PRODUCT SELECTIONS:

Ceiling/Roof	Tasman Insulation Pink Batts	R3.2 Classic	170mm
Walls	Tasman Insulation Pink Batts	R2.2 Classic	90mm
Windows	Double Glazed	R0.26	
Floor	Concrete Slab	R1.3	

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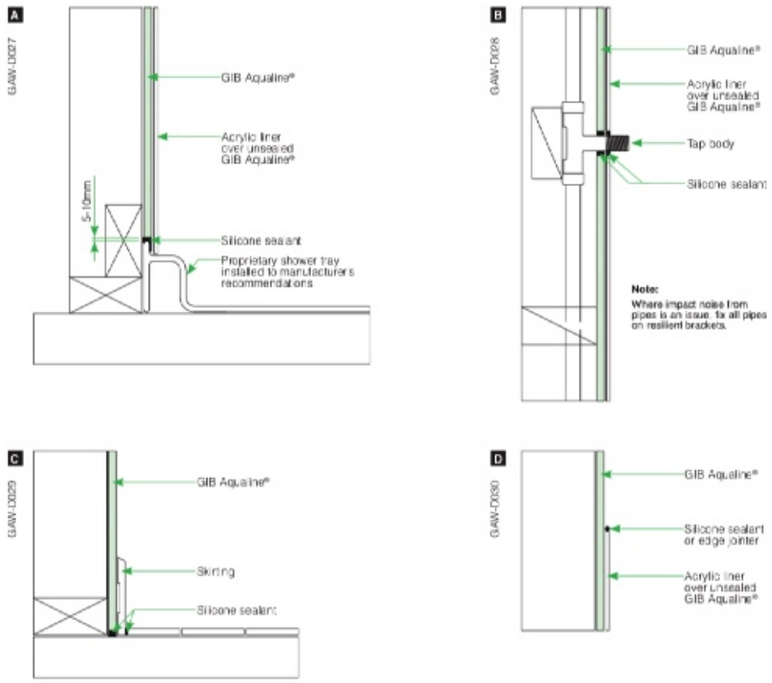
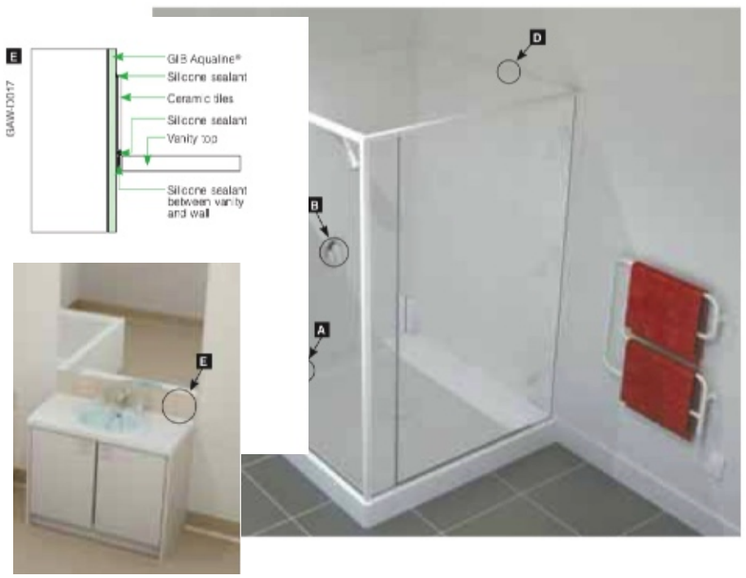
Title: H1 Insulation Plan
Drawn: Shane Taylor
Status: Consent Plans
Date Plotted: 28/07/2022
Drawing scale: 1:100 @A3
Sheet: A20
Job: 270568

GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

Shower – Acrylic Liner and Base

MARCH 2007





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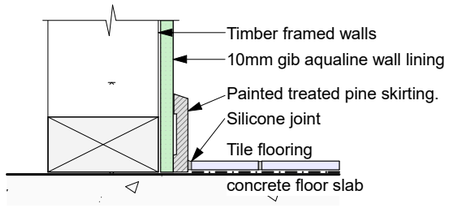
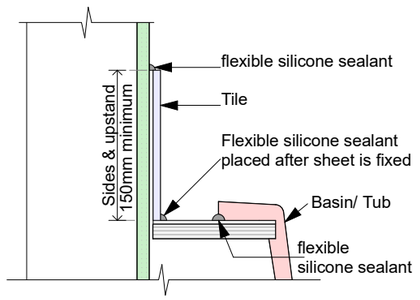


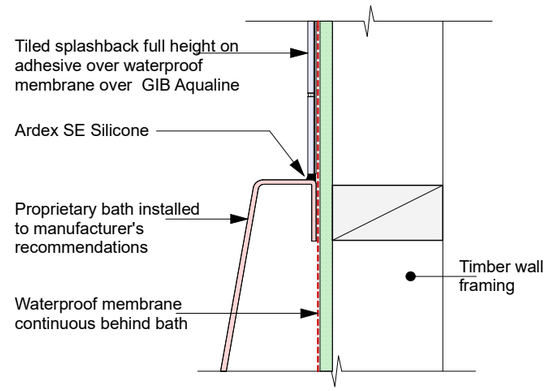
Tiled Floor

Scale: 1:5



Sink & Basin / Wall Junction

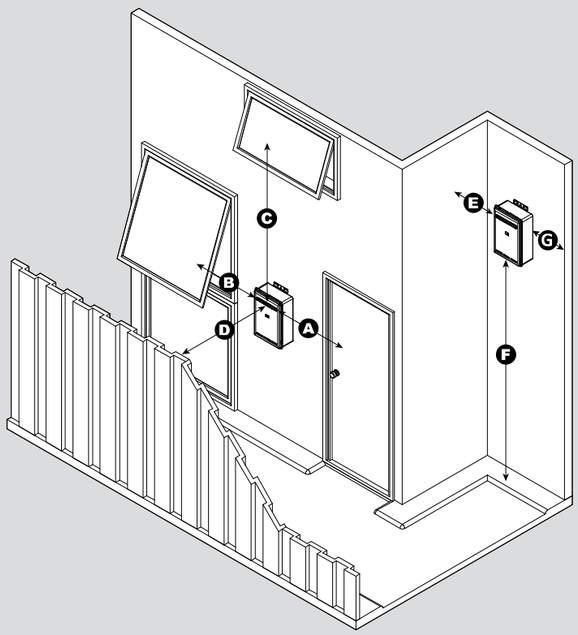
Scale: 1:5



Bath/Wall Detail

Scale: 1:5

External models: General flue clearances



Dim.	Infinity VT, HD200, EF models	Infinity HD250 models
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm*
G	Min. 300 mm	Min. 300 mm

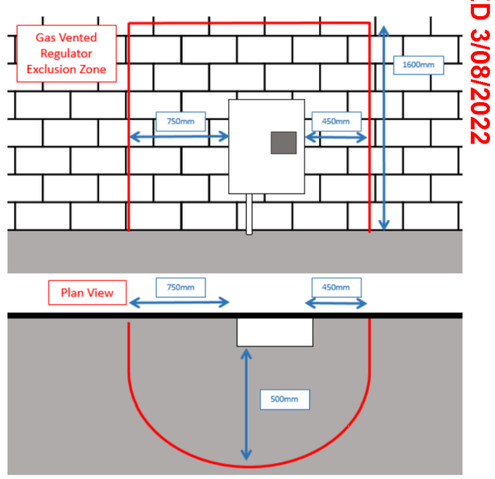
Other clearances

Below eaves, balconies, and other projections, minimum 300 mm.

From a gas meter, minimum 1000 mm.

From an electricity meter or fuse box, minimum 500 mm.

* Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.



re 6. **Vented Gas Regulator Exclusion Zone**

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Sheet: A21

Job: 270568

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Shane Taylor Ltd

PROJECT SPECIFICATION

Bibin Vijayan & Sandhya Sekharath

55 Tawhero Street

Gonville

Whanganui

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Issued for Consent

270568

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PROJECT OVERVIEW

Scope

GJ Gardner Proposed New Dwelling

Address

Site Address	55 Tawhero Street
Suburb	Gonville
City	Whanganui
Lot #	Lot 24
DP #	DP569376

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone C - Medium
Snow Loading Zone	Zone N0

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TABLE OF CONTENTS

Concrete 4
Materials 4
Brickwork 6
Brickwork 6
Carpentry 8
Workmanship & Materials 9
GIB® Plasterboard Linings 15
Ecoply Bracing 18
Roofing 20
Workmanship 20
Roofing Systems - Pressed Metal Tile 21
Aluminium Joinery 22
Aluminium Windows & Doors 22
Insulation 26
Pink Batts Insulation 26
Tiling 31
Tiling 31
Plumbing 35
Workmanship 35
Gas 37
Gas System - Piped Natural Gas 37
Drainlaying 40
Workmanship 40
Electrical 42
Workmanship 42
Appendix 44
Geotech Report 44
Storm Water Report 44
Truss Layout & PS1 44
Bracing 44
Brick veneer best practice guide 44
Tekton Wall Underlay spec's 44
Tekton BRANZ appraisal 44
Thermathene Datasheet 44
Thermathene install guide 44
Bituminous Roof Underlay 44
Gerard Roof Specs 44
Rinnai Infinity Spercs 44
F&P Rangehood specs 44
Manrose Extraction Fan Specs 44
BRANZ Appraisal No.238 - Pink® Batts® Insulation 44

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1 CONCRETE

1.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

1.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3124:1987(NZS)	Specification for concrete construction for minor works
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units

1.3 Materials

1.3.1 Damp Proof Membrane

Polythene damp proof membrane shall be 0.25mm thick and shall be continuous under slabs on grade or fill and under foundations. All joints lapped 200mm and continuously sealed with pressure sensitive tape. Tape seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

1.3.2 Reinforcement

Reinforcing grades are identified by bar diameters prefixed with letters thus:

D indicates Grade 300E deformed bar
R indicates Grade 300E plain round bar
HD indicates Grade 500E deformed bar
HR indicates Grade 500E plain round bar
RB indicates Grade 500 Reidbar (uniquely deformation patterned bars)

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Imported reinforcing steel will not be accepted without the prior approval of the Engineer. Reinforcing free of loose rust, mill scale, dirt, paint, oil, etc. and stored clear of the ground. Accurately place reinforcing and tie securely to prevent displacement during pouring of concrete. Tie wires must not project into specified concrete cover. Welding of reinforcing is not permitted unless specifically approved by the Engineer.

All terminal ends of reinforcing bars shall be hooked. Intersecting walls, beams and foundations shall contain return longitudinal reinforcement, as detailed for the intersecting members, all to NZS 3109 unless shown otherwise on the drawings.

1.3.3 Concrete Cover

Concrete cover not shown otherwise to be:
- Foundations - 75mm where poured against ground, 50mm elsewhere.
- Beams and columns - 40mm (for main reinforcing).
- Slabs - 50mm where poured on ground, 40mm where exposed to weather, 30mm elsewhere.
- Walls - 40mm where exposed or against ground, 30mm elsewhere.

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2 BRICKWORK

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2699.1:2000(AS/NZS)	Built-in components for masonry construction - Wall ties
3103:1991(NZS)	Specification for sands for mortars and plasters
3604:2011(NZS)	Timber-framed buildings
4210:2001(NZS)	Masonry construction: Materials and workmanship
4236:2002(SNZHB)	Masonry veneer wall cladding

2.3 Brickwork

2.3.1 Scope

Supply and lay the selected bricks to form the brick elements as shown on the drawings. All aspects of this work shall be in accordance with the related compliance documents and as shown on the drawings.

2.3.2 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall only be carried out by Licensed Building Practitioners - Bricklaying and Blocklaying, and conform to the requirements of NZS 4210.

Submit evidence on request of experience, relevant qualifications, LBP Licence - Bricklaying & Blocklaying, New Zealand Masonry Trades Association (NZMTA) Member Registration.

Co-operate with the concretor and carpenter in the setting out of the works.
Co-operate with other trades to ensure that all preliminary and preparatory works, including all framing, membranes, wraps, rigid air barriers, and flashings, all relevant clearances, and any other related works, are completed to specification and as shown on the drawings.
Co-ordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others.

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All brick veneer walls shall be true to line, level and plumb, and within the tolerances tabled in NZS 4210 and SNZ HB4236. All brickwork laid to stretcher bond pattern, with joints width 10mm +/- 3mm.

2.3.3 Installation

Install all brickwork related damp proof courses in accordance with the requirements of NZBC E2/AS1 and to the details shown on the drawings.

Mortar shall have a minimum compressive strength of 12.5 MPa, and be manufactured from cement, sand, lime, and admixtures, and be accurately measured and mixed in accordance with NZS 4210. Mineral oxide pigment dosages shall be to NZS 4210.

Form all necessary openings, reveals, sills, weepholes, separation and control joints, and cavities to the locations and details shown on the drawings, and in accordance with the requirements of NZBC E2/AS1 and NZS 4210. Install necessary vermin stops. Weatherproof all separation joints to the details shown on the drawings.

Wall tie type, durability, spacing, fixing and installation shall be as defined in NZBC E2/AS1 Tables 18A, 18B, 18C, and NZS 4210.

Install steel angle lintels to openings as required by NZBC E2/AS1 Table 18E and as noted on the drawings.

Install all necessary flashings to openings, and other locations as required, to the details shown on the drawings and in accordance with NZBC E2/AS1 requirements.

During the progress of work every care must be taken to prevent moisture penetration of the bricks. No bricklaying shall proceed during wet weather. Upon completion of each days work, exposed tops of brick veneers shall be protected from inclement weather.
Comply with NZS 4210 Cold Weather Construction and Hot Weather Construction requirements.

On completion or the works leave brickwork clean and free of marks and staining. All brickwork cleaning shall be done to the brick manufacturer's recommendations.
Thoroughly clean all other surfaces affected by the brickworks.

2.3.4 Mortar Pointing

Mortar joints shall be raked out, pointed and tooled to a depth not exceeding 6mm after the initial stiffening has occurred.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

3 CARPENTRY

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 1: Particleboard
1859.2:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 2: Dry process fibreboard
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:2018(AS|NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
AS/NZS 2269.0:2012	Plywood - Structural - Part 0: Specifications
NASH Standard	Residential and Low-rise Steel Framing - Part 1: Design Criteria
NZBC C/AS2-AS6	Protection from Fire
NZBC G6	Airborne and Impact Sound

3.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

3.4 Workmanship & Materials

3.4.1 Workmanship

3.4.1.1 Supervision

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

3.4.1.2 Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completley remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.

Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

3.4.1.3 Wall Underlay

Install a flexible heavyweight building paper or breathable/absorbent wall underlay behind all exterior wall claddings, fixed horizontally, with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.
Fix wall underlay at maximum 300mm centres, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings, fixed through nylon vertical strapping at every stud in exposed locations. Provide additional fasteners fixed through the underlay around framed openings. Cut window and door openings just prior to joinery installation; cut underlay at 45º angle away from each corner and return full framing depth and fasten to inside of frame.
Finish wall underlay at edges as detailed, and return full framing depth into window and door openings. Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with wall underlay manufacturer's requirements and as shown on the drawings.
For drained cavity construction to framed walls without a rigid wall underlay and where the studs are at greater than 450mm centres, restrain the underlay with nylon strapping to prevent the underlay from bulging into the cavity space.
Any damaged underlay shall be made good by lapping in a new section.
Do not leave wall underlays exposed before covering with wall cladding for more than the manufacturer's recommended duration.

3.4.1.4 Roof Underlay

Install heavyweight building paper or breathable/absorbent roof underlay behind roof cladding as detailed, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned in a manner that prevents sagging or ponding.
R1 class roof underlays shall be fully supported on nylon straps or non-corrosive netting/mesh; R2 class self-supporting underlays shall be laid to maximum 1200mm span between adjacent supports.
Run roof underlay horizontally or vertically up the roof slope on roof pitches above 10° pitch, and horizontally on roof pitches 10° or less.
Fix roof underlay at maximum 300mm centres to purlins, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or proprietary underlay fixings.
For tiled roofs, lay the roof underlay over the anti-ponding board and no-corrosive support netting/mesh, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.
Finish roof underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45º angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with the underlay manufacturer's requirements and as detailed. Roof underlay must be separated from chimneys and flues in accordance with the requirements of the NZBC C1-C6 Acceptable Solutions.
Any damaged underlay shall be made good by lapping in a new section.
Do not leave roof underlays exposed before covering with the roof cladding for more than the manufacturer's recommended duration.

3.4.1.5 Window Installation

Prepare window and external door framing openings for joinery installation by neatly cutting the building wrap at 45º into corners, returning turning the wrap through the frame depth and fixing to

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

the inside face.
Over-flash the underlay along the sill with a flexible flashing tape, installed full frame depth and length of the opening, returned minimum 100mm up the jambs, and with minimum 50mm return over the outside edge.
Over-flash the underlay at head/lintel corners with a flexible flashing tape, extending minimum 100mm each way from the corner, full frame depth, and with minimum 50mm return over the outside face.

Install external joinery frames with metal flashings as detailed and/or as required to completely weatherproof all frame-to-cladding junctions.
Unless shown otherwise, head flashings shall be carried minimum 75mm up behind claddings, extended at 15º out over the joinery head or facing board and returned down to cover the joinery or facing board minimum 10mm and finished with a 5mm, 45º 'kick out' drip-edge.
Neatly dress down the head flashings at the ends of the facings - for drained cavity construction, also form up-turned stop-ends in-line with the outside edge of cavity above.
Install metal (as specified) head flashings, fixed over the wall underlay, with the flashing upstand over-flashed minimum 50mm with a flexible flashing tape against the underlay, or with an additional piece of underlay extended over and lapped behind the underlay above, behind the inter-storey flashing or sill flashing above, or to the underside of the eaves.
Unless shown otherwise, sill flashings, where required, shall have a minimum 5º slope, minimum 8mm rear upstand with sealed sloping stop-ends, and be carried down minimum 35mm over the lower cladding and finished with a 5mm, 45º 'kick out' drip-edge.

Take delivery of window and door joinery. Check substrates for correct profile and alignment and that the joinery is fabricated to the correct wall construction set-out and depth. Set shims or pack as necessary to install joinery exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim, etc.

Install neat sealant beads as detailed or required.

After joinery installation, install closed cell backing rods as required and expanding foam seal the gap between the opening substrate and joinery liners/reveals (all round, from the inside).

On completion ensure that all sashes and doors neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating smoothly, without binding, to the required functionality.

3.4.1.6 Joinery Installation

Take delivery of all scheduled joinery items (doors, cabinets, shelves, etc.) and install in the positions shown, accurately aligned, true to level, plumb and square, and securely fastened as noted and in accordance with best trade practice and with due regard for adjacent linings, finishes and trim, and anticipated movements.

Cabinets scribed and/or recessed packers scribed to adjacent surfaces as detailed or directed. Protect all installed Joinery from damage including surface marking and contamination, dirt and dust, and

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

moisture until completion. Do not use Joinery items for working supports or platforms or for storage of materials or tools and equipments.

On completion ensure that joinery item doors and drawers all neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating to the required functionality.

3.4.2 Timber

3.4.2.1 Timber Materials

All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by treatment plants with recognised quality assurance systems that are administered by the Timber Preservation Council (NZTPC). Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.
Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.
Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flashed-off'.
Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced. Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.

All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.
All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

3.4.3 Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations shall be installed in strict accordance with the manufacturer's technical literature and design guides. No materials specified in the manufacturer's technical literature and design guide can be substituted without the written approval from the Architect/Designer.

3.4.4 Proprietary Roof Trusses

Roof trusses shall be of proprietary design, complying with the requirements of NZS 3603, NZS 3604, and AS/NZS 1170, and manufactured by suitably qualified fabricators.

Make allowance for all notching and holing to timber members to accommodate roof bracing etc., in the design of member sections of the roof trusses. Allow for all additional rafters, purlins, fixings and bracing necessary to complete the roof framing system with all accessories and incidental items necessary for proper installation even where not specifically shown on the drawings.
Proprietary roof trusses shall be designed to carry all imposed gravity and lateral loads. Refer to the approved design drawings for truss set-out and specified design loads. Roof trusses are assumed to be generally at 900mm centres spanning clear between walls or roof beams as shown on the drawings. The Main Contractor is responsible for the design of proprietary roof trusses, including their layout and interaction with and dependence on adjoining elements.

Provide all necessary design information and shop drawings for all proprietary roof trusses to be incorporated in the works for review prior to fabrication.
Provide Producer Statements from a Charted Professional Engineer covering the design and construction of the roof trusses. Provide all information required by the Territorial Authority for the purpose of obtaining a Building Consent.

3.4.5 Fixings

3.4.5.1 Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber. Power-driven staples are completely unacceptable in finishing timbers.

3.4.5.2 Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

item/element and the substrate material.
Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.
Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.
Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

3.4.5.3 Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified. Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

3.4.6 Flashings

Flashing materials shall be in accordance with the requirements of NZBC E2/AS1 Sections 2.2 Materials, 4.0 Flashings, Table 20 - Material Selection, Table 21 - Compatibility of Materials in Contact, and Table 22 - Compatibility of Materials Subject to run-off, and as noted on the drawings.
All flashings around windows, doors and other openings and apertures, at internal and external corners, inter-storey junctions, soffit junctions, and at junctions with other building elements and cladding systems, etc., shall all be carefully constructed, fixed and finished to the details shown on the drawings.

3.4.7 Sealants

3.4.7.1 Sealants

For critical joints such as primary water/weatherproofing seals, precast panels primary seals, structural floor slab control joints, structural glazing, immersion or hydrostatic pressure seals, etc., either use the sealant noted on the drawings or obtain a reputable sealant manufacturer's recommendation for the precise situation, and submit the manufacturer's specifications covering all relevant criteria and characteristics of the proposed sealant, primers, joint surfaces preparation, etc. to the Architect/Designer for review and confirmation to proceed.
If so requested, additionally submit a sample of the proposed sealant made up into a demonstration joint, incorporating the same materials, preparation, finish tooling, etc. After confirmation to proceed with the proposed sealant install a sample joint to approval, length approximately 2% of the overall length of the joints required, with a minimum length of two metres; when accepted this joint becomes the quality control sample for all subsequent similar joints.

For less critical joints such as those in covered or protected situations, and bathroom and kitchen ceramics and sanitaryware etc., either use the sealant noted on the drawings or select the sealant from a reputable manufacturer's range for the substrate materials involved, with due regard for the flexibility required, acid or neutral curing, mould resistance, paintability or clear or standard colours, slumping characteristics, temperature range expected, etc. - silicone, polymer or polyurethane sealants are anticipated.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

For all simple gap-filling and draught sealing situations, either use the sealant noted on the drawings or select from a reputable manufacturer's range for a paintable acrylic sealant with good adhesion characteristics for the substrates involved - pay particularly care in the sealant selection where bare metal, polycarbonate, polystyrene or similar substrates or where bituminous-based membranes are adjacent or where exposure to solvents is possible.

All joint surfaces preparation and priming and all sealant application work shall be exactly in accordance with the sealant manufacturer's recommendations, and carried out by competent and experienced applicators familiar with the materials and techniques required.
Ensure that the sealant is being used within the manufacturer's stated design parameters, particularly with regard joint design and anticipated cyclic movement.
Check that the joint faces are sound, completely dry, and frost free, clean and free of dirt, rust, oil, grease, laitance, etc., and they are primed to suit the surface porosity - particularly for critical locations.
Insert a polyethylene tape slip layer at the back of the joint or a closed cell polyethylene PEF backer rod where required and to the sealant manufacturer's recommendations. Mask off joint edges where a clean straight finish line is required.
Check the toxicity of the selected sealant and handle it appropriately. Check that the temperature during sealant installation is within the manufacturer's guidelines.
Apply the sealant and tool the filled joint's surface smooth and even, utilising a lubricant as necessary and strictly within the manufacturer's guidelines.
Remove any masking tape immediately after tooling, clean up all adjacent surfaces using the recommended cleaning agents as required, and protect the finished joint until the sealant has properly cured.

RECEIVED 3/08/2022

3.4.8 Interior Finishing Trim

All interior finishing trim shall be cut to the exact dimensions and fine sanded smooth, and with lightly sanded arrisses, and all fixed with plated finishing pins. Machine staple fixing is NOT acceptable.
Note that even traces of planer marks are unacceptable on architraves. Margins between interior trim and other elements shall be exactly even, and all mitres shall be exact and tight.

3.5 GIB® Plasterboard Linings

3.5.1 Scope

Supply and install GIB® Plasterboard Linings specified herein, as sheet lining materials to the walls, ceilings and other elements identified on the drawings, complete with all accessories required for proper installation, finishing and performance. All aspects of this work shall be in complete accordance with the current GIB® Site Guide and relevant GIB® Systems literature (check www.gib.co.nz, or call 0800 100 442 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for GIB® Plasterboard Linings, GIB® Systems or GIB® System components and accessories.

Bcon22/0511 - WDC Approved Plans - 16/09/2022

This specification must be read in conjunction with relevant GIB® Systems specifications - GIB® EzyBrace® Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems, GIB® Aqualine® Wet Area Systems, GIB® X-Block® Systems, GIB® Quietline®, GIB® Intertenancy Barrier System, and GIB® Rondo® Metal Batten Systems - and other specifications sections, as they are interrelated.

3.5.2 Requirements

3.5.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

3.5.3 GIB® Plasterboard Linings

3.5.3.1 GIB® Standard Plasterboard, 10mm

GIB® Standard Plasterboard, 10mm. A 10mm thick standard plasterboard interior lining. Suitable for use in residential and commercial applications on walls. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

3.5.3.2 GIB Aqualine®, 10mm

GIB Aqualine®, 10mm. A 10mm thick moisture resistant plasterboard interior lining, with a water resistant polymer impregnated core to help prevent moisture penetration. Suitable for use in residential and commercial applications on walls and ceilings in spaces at risk from water or moisture damage. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

3.5.4 Components & Accessories

3.5.4.1 Timber Ceiling Battens

Timber Ceiling Battens. Except where specified otherwise on the approved drawings, timber ceiling battens shall be minimum 70mm x 35mm, H1.2 treated, Merchantable grade Radiata, fixed in accordance with NZS 3604: Table 13.3. Refer to the GIB® Site Guide., and to separate specification section Timber Framing.

3.5.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

Coordinate with other trades to install GIB® Plasterboard Linings as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

- the linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

3.5.6 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation and finishing work of GIB® Plasterboard Linings shall be carried out by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with the GIB® Site Guide and the relevant GIB® product technical literature, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

GIB® Plasterboard Linings shall be jointed and finished to the specified Finish Levels in accordance with AS/NZS 2589 and GIB® Site Guide. Make all necessary arrangements for the quality assessment of plasterboard jointing and finishing Finish Levels prior to commencing decorating.

All cutting, fixing, jointing, finishing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard and free from damage and defects.

Protect surrounding surfaces and areas from jointing compound splashes and sanding dust.

3.5.7 Delivery & Handling

Store GIB® Plasterboard Linings indoors, in neat, flat stacks off the floor, in dry conditions and without any sagging or distortion, in accordance with the GIB® Site Guide. Keep plasterboard linings, compounds and accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all products and materials in accordance with the manufacturer's requirements and relevant Product Data Sheets and GIB® Site Guide, and in a manner that prevents damage. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall be familiar with and comply with the requirements of the GIB® Site Guide precautions for use, and use appropriate safety gear when handling materials.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

3.5.8 Completion

Check that GIB® Plasterboard Linings have been installed in accordance with the GIB® Site Guide and GIB® Systems literature, and are finished to the specified finish levels.

Check for any damage and defective work - repair or replace as necessary to the required standard.

Ensure that inspection and assessment of the plasterboard Finish Level has been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.

Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.

Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.

Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and dust. Remove all associated rubbish and excess material from the site.

Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

3.6 Ecoply Bracing

3.6.1 Scope

Supply 7mm or thicker Ecoply or Shadowclad structural plywood and install it as structural bracing or ceiling diaphragm in the positions identified on the Bracing Plan.

3.6.2 Preparation

Check that the timber wall framing complies with NZS 3604, is plumb and in true alignment, and has a maximum moisture content of 20% at the time of Ecoply Bracing installation. Ensure that the bottom plate hold-downs are correctly installed. Upon delivery store plywood on four evenly spaced level bearers, and protect the plywood from rain dirt etc. Ecoply Bracing installation work shall be carried out by competent tradesmen.

3.6.3 Installation

Handle the plywood carefully, and reject any damaged sheets. Fix sheets vertically, incorporating 2 - 3mm expansion gaps at joins. All sheet edges fully supported. Install with cut sheet ends to the top.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Fasten with 50 x 2.8mm galvanised flat head nails for direct fix. Refer to the Ecoply Specification and Installation Guide for preservative treatment and fastener durability requirements. Fix at 150mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Ensure that base clearances to E2/AS1 are provided.

Where Shadowclad plywood is used as both cladding and bracing refer to the Shadowclad Specification and Installation Guide for durability requirements. (Ph 0800 326 759 to confirm the date of the most recent edition).

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

4 ROOFING

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1562.2:1999(AS/NZS)	Design and installation of sheet roof and wall cladding - Corrugated fibre-reinforced cement
2295:2006(NZS)	Pliable, permeable building underlays
3604:2011(NZS)	Timber-framed buildings
4217:1980(NZS)	Pressed metal tile roofs
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0

4.3 Workmanship

4.3.1 Guarantees

The whole of the roof covering work shall be complete in all respects and absolutely watertight. Commencement of roofing works by any Subcontractor indicates their full agreement to and acceptance of an unwritten guarantee to maintain the whole of their work in a satisfactory and watertight condition, and to arrange and pay for any damage consequential upon the failure of their materials or workmanship, for the periods stated below, irrespective of the 90 day general maintenance period.

- Butyl roofer - ten years from completion.
- Galvanised steel roofer - two years after completion.
- Aluminium roofer - ten years after completion.
- Acrylic/f.glass roofer - ten years after completion.

4.3.2 Co-operation

Co-operate with other trades to ensure that framed roofing substrates have appropriate spacings, alignments and fixings, and to ensure that sheet roofing substrates have the correct edge and central fixings, appropriate alignments and gradients, edge priming if necessary, and are completely clean.

Ensure that each section is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

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4.4 Roofing Systems - Pressed Metal Tile

4.4.1 Scope

Supply the selected pressed metal tiles roofing and associated trims and install it to the areas shown on the Roof Plan. All handling and fixing techniques, and all jointing and sealing materials and techniques, shall be exactly as recommended by the roofing manufacturer.

4.4.2 Preparation

Co-ordinate to set-out the roof fixing battens etc. very carefully to absolutely minimize tile cutting. Coordinate to ensure that the timber members required for ridges, hips, valleys, penetrations, junctions with vertical faces, etc. are correctly in place and suit the selected trim.

Correctly install the specifed underlay with turn-ups to walls, parapets, openings, skylights, etc. as required, and check that pre-installed flashings are correctly in place. Ensure that the fixing battens are sized to suit the rafters spacing and are fixed to NZS 3604 table 10.9 requirements.

4.4.3 Delivery & Handling

Unload and handle tiles without scratching, distortion or other damage, store on a firm level base out of the weather, and keep clean until installed.

4.4.4 Fixings

Plan the tiles installation to minimize foot traffic over finished surfaces. Lap tiles away from line of site.
Cutting, bending or straightening etc. to NZS 4217 requirements, neatly and true to line.
Fix with nails as specified by the tiles manufacturer, with all nails correctly positioned.

4.4.5 Flashing

Install ridges, hips, barge flashings etc. as detailed and as recommended by the tiles manufacturer.

4.4.6 Completion

Plumbing penetrations custom flexible rubber flashed (fully sealed), and instruct the Plumber that no copper (or brass) pipes are to discharge on to the roof. Completely clean off all drill and power saw swarf and pop-rivet shanks as the work proceeds (at least daily, and keep them and other rubbish out of the spoutings). Remove trade debris from the roof and from the site progressively, and on completion leave the roof and rainwater system completely clean.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

5 ALUMINIUM JOINERY

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.2:2016(NZS)	Glazing in buildings - Part 2: Insulating glass units
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

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5.3 Aluminium Windows & Doors

5.3.1 Alternatives

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

Thermal performance (NZBC H1/AS1) must be as required to meet the Designer's Thermal Evaluation.

5.3.2 Installation Type

5.3.2.1 Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.
Check framing alignment, and that window openings are square and the correct size for fitting tolerances.
Prepare framing openings by neatly cutting the building wrap at 45º into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded

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plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the WANZ extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit. Install the head cavity closer, positioned to provide a 15mm drip edge to the cladding.

Set shims or pack as necessary and install the frames exactly true and square, blocked-up off the support bar as required. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15º down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45º 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribers as detailed.
After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

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5.3.3 Interior Finish

Architraved.

5.3.4 Glass Platform

Double Glazed.

5.3.5 Workmanship

These windows will be manufacturerd in workshops containing all mechanical equipment appropriate for the work, and by experienced and competent tradesmen who are familiar with the techniques and materials specified.

The manufacturer will co-ordinate with other trades to establish the exact sizes for all frames before fabrication. Frames and sashes will be fabricated true, square, rigid, and ‘out of wind’, with all joints strongly mechanically fixed, and with mitres tight and fully sealed. Potential thermal, wind and seismic movements will be accommodated within the construction. All cavities will drain to the exterior, and all drilling swarf etc. will be removed during fabrication.

Stays, hinges, running gear and glazing will be installed as scheduled (the Designer will be notified if any scheduled hardware of fixing position appears to be inappropriate for this project).

Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

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Glass will be cut true and square, sized to provide correct edge clearances, blocked into place as required, and all units will be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets will be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation. Frames will be braced etc. as necessary for transportation to the site.

Flashings as detailed will be supplied. Flashing materials will be compatible with the windows.

5.3.6 Delivery and Installation

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and the construction principles that are embodied in the Acceptable Solutions.

Arrange for delivery of windows to the site only when a suitable storage situation is available for them, handle the windows in accordance with the manufacturers requirements, avoid any frame distortion, avoid rubbing damage, avoid contact with concrete, plaster, mud etc. and keep them dry. Retain protective coverings for as long as possible, and remove them at completion.

Experienced and competent tradesmen who are familiar with the techniques and materials specified shall carry out all installation work. Fix in accordance with the manufacturer's instructions. Take utmost care to avoid damage to anodized or powder coated surfaces - correction of any such disfigurement requires written authority - replace any badly damaged items.

Use fixings compatible with the materials involved, as recommended by the windows manufacturer and to comply with the DWP requirements, basically aluminium or Type 316 stainless steel where exposed externally; galvanized to AS/NZS 4680, 610g/m2, may be used where not exposed.

Thoroughly check all preparatory work to openings prior to installation, including underlay, corner seal tapes, adjacent cladding, pre-installed flashings, waterproofing systems etc. as appropriate. Use inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

Install flashings as detailed and supplied by the windows manufacturer, installed tightly and neatly with absolute minimum tolerances, with head weathering jamb, jamb weathering sill, and sill open (draining) to exterior. Except where the window is recessed all head flashings shall extend 30mm minimum beyond the frame.

Air-seal all frame perimeters to adjacent structure to a depth of 15 - 20mm with expanding foam or appropriate sealant including a PEF rod at head, sill and jambs to retard the spread of sealant.

Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the windows manufacturer, to achieve a fully watertight installation. In preparation for sealant the joints shall be clean, dry, and primed if necessary. Insert closed cell polyethylene backer rods or a polyethylene tape slip layer if required. Mask adjacent surfaces if appropriate, install the sealant fully in accordance with the sealant manufacturer's recommendations, and finish to even smooth surfaces.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Remove trade debris progressively, appropriately clean any affected adjacent surfaces, thoroughly clean the windows, check that all hardware is in full working order, and provide safety indication of the glass for the balance of adjacent works.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

6 INSULATION

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

4218:2009(NZS)	Thermal insulation - Housing and small buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4859.1:2018(AS|NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions

6.3 Pink Batts Insulation

6.3.1 Scope

The following is a list and/or general description of the extent of the Pink® Batts® Insulation works, which are more specifically defined in the contract documents, required for the completion of the contract works:

6.3.2 Requirements

6.3.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

6.3.2.2 Warranty - applies to BRANZ Appraised Pink® Batts® Ceiling & Wall products

Pink® Batts® Lifetime Product Warranty:

- 50 Years Warranty for BRANZ Appraised Pink® Batts® ceiling and wall products installed according to the warranty conditions.
- Provide the Pink® Batts® Lifetime Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

6.3.2.3 Inspections

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and manufacturer guidelines.

Complete a Pre-Installation Checklist prior to installation, and a Pre-Line Checklist before handing over for subsequent work.

Note: Pink® Batts® checklist applies only to Pinkfit.

6.3.3 Wall Thermal Insulation

6.3.3.1 Pink® Batts® Classic R2.2 Wall

Pink® Batts® Classic R2.2 Wall - product code 7127122. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-2.2. 90mm thick x 560mm wide x 1140mm long segments.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238.

Installed as wall cavity thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

6.3.4 Ceiling Thermal Insulation

6.3.4.1 Pink® Batts® Classic R3.2 Ceiling

Pink® Batts® Classic R3.2 Ceiling - product code 7110132. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-3.2. 170mm thick x 432mm wide x 1220mm long segments.

Pink® Batts® ceiling insulation is a lightweight flexible glasswool insulation products 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 non-standard constructions;
- meet the requirements of the New Zealand Building Code for different designs and environments.

Pink® Batts® Classic R3.2 Ceiling is BRANZ Appraised - refer to BRANZ Appraisal No.238.

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

6.3.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with trades to install Pink® Batts® Insulation as required.

6.3.6 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

The building envelope must be fully enclosed and weatherproof, with construction materials framing at or below the required moisture content, before insulation installation commences.

All installation work shall be carried out by registered PinkFit® Installers, or by experienced and competent installers, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and the manufacturer's guidelines. Inspect all Pink® Batts® insulation work before it is closed off with linings or made inaccessible.

Insulation shoud be installed without leaving gaps or compresing the material. Always maintain full insulation thickness to ensure that the stated thermal and acoustic values are achieved. Do not install insulation into closed cavities with a cavity depth less than the insulation's stated thickness.

6.3.7 Delivery & Handling

Store the Pink® Batts® Insulation materials undercover, in a weatherproof environment, off the floor, on a flat, even surface in accordance with the manufacturer's requirements. Keep materials dry and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials.

Should a problem be encountered with any Pink® Batts® Insulation product, immediately contact Pink® Batts® on 0800 746 522. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question and where possible, the bale package documentation with batch number and/or date of manufacture.

Handle Pink® Batts® Insulation products in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the product. Ensure installed Pink® Batts® Insulation remains dry at all times.

Installers shall be familiar with and comply with the manufacturer's Safety Data Sheet precautions for use, and use recommended safety gear when handling materials.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

6.3.8 Installation

6.3.8.1 General

Install Pink® Batts® Insulation in accordance with NZS 4246 and the manufacturer's requirements.

Each installation is unique, so prior to installation:
- check for all hazards that may cause injury; and
- carry out any required repair work before starting installation; and
- ensure there's adequate lighting to identify any hazards; and
- treat all electrical cables as live, being careful not to cut or expose cables and wires; and
- beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work.

6.3.8.2 Pink® Batts® Wall

Pink® Batts® wall insulation segments shall be oversized by no more than 10mm than the wall framing spacings. If cutting is required, cut oversize by 5mm to ensure a good friction fit.

Friction fit the insulation segments between wall framing members ensuring there is no undue compression, gaps, creases, tucks or folds, and the insulation is finished flush with the framing edges.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Fit Pink® Batts® insulation tight and close around electrical cables and pipes. As necessary, partially cut and fit insulation around cables and pipes. Take extreme care when working around exposed electrical cables - treat all cables as live.

6.3.8.3 Pink® Batts® Ceiling - Truss/Framed Roof

Pink® Batts® insulation segments shall be oversized by no more than 10mm wider than the ceiling framing spacings.

Lay the insulation segments over the ceiling, friction fitted between the ceiling joists/truss chords, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Cover the entire ceiling, including the outer edge of the top plate of external walls - the insulation must cover at least 50% of external top plates.

Maintain a minimum 25mm clearance between the top of the ceiling insulation and any roofing material, including underlay. If required, trim the insulation or use a thinner product around the perimeter.

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Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

6.3.9 Completion

Check that all specified Pink® Batts® Insulation products have been installed correctly in accordance with the manufacturer's requirements.

Check for damage and defects - replace damaged and defective insulation as necessary to the required standard.

Ensure the installed insulation will be adequately protected for durability and performance in accordance with the manufacturer's warranty requirements.

Leave all of this work complete, and in the condition required for proper performance, including for the installation of subsequent linings, in accordance with the manufacturer's warranty requirements.

Leave adjacent surfaces and finished work clean and free of damage. Remove all associated rubbish and waste material from site.

Issue to the Owner a copy of the Pink® Batts® Lifetime Product Warranty for all Pink® Batts® Insulation products installed.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

7 TILING

7.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

7.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2358:1990(AS)	Adhesives - For fixing ceramic tiles
3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3661.2:1994(AS/NZS)	Slip resistance of pedestrian surfaces - Part 2: Guide to the reduction of slip hazards
3740:2010(AS)	Waterproofing of domestic wet areas
4586:2004(AS/NZS)	Slip resistance classification of new pedestrian surface materials
4858:2004(AS/NZS)	Wet area membranes
BRANZ Good Practice Guide	Tiling
NZBC B2/AS1	Durability
NZBC D1/AS1	Access Routes
NZBC E3/AS1	Internal Moisture

7.3 Tiling

7.3.1 Scope

Supply, install and finish all Tiling works, complete with all necessary components and accessories required for proper installation and performance, as specified herein and to the locations, layouts and details shown on the approved drawings. All aspects of this work shall be carried out to comply with the New Zealand Building Code and relevant standards, and in accordance with the approved project design documentation, and with any relevant product manufacturers' technical literature.

7.3.2 Requirements

7.3.2.1 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of Tiling work are carried out to the highest standard.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

7.3.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install tiling as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent finishes, fixtures and fittings, etc; and
- penetrations for piped and cabled services are correctly located to maintain tile integrity and tiling performance.

7.3.4 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All Tiling work shall be carried out to best trade practice by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with AS 3958.1 and relevant product manufacturers' technical literature, to the layout and details shown on the approved drawings, and to fully comply with all warranty requirements.

Submit evidence of experience on request, e.g. National Certificate in Floor and Wall Tiling, or certified member of Master Plasterers and Tilers Association.

All substrate preparation, tile laying and tiling accessories application and finishing techniques shall be exactly as recommended by the specified product manufacturer. All work shall be such as to leave a neat, efficient and robust installation.

Interior wet-area tiling shall be waterproof and installed over a waterproof membrane as shown on the drawings.
Exterior floor tiling shall be waterproof and weathertight, and where necessary installed over a waterproof membrane as shown on the drawings.

As recommended by the tile manufacturer, use only an approved adhesive that is compatible with the specified tile, its substrate and its application/use.

Where necessary, delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Do not cover or bridge movement control joints with tiles and tile underlay.

Tiling shall not be undertaken when the ambient and surface temperatures are outside the specified product manufacturer's permissible temperature range.

Where necessary, mask off and protect from contamination adjacent surfaces, joinery, fixtures and finished work before commencing.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Exterior tiling shall not be undertaken during inclement weather. As necessary and in accordance with the manufacturer's requirements, protect exterior tiling from rain, hot dry winds and direct sunlight to aid proper drying and curing.

Leave all tiled surfaces clean, sound, and free from blemishes of any kind.

7.3.5 Delivery & Handling

Upon delivery to site, inspect the tile packs and reject those items that are found to be damaged, defective or contaminated. Contact the supplier for replacement of rejected items at time of delivery to site.

Do not use damaged, defective or contaminated materials, or products that are beyond their designated shelf life.

Store all tiling materials undercover, in a weatherproof environment, off the floor, on a flat, even and level surface in accordance with the manufacturer's requirements. Keep products and materials dry, out of direct sunlight and protected from damage, moisture and contamination at all times.

Handle tiling materials in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the materials and works.

Installers shall be familiar with and comply with all associated product Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

7.3.6 Completion

Check that all Tiling work has been correctly installed to the required layout, and that all tile joints, edge-trimming and other detailing is correctly finished, grouted and sealed.

Check all Tiling installations for damage, marks and defects - repair or replace as necessary. Carry out any repairs to the required standard.

Thoroughly clean tiled surfaces in accordance with the manufacturer's recommended procedures and techniques. Lightly buff where appropriate.

Leave this work complete and to the required standard, and in accordance with the associated warranty requirements.

Clean up thoroughly, and leave adjacent surfaces and finished work clean and free of damage and contamination. Remove all associated rubbish from site.

Protect the completed installation from damage, trafficable dirt and grime, and stains as necessary until hand-over as scheduled or directed.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Issue to the Owner a copy of all relevant product manufacturers' maintenance requirements, and a copy of relevant manufacturer Product Warranties and the installer/applicator Installation Warranty for the installed products and completed works.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

8 PLUMBING

8.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

8.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3500.2:2021 (AS|NZS) Plumbing and drainage Part 2: Sanitary plumbing and drainage

8.3 General

Carry out all works necessary to leave the water, waste, vent and soil systems serving the sanitary fittings and the plumbing hardware shown on the drawings or specified below in correct working order complete with all ancillary systems (safetrays, floor drains, overflows, relief valves, etc.) required, and with all normal incidentals customarily installed by this trade.

Comply with the Building Code, Territorial Authority By-laws and statutory authority Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange for all tests and pay all fees and customary charges in connection with the required works.

8.4 Workmanship

8.4.1 Workmanship

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

8.4.2 Testing

All plumbing services shall be completed in stages which will allow for proper testing under normal working pressures prior to the application of insulation, concealment or other enclosure. Testing of piped water services shall be by hydrostatic testing in accordance with AS/NZS 3500.1 and shall not show any leakage when subjected to a hydrostatic pressure of 1500kPa for a period of not less than 30 minutes. All leaks remedied and retested. On completion the whole of the plumbing services to

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be subjected to full operational tests in the presence of the plumbing inspector, with any defects revealed in these tests properly remedied.

RECEIVED 3/08/2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

9 GAS

9.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

9.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4219:2009(NZS)	Seismic performance of engineering systems in buildings
5601.1:2013(AS|NZS)	Gas installations - Part 1: General installations
7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
NZBC G10	Piped Services
NZBC G11	Gas as an Energy Source

9.3 Gas System - Piped Natural Gas

9.3.1 Scope

Supply, install, test and commission the Gas System Piped Natural Gas shown on the drawings, complete with all system components and accessories required for proper performance, functionality, and compliance. Carry out the works to comply with the requirements of the NZ Building Code, and with all relevant Regulations and Acts and Standards, and the requirements of Local Territorial Authority, and as shown on the drawings and schedules.

9.3.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installation.
Co-ordinate with all trades to install the piped gas system and components as required.

9.3.3 Workmanship

Installation work shall be carried out by qualified and experienced tradesmen, under the direct supervision of a NZ certified Registered Gasfitter authorised to undertake the work under the Plumbers, Gasfitters, and Drainlayers Act 2006, in accordance with the requirements of AS/NZS 5601.1, NZS 5258, NZBC G10 and NZBC G11, and with all regulatory authority requirements.

Workmanship shall be of best trade practice, and all work shall be well ordered and set-out and shall be such as to leave a neat, efficient and robust installation. Do not install damaged or defective products. Adequately protect all surrounding surfaces and work done by others during installation.

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Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Gasfitters expense.

9.3.4 Delivery & Handling

Store materials and equipment undercover, off the ground on a flat, level surface in accordance with the manufacturer's requirements. Keep materials and equipment dry, and protect from damage and contamination while stored and as necessary during installation. Restrain stacked gas pipe with wedges to prevent accidental movement and collapse.
Handle all material and equipment in accordance with the manufacturers' recommendations.

9.3.5 General Requirements

New piped gas system from a new connection to the existing in-ground supply pipe or primary meter identified on the drawings. Primary meter supplied and installed by the network utility operator to suit the required design load and supply pressure and pressure drop.
The new system shall include all in-ground and above-ground pipework, an in-ground toby, isolation valves, pressure reducing valve and fittings. Materials and equipment shall be installed undamaged and free of defects. Equipment shall be installed strictly in accordance with the manufacturer's requirements and with all necessary clearances for proper operation and maintenance.

Where pipework is installed in an enclosed space, the enclosed space shall be ventilated in accordance with NZBC E2/AS1. Pipework installed under floor spaces shall be suspended clear of the ground by a minimum of 100mm. Pipework installed in unventilated and/or inaccessible spaces shall be installed without joints - where joints are unavoidable in unventilated and/or enclosed spaces, each joint shall be inspected, tested and proved sound before the pipework is concealed. Do not install pipework in lift wells, air ducts, plenum ceilings, air handling plena, laundry/clothes chutes, rubbish chutes, ventilating ducts, fire hydrant cupboards or fire isolated stairways.

Installation of equipment shall comply with the Gas Act 1992, the Gas (Safety & Measurement) Regulations 2010, and the NZ Building Code. Obtain all necessary permits, pay all fees and give all notices, and complete the works to the approval of the Local Territorial Authority.

9.3.6 Completion

Demonstrate to the authority that the installation complies with the requirements of the contract documents and with the requirements of all relevant standards and regulatory bodies.
Notify the authority seven days in advance of the tests. Confirm the accuracy of instruments when requested. Provide signed records of all tests. The records shall also show the specified performance.
Certificates of all meter accuracies shall be forwarded to the authority and included in the As-built documents.

Check that the Piped Gas System and components have been installed correctly in accordance with the drawings, schedules and specification, and that the installation has been fully commissioned to the required operating performance and functionality. Check for damage, defects, and faults; replace/repair as necessary.
Leave the works area clean and free of rubbish. Remove rubbish and waste material from the site.

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Issue to the Owner all necessary warranties for the installed system and components.

Issue all As-Built Documentation and Certificates required to the relevant parties.

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10 DRAINLAYING

10.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

10.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS|NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
1547:2012(AS/NZS)	On-site domestic wastewater management
2032:2006(AS/NZS)	Installation of PVC pipe systems
3500.2:2018(AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems

10.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

10.4 Workmanship

10.4.1 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

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10.4.2 Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

10.4.3 Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

10.4.4 Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

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11 ELECTRICAL

11.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

11.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2053.1:2001(AS/NZS)	Conduits and fittings for electrical installations - General requirements
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:2019(AS|NZS)	Emergency lighting and exit signs for buildings - Part 2: Routine service and maintenance
3000:2018(AS|NZS)	Electrical installations - Known as the Australian/New Zealand Wiring Rules
3100:2009(AS/NZS)	Approval and test specification - General requirements for electrical equipment
3112:2011(AS/NZS)	Approval and test specification - Plugs and socket-outlets
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60335.2.30:2015(AS|NZS)	Household and similar electrical appliances - Safety - Part 2.30: Particular requirements for room heaters
60335.2.30:2015(AS|NZS)INCIEC	Household and similar electrical appliances - Safety - Part 2.30: Particular requirements for room heaters
60335.2.35:2013(AS/NZS)	Household and similar electrical appliances - Safety - Part 2.35: Particular requirements for instantaneous water heaters
60598.2.2:2016(AS|NZS)	Luminaires - Part 2.2: Particular requirements - Recessed luminaires
6104:1981(NZS)	Specification for emergency electricity supply in buildings

11.3 Workmanship

11.3.1 General

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance (made available to the Contractor in time for the Code Compliance Certificate application).

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

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11.3.2 Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

11.3.3 Workmanship

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

11.3.4 Wiring

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

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1. Geotech Report
2. Storm Water Report
3. Truss Layout & PS1
4. Bracing
5. Brick veneer best practice guide
6. Tekton Wall Underlay spec's
7. Tekton BRANZ appraisal
8. Thermathene Datasheet
9. Thermathene install guide
10. Bituminous Roof Underlay
11. Gerard Roof Specs
12. Rinnai Infinity Spercs
13. F&P Rangehood specs
14. Manrose Extraction Fan Specs
15. BRANZ Appraisal No.238 - Pink® Batts® Insulation

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Shane Taylor Ltd

SPECIFICATION APPENDIX

Bibin Vijayan & Sandhya Sekharath

55 Tawhero Street

Gonville

Whanganui

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Issued for Consent

270568

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8th March 2022

G.J.Gardner Homes Limited
PO Box 695
Whanganui Mail Centre
Whanganui 4541

Dear Alex,

LTR-3485-B-02 TAWHERO STREET EXTENSION – FOUNDATION REQUIREMENTS

We have been engaged to provide engineering services for the recently constructed Tawhero Street subdivision located between Magnolia Crescent and Tawhero Street, Whanganui, Lot 5 DP 22736.

The purpose of this letter is to provide foundation requirements for all Lots across the site to address MBIE liquefaction vulnerability, and to address remediation of foundations soils for Lots identified within the Geotechnical Completion Report with unsuitable subsoils for conventional foundations.

This letter should be read in conjunction with Red Jacket Geotechnical Completion Report RPT-3485-03 Rev A.

LIQUEFACTION VULNERABILITY

The site has been assessed via the WDC Earthquake Liquefaction Hazard Map GIS mapping service, refer Figure 1 below. Generally, the site is classified as having a low liquefaction vulnerability (yellow hatch) with a small area within the south-eastern corner of the site having a medium liquefaction vulnerability (pink hatch).

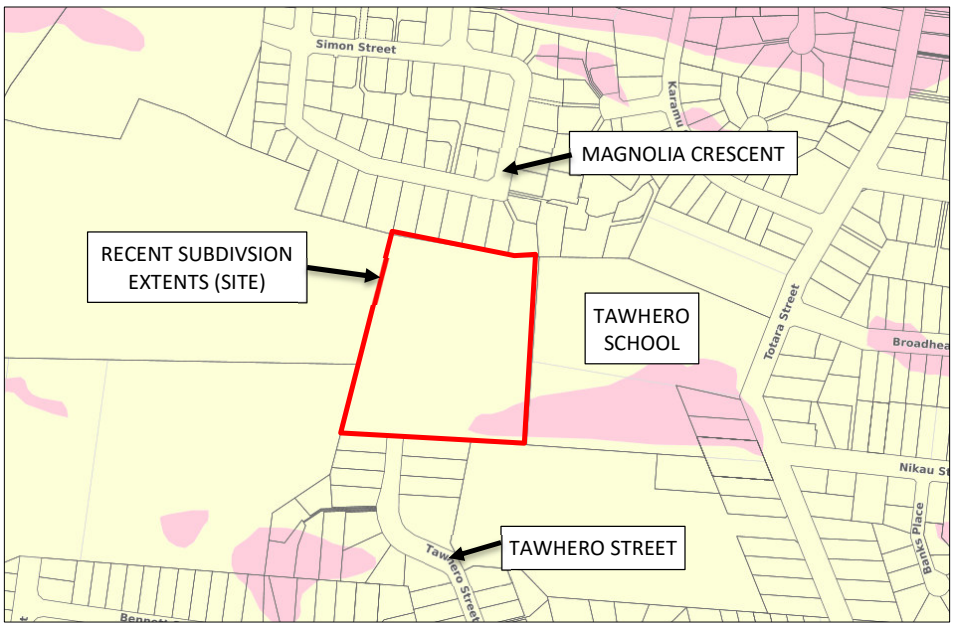

Figure 1 WDC GIS Maps – Liquefaction Hazard Mapping Excerpt

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We have followed MBIE Building Performance guidance for *'Ensuring new buildings can withstand liquefaction effects'*. Given that WDC have provided regional liquefaction hazard information in the form of the GIS mapping service, we have followed the foundation selection guidance Figure 5. Lots within Low Liquefaction Vulnerability areas are suitable for a Technical Category 1 (TC1) type foundation and Lots within Medium Liquefaction Vulnerability areas are suitable for a Technical Category 2 (TC2) type foundation.

The WDC hazard mapping data has been overlaid with the recent subdivision Lot layout to confirm specific Lot foundation requirements. Refer Figure 2 below.

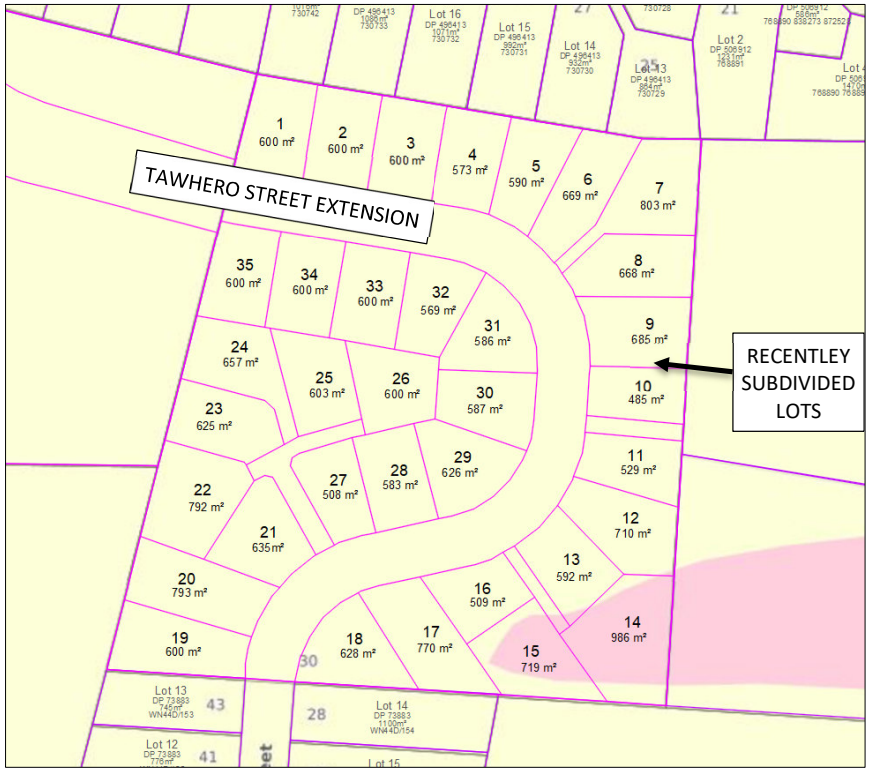

Figure 2 WDC GIS Maps – Liquefaction Hazard Mapping Excerpt Overlaid with Lot Layout

Lots 1 – 11, and 16 – 35 are located in the Low Liquefaction Vulnerability areas.

Lots 12 and 13 are generally located in the Low Liquefaction Vulnerability areas, with less than 5% of the Lot area located in the Medium Liquefaction Vulnerability. The Medium Vulnerability are located in minor areas at the southern boundary of the Lots outside of typical building platform location. TC1 type foundations are suitable for these Lots with some minor restrictions for the building platform location.

Lots 14 and 15 have significant areas of Medium Vulnerability within the Lot, where a typical building platform would be located, therefore TC2 type foundations would be required for these Lots. However, given that during the subdivision construction, the ground surrounding these Lots was raised by between 1.5 – 2.2 m with well compacted sand fill, lifting the site above the groundwater table. These Lots could be specifically assessed by a suitably qualified Geotechnical Engineer to confirm a lower liquefaction vulnerability within the Lots is appropriate.

TC1 and TC2 foundations are outlined in the MBIE Canterbury Guidance Document version 3 dated December 2012, and are defined as follows:

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- TC1 type foundations include NZS 3604 timber piles or slabs type foundations (as modified by B1/AS1), or raft foundations (Options 1 – 4), or specific engineering design.
- TC2 type foundations include Light construction with timber floors and shallow piles as per NZS 3604, Enhanced perimeter foundation wall and shallow piles as per NZ 3604, or raft foundations (Options 1 – 4), or specific engineering design.

Refer to Table 1 below for the foundation requirements of each Lot.

Table 1 Lot Foundation Requirements

LOT NUMBERS	LIQUEFACTION VULNERABILITY AREA	TECHNICAL CATEGORY	FOUNDATION REQUIREMENTS
1 – 11 16 – 18 20 – 23 28 – 32	Low	TC1	• TC1 type foundations are appropriate. • Compliance with recommendations outlined in Geotechnical Completion Report including building restrictions, finished floor levels, and fill slope.
12 – 13	Low with minor area of Medium	TC1	• TC1 type foundations are appropriate, provided the offsets below are complied with. • Lot 12 building platform shall be offset a minimum of 2.0 m from the southern-most boundary. • Lot 13 building platform shall be offset a minimum of 5.0 m from the south-eastern boundary. • Compliance with recommendations outlined in Geotechnical Completion Report including building restrictions, finished floor levels, and fill slope.
14 – 15	Medium with minor area of Low	TC2	• TC2 type foundations are appropriate. Alternatively, a site-specific liquefaction vulnerability assessment could be undertaken by a suitably qualified geotechnical engineer to confirm if a lower liquefaction vulnerability is appropriate within the Lot and provide appropriate foundation requirements. • Compliance with recommendations outlined in Geotechnical Completion Report including building restrictions, finished floor levels, and fill slope.
19 24 – 27 33 – 35	Low	TC1	• TC1 type foundations are appropriate. • Foundation subsoils do not comply with NZS 3604 'good ground'. For conventional foundations, the site subsoils will require remediation or specific engineering design for foundations. Refer Section below. • Compliance with recommendations outlined in Geotechnical Completion Report including building restrictions, and finished floor levels.

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REMEDIATION OF FOUNDATION SUBSOILS – LOTS 19, 24 - 27, 33 - 35

As noted in the Red Jacket Geotechnical Completion Report RPT-3485-03 Rev A, the site subsoils beneath Lots 19, 24 – 27, and 33 – 35 do not comply with NZS 3604 'good ground' due to underlying subsoil conditions including unsuitable organic material.

It is proposed to remediate the building platforms within these Lots by undercutting the unsuitable material and replacing with compacted clean sand fill material. This section details the remediation requirements to provide building platforms that comply with NZS 3604 'good ground'.

Remediation Design:

- Undercut all underlying unsuitable material, undercut depth varies across Lots. Undercut area shall extend 1 m beyond the building foundations plus an offset to achieve a 3H:1V backfill slope. Refer Figure 3 below.
- Building platform undercut extents shall be confirmed on site by a licensed surveyor. The undercut / stripped subgrade shall be certified by a suitably qualified engineer.
- Undercut area to be backfilled with compacted clean sand fill to the underside of the dwelling foundations. Fill material to be tested to comply with NZS 3604 'good ground' requirements, as follows:

  Fill compaction to be confirmed with scala penetrometer by suitably qualified engineer or IANZ accredited laboratory. The number of scala penetrometer blows per 100mm depth of penetration below the underside of the proposed footing at each test site shall be greater than or equal to:

  - Five down to a depth equal to the 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.
- Suitably qualified engineer to certify the remediated Lots as suitably for NZS 3604 type foundations.

Refer Figure 3 below for typical remediation detail.

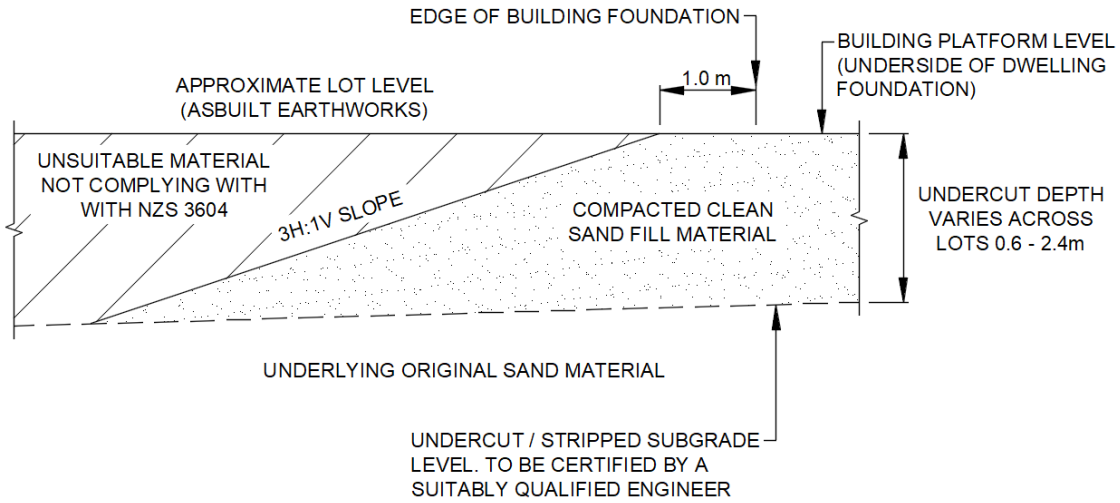

Figure 3 Typical Remediation Detail

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Minimum remediation engineering inspections:

(a) Stripped / undercut subgrade inspection.

(b) Confirmation of clean sand fill material – can be confirmed by IANZ accredited laboratory.

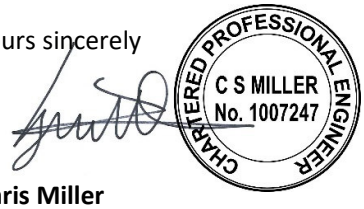
(c) Fill material certification – can be tested by IANZ accredited laboratory.

LIMITATIONS

This report is prepared for your use and your agents for the stated purpose and cannot be used for any other purpose or by others unless authority is given by the undersigned.

Please contact me if you have any queries.

Yours sincerely



Chris Miller
Senior Civil Engineer CPEng, CMEngNZ

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15th July 2022

Jarod Walker
G.J.Gardner Homes Limited
PO Box 695
Whanganui Mail Centre
Whanganui 4541

Dear Jarod,

LTR-3485-B-07 LOT 24 STORMWATER DESIGN

INTRODUCTION

We have been engaged to provide engineering services for the recently constructed Tawhero Street subdivision located between Magnolia Crescent and Tawhero Street, Whanganui, existing Lot 5 DP 22736. The specific site is Lot 24 Tawhero Street, Whanganui.

The purpose of this letter is to outline the on-site stormwater storage design as part of the residential dwelling design and to support the Building Consent application.

G.J.Gardner has provided the architectural drawing set 270568 dated 28/06/2022 for the basis of design.

STORMWATER STORAGE SIZING

As noted in the Red Jacket Geotechnical Completion Report RPT-3485-03 Rev A, the site subsoil beneath the proposed stormwater soakage field requires undercutting of the organic material and backfilling with free-draining material, namely being clean sand which is typical of the area.

We have calculated the required volume of on-site stormwater storage for the proposed development of Lot 24 in accordance with NZBC E1/VM1. Refer attached CAL-3485-B-04.

The on-site storage will be by way of rock-filled soakage trench. The storage calculation has conservatively allowed for no soakage, as a soakage rate cannot be confirmed at this stage until the subgrade has been remediated as discussed above.

Therefore, the attached stormwater design is subject to a subgrade inspection and certification by a suitably qualify engineer post subgrade remediation.

Please contact me if you have any queries.

Yours sincerely

CHARTERED PROFESSIONAL ENGINEER
C S MILLER
No. 1007247

Chris Miller
Senior Civil Engineer CPEng, CMEngNZ

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Date	15/07/2022	Job No.	3485-B
By	CM	Page No.	1 of 2
Doc No.	CAL-3485-B-04		

RESIDENTIAL ON-SITE SOAKAGE SIZING

LOT 24 TAWHERO STREET EXTENSION, WHANGANUI

HIRDS TABLE

HIRDS V4 Intensity-Duration-Frequency Results									
Site name: LOT 24 TAWHERO STREET EXTENSION, WHANGANUI									
Coordinate system: WGS84									
Longitude: 175.0117									
Latitude: -39.9359									
Rainfall intensities (mm/hr) RCP6.0 for the period 2081-2100									
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h
1.58	0.633	45.9	31.6	25.2	16.9	11.1	5.52	3.47	2.16
2	0.5	51	35	27.9	18.7	12.3	6.07	3.81	2.36
5	0.2	69	47	37.3	24.9	16.3	7.97	4.97	3.06
10	0.1	83.4	56.6	44.8	29.8	19.4	9.42	5.86	3.59
20	0.05	99	66.9	52.9	35	22.7	11	6.79	4.13
30	0.033	109	73.5	58	38.3	24.8	11.9	7.36	4.47
40	0.025	116	78.3	61.7	40.7	26.3	12.6	7.79	4.73
50	0.02	122	82.2	64.8	42.6	27.5	13.2	8.12	4.92
60	0.017	127	85.5	67.3	44.3	28.5	13.7	8.41	5.09
80	0.013	136	90.9	71.5	46.9	30.2	14.4	8.85	5.35
100	0.01	142	95.1	74.8	49	31.5	15	9.22	5.56
250	0.004	171	114	89.1	58.1	37.2	17.6	10.7	6.45

Disclaimer:

These Stormwater Disposal Calculations are prepared for the client of Red Jacket for the stated purpose, and cannot be used for any other purpose or by others unless authority is given by Red Jacket Consulting Engineers Ltd.

Red Jacket Limited - 3 Davidson Street, New Plymouth 4312, NZ
P.06 759 0999 - info@redjacket.co.nz - www.redjacket.co.nz

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Date	15/07/2022	Job No.	3485-B
By	CM	Page No.	2 of 2
Doc No.	CAL-3485-B-02		

RESIDENTIAL ON-SITE SOAKAGE SIZING

LOT 24 TAWHERO STREET EXTENSION, WHANGANUI

Design Storm Parameters		Inputs			References
Catchment Area	A =	287	m^2		Roof and impermeable pavement area
Surface Type		Roofed & Sealed Development			NZBC: E1
Run-off Coefficient	C =	0.9			NZBC: E1
Time of Concentration		60	mins		
Return Period		10%	AEP		NZBC: E1
Storm Intensity	I =	29.8	mm		HIRDS(Attached)
Output Volume	**R_C =**	**7.70**	**m^3**	**R_C = 10CIA**	NZBC: E1
	S_r =	0	**mm/hr**	**S_r = 0 mm/hr**	Conservative assumption
	V_{soak} =	0	**m^3**	**$V_{soak} = A_{sp}*S_r/1000$**	NZBC: E1
	$V_{storage}$ =	7.70	**m^3**	**$V_{storage} = R_C - V_{soak}$**	NZBC: E1

Rock Filled Trench			
Trench Length	7.5	m	
Trench Width	3.5	m	
Trench Depth	0.8	m	NZBC: E1
Rock Void Ratio	0.38		
Required Trench Size	7.70	m^3	
Actual Trench Size	7.98	m^3	

→ Therefore use a 7.5m Long x 3.5m Wide x 0.8m Deep Soakage Trench

→ Fill Trench with 100mm - 150mm Clean Drainage Metal Wrapped in Filter Fabric

→ Soakage beds to meet NZBC E1 requirements

→ Final dimensions can be altered to suit site conditions. To be confirmed by engineer.

NOTES

1. All soakage systems to be located 1.0m from any dwelling and 1.5m from any boundary.
2. Ensure all secondary flow paths are not obstructed and secondary flow is directed away from all dwellings and structures south towards ROW to Tawhero Street.
3. All soakage systems to have 1.5m separation to other soakage devices.
4. All soakage systems to be located in approved subgrade away from banks and retaining walls.
5. Catchment area based on dwelling roof area and hardstand area identified in the G.J.Gardner drawing set 270544.
6. Sr value of 0 mm/hr has been used to provide a conservative design.
7. Groundwater table to be confirmed on site. Rock-filled trench dimensions can be altered to suit ground conditions as approved by Engineer.
8. The subgrade is to be undercut of all organic soil and replaced with free-draining clean sand. Engineer to inspect and certify.
9. All pipework, levels, and final soakage system placement by others.

Disclaimer:
These Stormwater Disposal Calculations are prepared for the client of Red Jacket for the stated purpose, and cannot be used for any other purpose or by others unless authority is given by Red Jacket Consulting Engineers Ltd.

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P.06 759 0999 - info@redjacket.co.nz - www.redjacket.co.nz

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REDJACKET

GEOTECHNICAL COMPLETION REPORT

MAGNOLIA CRESCENT / TAWHERO STREET SUBDIVISION

TAWHERO STREET, WHANGANUI

FOR A SIGLEY DEVELOPMENTS

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CLIENT: A Sigley Developments

PROJECT TITLE: Magnolia Crescent / Tawhero Street Subdivision

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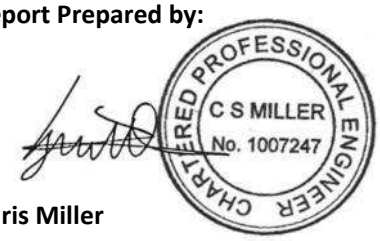

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

TABLE OF CONTENTS

1. INTRODUCTION 4
2. SITE DESCRIPTION 5
3. SUBSOIL INVESTIGATIONS 8
3.1 Post-Earthworks Subsoil Investigations 8
3.1.1 Red Jacket Testing 8
3.1.2 TestLab Testing 9
3.2 Quality Assurance Subsoil Investigations 9
3.3 NZS 3604 Good Ground Assessment 10
3.4 Soil Expansivity 10
3.5 Site Subsoil Class 11
4. ENGINEERING SCHEDULE 12
4.1 Standard Notes 21
5. ENGINEERING SUMMARY 23
6. LIMITATIONS 24

Table of Tables

Table 4-1 Engineering Schedule 12

Table of Figures

Figure 1-1: Harrison & Sullivan Surveyors Limited Scheme Plan 4

Table of Photographs

Photo 1: Site looking south-west 26
Photo 2: Lots 1 – 8 looking west 26
Photo 3: Lots 7 – 14 eastern boundaries looking south 27
Photo 4: Lots 10 – 11 unfinished link pathway looking east 27
Photo 5: Lots 14 – 18 southern boundary looking west 28
Photo 6: Lots 35 – 32 on left with Lots 25 – 30 on right looking east 28

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

1. INTRODUCTION

Red Jacket Limited has prepared a Geotechnical Completion Report for the recently constructed Magnolia Crescent / Tawhero Street urban residential subdivision. The site is located between Magnolia Crescent and Tawhero Street, Whanganui, existing legal description Lot 5 DP 22736 as shown in the Harrison & O'Sullivan scheme plan below, Figure 1-1, and Appendix A.

The purpose of this report is to satisfy clause 2.6.1 of NZS4404:2010 for the proposed 35 residential Lots, to satisfy the engineering requirements of approved Whanganui District Council (WDC) Subdivision Resource Consent SUB20/029. This report should be read in conjunction with the Red Jacket engineering design report RPT-3485-01 Rev C.

Earthworks completed within Lots 1 – 35 have been monitored by Red Jacket with assistance from the principal (client), contractor, and TestLab as part of the subdivision construction.

Lots 36 – 40 have not been assessed as part of this report as they are Lots containing a vested roadway, a link pathway, or undeveloped WDC owned residential land.

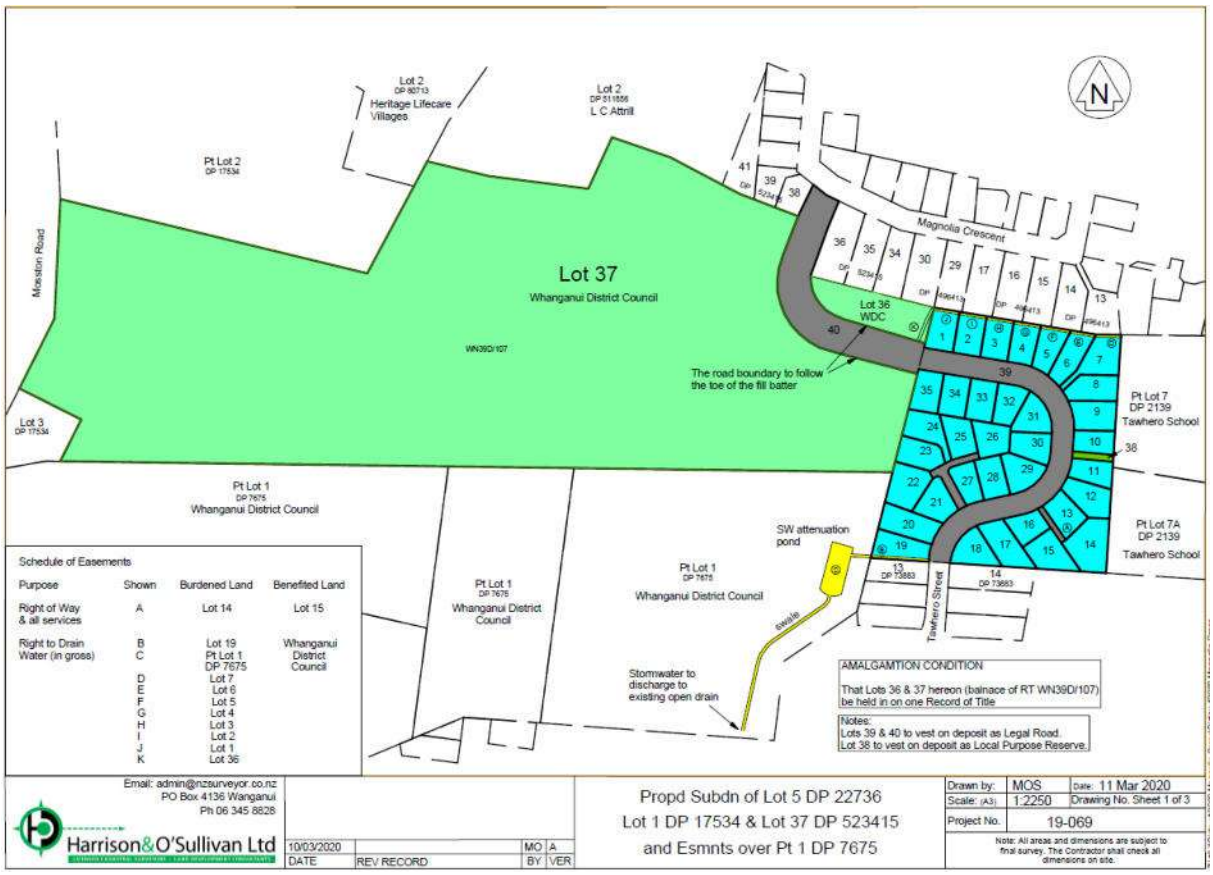

Figure 1-1: Harrison & Sullivan Surveyors Limited Scheme Plan

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2. SITE DESCRIPTION

The recently constructed subdivision involved the construction of a new 500 m long urban roadway to service 35 new residential Lots. The new roadway is an extension of the previously dead-end Tawhero Street and intersects with Magnolia Crescent to the north.

The new roadway at the northern end passes through existing developed residential Lots and as it heads south cuts through undeveloped residential land owned by WDC. The new roadway winds its way through the recently constructed Lots 1 – 35 and connects to the existing Tawhero Street.

Lots 1 – 13, 16 – 21, and 27 – 35 are accessed via the Tawhero Street extension. Lots 14 and 15, and Lots 22 – 26 are accessed by private Right of Ways (ROW), onto the Tawhero Street extension.

The Tawhero Street extension roadway rises approximately 5 m in elevation from the existing Tawhero Street end to the Magnolia Crescent end. The existing ground within the Lot areas has been raised to provide sections with freeboard and gravity sewer connections to the new roadway and reticulated wastewater system, with Lots typically terraced as they follow the roadway elevation south to north.

Lots 1 – 7

Lots 1 to 7 are located at the northern end of the original Lot boundary. The Lots are bordered by elevated residential sections to the north, the lower Tawhero School fields to the east, the new Tawhero Street extension to the south, and undeveloped WDC residential land to the west.

The Lots tie in with the roadside berm level at the southern boundary and fall at between 1 – 4 % slope towards the northern boundary. The Lots typically have been overlaid with a sandy topsoil and have established grass growth.

Along the northern boundary is an identified overland flow path within an easement. The overland flow path services the existing residential Lots elevated approximately 5 m above the sites, and to also provide a secondary flow path for Lots 1 to 7. The overland flow path splits east and west with a high point at Lot 4. Within the easement is a DN160 subsoil drain running beneath the overland flow path.

Along the eastern portion of Lot 7, the ground slopes down to the eastern boundary with the Tawhero School field. The fill batter is approximately 2.3H:1V and varies in height from 0.4 m at the northern end and 1.5 m high at the southern end. The fill batter is sparsely vegetated with exposed areas of the sand fill material.

Along the western portion of Lot 1, the ground slopes down to the western boundary with the WDC undeveloped residential land. The fill batter is approximately 2.7H:1V and varies in height from 0.8 m at the northern end and 1.5 m high at the southern end. The fill batter is well vegetated with grass growth.

Lots 8 – 14

Lots 8 to 14 are located at the western edge of the original Lot boundary. The Lots are bordered by the new residential sections to the north, the lower Tawhero School fields to the east, St Marcellin School fields to the south, and the new Tawhero Street extension to the west.

The Lots typically fall between 0.5 – 2.0 % towards the western Lot boundaries to tie in with the roadside berm level. Lot 14 has approximately 0.5 % fall towards the eastern boundary. The Lots typically have been overlaid with a sandy topsoil and have established grass growth.

Along the eastern portion of Lots 8 – 12, and 14 the ground slopes down to the eastern boundary with the Tawhero School field. The fill batter is approximately 2.3H:1V – 2.7H:1V and varies in height from

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1.5 m at the northern end and 2.2 m high at the southern end. The fill batter is sparsely vegetated with exposed areas of the sand fill material.

Between Lots 10 and 11, there is a lower area that was formed for a link pathway between the new roadway and Tawhero School, that has not been constructed. The southern boundary of Lot 10 slopes down to the pathway area, with Lot 11 sloping down from the northern Lot boundary. The slope of the two fill batters is between 1H:1V and 2H:1V, tapering from level to a maximum height of 1.3 m.

Along the southern portion of Lot 14, the ground slopes down to the southern boundary with the St Marcellin School field. The fill batter is approximately 2H:1V and 1.7 m in height. The fill batter is sparsely vegetated with exposed areas of the sand fill material.

Along the southern boundary of Lot 14 is a DN160 overflow pipe located with an easement. The overflow pipeline is to provide conveyance of potential stormwater runoff from the Tawhero School field.

Lots 15 –18

Lots 15 to 18 are located at the southern end of the original Lot boundary. The Lots are bordered by the new Tawhero Street extension to the north and east, new residential sections to the west, and St Marcellin School fields and existing residential Lot to the south.

The Lots typically fall at between 0.2 – 0.6 % towards the northern Lot boundaries to tie in with the roadside berm level. Lot 15 has approximately 1.5 % fall towards the southern boundary. The Lots typically have been overlaid with a sandy topsoil and have established grass growth.

Along the southern portions of Lots 15, 17, and 18 the ground slopes down to the southern boundary with the St Marcellin School field and existing the residential Lot. The fill batter is approximately 1.5H:1V – 1.8H:1V and varies in height from 0.6 m at the western end and 1.9 m high at the eastern end. The fill batter is sparsely vegetated with exposed areas of the sand fill material.

Along the southern boundary of Lot 15, 17, and 18 is a DN160 overflow pipe which is located within an easement. The overflow pipeline is to provide conveyance of potential stormwater runoff from the Tawhero School field.

Lot 19

Lot 19 is located at the southern end of the original Lot boundary. The Lot is bordered by new residential sections to the north, the new Tawhero Street extension to the east, existing residential Lots to the south and WDC undeveloped residential land to the west.

The Lot falls from the tie in with the roadside berm level at between 0.4 – 2.0 % towards the western Lot boundary. The Lot appears to have been overlaid with a sandy topsoil, no vegetation has been established.

Along the southern portion of Lot 19 is an existing timber retaining wall approximately 1.5 m high. The retaining wall was not designed as part of this development and no assessment has been undertaken on its suitability.

Along the western portion of the Lot, the ground slopes gently at approximately 7 % towards the west into the WDC undeveloped residential land. The slope is sparsely vegetated with exposed areas of the sand fill material.

Along the southern boundary of the Lot is a DN375 stormwater pipe located within an easement. The stormwater main services the new Tawhero Street stormwater reticulation.

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Lots 20 – 23

Lots 20 to 23 are located at the western edge of the original Lot boundary. The Lots are bordered by new residential sections to the north and south, the new Tawhero Street extension to the east, and WDC undeveloped residential land to the west. Lots 22 and 23 are serviced by a ROW.

The Lots typically fall at between 1.0 – 2.5 % towards the western Lot boundaries. The Lots typically have been overlaid with a sandy topsoil that are sparsely vegetated with grass growth.

Along the western portions of Lots 20, 22, and 23 the ground slopes down to the west into the WDC undeveloped residential land. The fill batter is approximately 5H:1V and 0.6 m in height. The fill batter has been overlaid with topsoil and has established grass growth.

Lots 24 – 27

Lots 24 to 27 are located at the western portion of the original Lot boundary. The Lots are bordered by new residential sections to the north and south, the new Tawhero Street extension to the east, and WDC undeveloped residential land to the west. These Lots are serviced by a ROW.

The Lots typically fall west and south across the Lots at between 1.0 – 2.5 %. The Lots typically have been overlaid with a sandy topsoil and is sparsely vegetated with grass growth.

Along the western portion of Lot 24, the ground slopes down to the west into the WDC undeveloped residential land. The fill batter is approximately 5H:1V and 0.6 m in height. The fill batter has been overlaid with topsoil and has established grass growth.

Along the northern portions of Lots 24 – 26, the ground slopes up to the northern boundary with Lots 32 - 35. The fill batter is approximately 6H:1V and 1.0 m in height. The fill batter has been overlaid with topsoil and growth is sparsely vegetated with grass growth.

Lots 28 – 32

Lots 28 to 32 are located at the central portion of the original Lot boundary. The Lots are bordered by the new Tawhero Street extension to the north, east and, south and new residential Lots to the west.

The Lots typically fall east and south across the Lots at between 0.5 – 1.0 %. The Lots typically have been overlaid with a sandy topsoil and is sparsely vegetated with grass growth.

Along the southern portion of Lots 32, the ground slopes down from the southern boundary to Lot 26. The fill batter is approximately 6H:1V and 0.5 m in height. The fill batter has been overlaid with topsoil and growth is sparsely vegetated with grass growth.

Lots 33 – 35

Lots 33 to 35 are located at the north-western portion of the original Lot boundary. The Lots are bordered by the new Tawhero Street extension to the north, new residential Lots to the east and south, and WDC undeveloped residential land to the west.

The Lots typically fall north at between 0.2 – 1.0 % towards to the road-side berm. Lot 35 is relatively flat with some fall to the north and south. The Lots typically have been overlaid with a sandy topsoil and is sparsely vegetated with grass growth.

Along the southern portion of the Lots, the ground slopes down from the southern boundary to Lots 24 – 26. The fill batter is approximately 6H:1V and varies in height from 1.0 m to 0.5 m in height. The fill batter has been overlaid with topsoil and growth is sparsely vegetated with grass growth.

Along the western boundary of Lot 35, the ground slopes down to the WDC undeveloped residential land. The fill batter is approximately 2.6H:1V and 1.9 m in height. The fill batter has been overlaid with topsoil and has established grass growth.

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3. SUBSOIL INVESTIGATIONS

Subsoil investigations undertaken in November 2019 were carried out for the purpose of design and are detailed within the engineering design report RPT-3485-01.

The general soil summary from the November 2019 investigation indicated that the subsoil was a dark grey/brown sand overlain by a layer of topsoil/organic sand mix 0.1 to 0.4 m thick. There was an area within the south-western corner that had overlying gravel and clay within the upper layer.

Significant earthworks have been undertaken as part of the subdivision construction. The earthworks included stripping unsuitable overlying material, minor cut to fill, and a significant amount of importing sand fill. The imported clean sand fill was taken from a borrow area within the neighbouring WDC owned Lot to the west.

The assessment and certification for the earthworks is covered in the as-built drawings for earthworks and subsoil drains in accordance with NZS 4404 clause 2.6.2 and the Schedule 2A certificate.

3.1 POST-EARTHWORKS SUBSOIL INVESTIGATIONS

This section covers subsoil investigations undertaken post-earthworks construction.

Red Jacket undertook subsoil investigations on completed Lots with support from TestLab who undertook subsoil investigation on Lots as they were completed.

3.1.1 Red Jacket Testing

Red Jacket undertook subsoil testing on the 14th June 2021 within Lots 1, 7, 10, 14, 20, 25, 33, and 35. The subsoil testing including hand augered boreholes and scala penetrometer testing in accordance with NZS 3604 determination of “good ground”, refer Section 3.3 below.

Boreholes

At least one hand augered borehole was undertaken within each Lot with a target depth of 2.0 m below ground level (bgl). Some boreholes depths did not achieve 2.0 m bgl where the sand material collapsed due to the groundwater table.

Typically, the boreholes indicate the Lot subsoils consists of 100 – 200 mm thick layer of sandy black TOPSOIL overlying grey / brown SAND to the extents of the boreholes. The sand layer was either the sand fill material or the original sand subgrade, depending on depth of fill at the test location. This was consistent over Lots 1, 7, 10, 14 and 20.

Borehole testing within Lots 25, 33 and 35 identified an unsuitable layer of organic PEAT material within the subsoil profile. At Lot 25 the layer of peat was identified at the surface and was 1.0 m thick. At Lot 33 the layer of peat was identified at 0.8 m bgl and was 1.2 m thick. At Lot 35 the layer of peat was identified at 1.2 m bgl and was 1.2 m thick.

The groundwater table was encountered at Test Locations 8 (Lot 7), 9 (Lot 1), 15 (Lot 25). The groundwater table was measured at between 1.3 to 2.0 m bgl.

Scala Penetrometers

At least two scala penetrometer tests were undertaken within each Lot with a target depth of 2.0 bgl.

Typically, the scala penetrometer achieved 5 blows per 100 mm penetration within 200 – 400 mm bgl. This was consistent over Lots 1, 7, 10, 14 and 20.

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Scala penetrometer testing within Lots 25, 33 and 33 indicated that the results within the clean sand fill achieved a minimum of 3 – 5 blows per 100 mm penetration, and results within the peat layer were between 0.5 – 5 blows per 100 mm penetration.

3.1.2 TestLab Testing

TestLab undertook subsoil testing between June 2021 and November 2021 within Lots 2 – 13, 15 – 20, 21 – 24, 26 – 32, and 34. The subsoil testing including hand augered boreholes and scala penetrometer testing in accordance with NZS 3604 determination of "good ground", refer Section 3.3 below.

Boreholes

At least one hand augered borehole was undertaken within each Lot with a target of depth of 2.0 m bgl. Some boreholes depths did not achieve 2.0 m bgl where the sand material collapsed due to the groundwater table.

Typically, the boreholes indicate the Lot subsoils consists of a 100 – 400 mm thick layer of sandy black TOPSOIL overlying grey SAND to the extents of the boreholes. The sand layer was either the sand fill material or the original sand subgrade, depending on depth of fill at test location. This was consistent over Lots 2 – 13, 15 – 18 and 21 – 22, 28 – 32.

Borehole testing with Lot 19 identified various layers of sandy soil with presence of organic TOPSOIL. The borehole collapsed at 1.0 m bgl.

Borehole testing within Lots 26, 27, and 34 identified an unsuitable layer of organic PEAT material within the subsoil profile. At Lot 26 the layer of peat was identified at 1.3 m bgl and was 0.2 m thick. At Lot 27 the layer of peat was identified at 1.8 m bgl, the depth was not confirmed due to the collapsing of the borehole. At Lots 23 and 24 the presence of underlaying peat material was not confirmed due to the collapsing of the borehole.

The groundwater table was encountered at Lots 2 – 13, 15 – 18, 21 – 27, 31, 32, and 34. The groundwater table was measured at between 1.2 to 1.8 m bgl.

Scala Penetrometers

At least two scala penetrometer tests were undertaken within each Lot with a target depth of 2.0 bgl.

Typically, the scala penetrometers achieved 5 blows per 100 mm penetration within 300 – 400 mm bgl. This was consistent over Lots 2 – 4, 6 – 19, 21 – 23, and 27 – 32. At Lot 5 the results indicated that 5 blows per 100 mm penetration was not achieved until 600 mm bgl.

Scala penetrometer testing within Lots 24 and 26 indicated results were between 1 – 5 blows per 100 mm penetration between 1.1 m and 0.5 m bgl, respectively.

3.2 QUALITY ASSURANCE SUBSOIL INVESTIGATIONS

This section covers subsoil investigations undertaken during earthworks construction.

Typically, TestLab undertook the inspections as part of the contractor's quality assurance and on-behalf of Red Jacket where required.

TestLab undertook stripped subgrade inspections on behalf of Red Jacket for the Lot areas prior to bulk cutting and filling by the contractor, which is outlined in their site investigation reports.

The quality assurance testing undertaken by TestLab was focused on the new roadway construction including the bulk fill and backfill of utility service trenching for the 3 waters. The quality assurance

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testing also included compaction testing of bulk fill within the Lot areas. The quality assurance testing consisted of NDM field density testing of the fill material to confirm the compaction density in the form of percentage achieved relative to laboratory tested maximum dry density. The specified minimum level of compaction required was 95 % of laboratory maximum dry density. Typically, the compaction density achieved was over 100 % MDD, with the lowest being 97 % MDD. The TestLab testing results have been provided to WDC as part of the as-built process.

As the contractor bulk filled the Lot areas, TestLab undertook NDM testing within Lots at various depths of fill layers being subgrade level and 0.6 m depth. Results were provided for Lots 1 – 20, and 26 – 32. Typically, the compaction density achieved was between 100 % - 109 % MDD, with the lowest being 97 % MDD. The TestLab testing results have been provided to WDC as part of the as-built process.

NZS 4431:1989 requires cohesionless soil fill to achieve a density no less than 92 % of the laboratory MDD. Overall, the testing results provided indicates the contractor's compaction methodology has achieved well compacted fill material within the Lots suitable for residential development.

3.3 NZS 3604 GOOD GROUND ASSESSMENT

The residential Lots have been assessed for compliance with NZS 3604:2011 for suitability of standard foundation types outlined in the standard. For buildings of light-weight timber frame construction to be founded on "good ground" as defined by NZS3604:2011 clause 3.1.3. Such foundations do not require specific engineering design of foundations.

NZS 3604:2011 defines the criteria for "good ground" as that which has an ultimate bearing capacity of at least 300 kPa, and excludes:

- Potentially compressible ground, such as organic topsoil, soft soils, or uncertified fill;
- Expansive clay soils;
- Subsoil which has buried services or records of land slips and surface creep.

NZS 3604 states that the soil for the foundations shall be assumed to have an ultimate bearing capacity of not less than 300kPa when the number of scala penetrometer blows per 100mm depth of penetration below the underside of the proposed footing at each test site exceeds:

- Five down to a depth equal to the 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.

Compliance with "good ground" within each Lot is detailed within Section 4 Engineering Schedule below.

3.4 SOIL EXPANSIVITY

Based on the subsoil investigations across the site, the sand subsoils have been classified as Class A as per Table 2.1 of AS 2870:2011. Class A type soils are defined as "most sand and rock sites with little or no ground movement from moisture change".

Therefore, soil expansion risk is considered low, and no additional mitigation is required.

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3.5 SITE SUBSOIL CLASS

Based on the subsoil investigation undertaken and absence of deep specific subsoil class investigation, we consider the soil classification in line with NZS 1170.5:2004 to be 'Class D – Deep or Soft Soil'.

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4. ENGINEERING SCHEDULE

Each residential Lot has been assessed for building platform suitability in accordance with NZS 3604:2011 and on-site stormwater management in accordance with NZBC E1.

Requirements are detailed in Table 4-1 below.

Table 4-1 Engineering Schedule

Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 1 – 7 Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is not required for these Lots provided our recommendations are complied with.	Specific Engineering Design for Stormwater disposal is not required for these Lots, provide our recommendations are complied with.
	The Lots are located on sand subgrade being a mixture of fill material and original material to at least 2.0 m depth bgl. The sites have been filled to form relatively level building platforms. Lot 1 has a fill batter along the western boundary which slopes at approximately 2.7H:1V and is between 0.8 – 1.5 m in height. Lot 7 has a fill batter along the eastern boundary which slopes at approximately 2.3H:1V and is between 0.4 – 1.5 m in height. All Lots have an easement along the northern boundary containing an overland flow path a DN160 subsoil drain. The subsoil conditions below the overlying topsoil layer meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. **The proposed dwellings shall have the following recommendations or be subject to SED for foundations:** **a) Proposed residential buildings within all Lots shall have an appropriate offset from the foundations to the northern overland flow path and subsoil drain easement. To be confirmed by WDC during building consent stage.** **b) Proposed residential buildings within Lot 1 shall have a minimum offset of 1.5 m from foundations to the western boundary.** **c) Proposed residential buildings within Lot 7 shall have a minimum offset of 5.0 m from the foundations to the western boundary.** **d) For long term stability, all fill slopes to be formed and appropriately vegetated in accordance with the original earthworks detail in engineering drawings DWG-100-365. Otherwise appropriately retained.**	The sites are relatively flat with some fall to the northern boundary towards an overland flow path. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling location towards the northern flow path along the northern boundary, or towards Tawhero Street extension to the south. The sand fill subgrade material indicates that the subsoils on this site will have suitable permeability for on-site disposal of developed stormwater via ground soakage. The Lots are suitable for on-site disposal of stormwater by shallow conventional soakage systems. Refer note 3 below. **The proposed Lots shall have the following recommendations or be subject to SED for stormwater design:** **a) On-site soakage systems shall be located above the winter groundwater table and designed in accordance with NZBC E1 by suitably qualified person.** **b) On-site soakage systems shall be located a minimum offset of 3 m from the northern overland flow path and subsoil drain easement.** **c) Lot 1 on-site soakage system shall have a minimum offset of 3 m from the western boundary.** **d) Lot 7 on-site soakage system shall have a minimum offset of 5.5 m from the eastern boundary.** **e) The overland flowpath and DN160 subsoil drain identified along the northern boundary shall be maintained.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
	e) Lot 1 must achieve a minimum finished floor level of RL 119.35 m. f) Lot 2 must achieve a minimum finished floor level of RL 119.16 m. g) Lot 3 must achieve a minimum finished floor level of RL 119.04 m. h) Lot 4 must achieve a minimum finished floor level of RL 118.88 m. i) Lot 5 must achieve a minimum finished floor level of RL 118.82 m. j) Lot 6 must achieve a minimum finished floor level of RL 118.76 m. k) Lot 7 must achieve a minimum finished floor level of RL 118.74 m.	

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 8 – 14 Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is not required for these Lots provided our recommendations are complied with.	Specific Engineering Design for Stormwater disposal is not required for these Lots, provide our recommendations are complied with.
	The Lots are located on sand subgrade being a mixture of fill material and original material to at least 2.0 m depth bgl. The sites have been filled to form relatively level building platforms. Lots 8 – 12 and 14 have a fill batter along the eastern boundary which slopes at approximately 2.3H:1V and 2.7H:1V and is between 1.5 – 2.2 m in height. Lots 10 and 11 have a fill batter along the southern and northern boundary, respectively. The fill batter slopes at between 1H:1V and 2H:1V to a maximum height of 1.3 m. Lot 14 has a fill batter along the southern boundary which slopes at approximately 2H:1V and is 1.7 m in height. Lot 14 has an easement along the southern boundary containing a DN160 subsoil drain. The subsoil conditions below the overlying topsoil layer meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. **The proposed dwellings shall have the following recommendations or be subject to SED for foundations:** **a) Proposed residential buildings within Lot 14 shall have an appropriate offset from the foundations to the southern subsoil drain easement. To be confirmed by WDC during building consent stage.** **b) Proposed residential buildings within Lot 8 shall have a minimum offset of 5.6 m from foundations to the eastern boundary.** **c) Proposed residential buildings within Lot 9 shall have a minimum offset of 5.6 m from the foundations to the eastern boundary.** **d) Proposed residential buildings within Lot 10 shall have minimum offsets from the foundations of 6.0 m to the eastern boundary and 4.0 m from the southern boundary.** **e) Proposed residential buildings within Lot 11 shall have minimum offsets from the foundations of 4.0 m to the northern boundary and 7.0 m from the eastern boundary.** **f) Proposed residential buildings within Lot 12 shall have a minimum offset of 7.0 m from the foundations to the eastern boundary.**	The sites are relatively flat with some fall to the Tawhero Street extension on the western boundary. Lot 14 has minor fall towards the eastern boundary. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling location towards Tawhero Street extension to the west. The sand fill subgrade material indicates that the subsoils on this site will have suitable permeability for on-site disposal of developed stormwater via ground soakage. The Lots are suitable for on-site disposal of stormwater by shallow conventional soakage systems. Refer note 3 below. **The proposed Lots shall have the following recommendations or be subject to SED for stormwater design:** **a) On-site soakage systems shall be located above the winter groundwater table and designed in accordance with NZBC E1 by suitably qualified person.** **b) Lot 8 on-site soakage system shall have a minimum offset of 6.5 m from the eastern boundary.** **c) Lot 9 on-site soakage system shall have a minimum offset of 6.5 m from the eastern boundary.** **d) Lot 10 on-site soakage system shall have a minimum offset of 7.0 m from the eastern boundary and 3.5 m from the southern boundary.** **e) Lot 11 on-site soakage system shall have a minimum offset of 3.8 m from the northern boundary and 7.0 m from the eastern boundary.** **f) Lot 12 on-site soakage system shall have a minimum offset of 8.0 m from the eastern boundary.** **g) Lot 14 on-site soakage systems shall be located a minimum offset of 8.0 m from the eastern boundary and 6.5 m from the southern boundary.** **h) The DN160 subsoil drain within Lot 14 along the southern boundary shall be maintained.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
	g) Proposed residential buildings within Lot 14 shall have minimum offsets from the foundations of 7.0 m to the eastern boundary and 7.5 m from the southern boundary. h) For long term stability, all fill slopes to be shaped and appropriately vegetated in accordance with the original earthworks detail in engineering drawings DWG-100-365. Otherwise appropriately retained. i) Lot 8 must achieve a minimum finished floor level of RL 118.71 m. j) Lot 9 must achieve a minimum finished floor level of RL 118.65 m. k) Lot 10 must achieve a minimum finished floor level of RL 118.59 m. l) Lot 11 must achieve a minimum finished floor level of RL 118.54 m. m) Lot 12 must achieve a minimum finished floor level of RL 118.48 m. n) Lot 13 must achieve a minimum finished floor level of RL 118.45 m. o) Lot 14 must achieve a minimum finished floor level of RL 118.38 m.	

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 15 – 18 Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is not required for these Lots provided our recommendations are complied with.	Specific Engineering Design for Stormwater disposal is not required for these Lots, provide our recommendations are complied with.
	The Lots are located on sand subgrade being a mixture of fill material and original material to at least 2.0 m depth bgl. The sites have been filled to form relatively level building platforms. Lots 15, 17 and 18 have a fill batter along the southern boundary which slopes at approximately 1.5H:1V to 1.8H:1V and 2.7H:1V and is between 0.6 – 1.9 m in height. Lots 15, 17 and 18 has an easement along the southern boundary containing a DN160 subsoil drain. The subsoil conditions below the overlying topsoil layer meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. **The proposed dwellings shall have the following recommendations or be subject to SED for foundations:** **a) Proposed residential buildings within Lots 15, 17 and 18 shall have an appropriate offset from the foundations to the southern subsoil drain easement. To be confirmed by WDC during building consent stage.** **b) Proposed residential buildings within Lot 15 shall have a minimum offset from foundations of 6.0 m to the southern boundary.** **c) Proposed residential buildings within Lot 17 shall have a minimum offset from the foundations of 4.0 m to the southern boundary.** **d) Proposed residential buildings within Lot 18 shall have a minimum offset from the foundations of 4.0 m to the southern boundary.** **e) For long term stability, all fill slopes to be shaped and appropriately vegetated in accordance with the original earthworks detail in engineering drawings DWG-100-365. Otherwise appropriately retained.** **f) Lot 15 must achieve a minimum finished floor level of RL 118.38 m.** **g) Lot 16 must achieve a minimum finished floor level of RL 118.35 m.** **h) Lot 17 must achieve a minimum finished floor level of RL 118.24 m.** **i) Lot 18 must achieve a minimum finished floor level of RL 118.09 m.**	The sites are relatively flat with some fall to the Tawhero Street extension on the northern boundary. Lot 15 has minor fall towards the southern boundary. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling location towards Tawhero Street extension to the north. The sand fill subgrade material indicates that the subsoils on this site will have suitable permeability for on-site disposal of developed stormwater via ground soakage. The Lots are suitable for on-site disposal of stormwater by shallow conventional soakage systems. Refer note 3 below. **The proposed Lots shall have the following recommendations or be subject to SED for stormwater design:** **a) On-site soakage systems shall be located above the winter groundwater table and designed in accordance with NZBC E1 by suitably qualified person.** **b) Lot 15 on-site soakage system shall have a minimum offset of 6.0 m from the eastern boundary.** **c) Lot 17 on-site soakage system shall have a minimum offset of 5.5 m from the eastern boundary and 3.5 m from the southern boundary.** **d) Lot 18 on-site soakage system shall have a minimum offset of 5.0 m from the northern boundary and 7.0 m from the eastern boundary.** **e) The DN160 subsoil drain within Lots 15, 17 and 18 along the southern boundary shall be maintained.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lot 19, Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is required for this Lot.	Specific Engineering Design for Stormwater disposal is required for this Lot.
	The Lot is located on subsoils consisting of various layers of sand, granular material, silt clay and topsoil. The site has been shaped to form a relatively level building platform. Lot 19 have a 1.5 m high existing timber retaining wall along the southern boundary. The suitability of the wall has not been assessed as part of this report. The Lot has an easement along the southern boundary containing a DN375 stormwater main. The subsoil conditions below the overlying topsoil layer do not meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is not suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. The site is subject to Specific Engineering Design, SED for foundations. **The proposed dwelling shall have the following recommendations to be considered as part of SED for foundations:** **a) Proposed residential buildings within Lot 19 shall have an appropriate offset from the foundations to the southern stormwater main easement. To be confirmed by WDC during building consent stage.** **b) Proposed residential buildings within Lot 19 shall have a minimum offset from foundations of 2.5 m to existing wall along the southern boundary.** **c) Lot 19 must achieve a minimum finished floor level of RL 118.04 m.**	The site is relatively flat with some fall to the western boundary. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling location towards the west to the WDC undeveloped residential land. The northern portion of the Lot was filled as part of the subdivision earthworks, therefore sand fill subgrade material within that part of the Lot will have suitable permeability for on-site disposal of developed stormwater via ground soakage. Due to the presence of underlying unsuitable organic topsoil layers, the assessment and design of on-site stormwater soakage systems are subject to Specific Engineering Design, SED. **The proposed Lot shall have the following recommendations to be considered as part of SED for stormwater design:** **a) Proposed locations of stormwater soakage systems to be undercut of unsuitable organic soils and backfilled with suitable free draining material, to be designed by a suitably qualified engineer.** **A suitably qualified engineer shall undertake field testing to confirm the subsoil soakage rate in accordance with NZBC E1 clause 9.0.2 for design of on-site soakage systems.** **b) On-site soakage systems shall be located above the winter groundwater table.** **c) Lot 19 on-site soakage system shall have an appropriate offset from the existing retaining wall and DN375 stormwater main.** **d) The DN375 stormwater main along the southern boundary shall be maintained.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 20 – 23, Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is not required for these Lots provided our recommendations are complied with.	Specific Engineering Design for Stormwater disposal is not required for these Lots, provide our recommendations are complied with.
	The Lots are located on sand subgrade being a mixture of fill material and original material to at least 2.0 m depth bgl. The sites have been filled to form relatively level building platforms. Lots 20, 22 and 23 have a fill batter along the western boundary which slopes at approximately 5H:1V and is 0.6 m in height. The subsoil conditions below the overlying topsoil layer meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. **The proposed dwellings shall have the following recommendations or be subject to SED for foundations:** **a) Proposed residential buildings within Lots 20, 22 and 23 shall have a minimum offset from foundations of 1.0 m to the western boundary.** **b) Lot 20 must achieve a minimum finished floor level of RL 118.09 m.** **c) Lot 21 must achieve a minimum finished floor level of RL 118.24 m.** **d) Lot 22 must achieve a minimum finished floor level of RL 118.39 m.** **e) Lot 23 must achieve a minimum finished floor level of RL 118.33 m.**	The sites are relatively flat with some fall towards the western boundary. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling locations towards the western boundary, or Tawhero Street extension to the east. The sand fill subgrade material indicates that the subsoils on this site will have suitable permeability for on-site disposal of developed stormwater via ground soakage. The Lots are suitable for on-site disposal of stormwater by shallow conventional soakage systems. Refer note 3 below. **The proposed Lots shall have the following recommendations or be subject to SED for stormwater design:** **a) On-site soakage systems shall be located above the winter groundwater table and designed in accordance with NZBC E1 by suitably qualified person.** **b) Lots 20, 22 and 23 on-site soakage systems shall have a minimum offset of 3.0 m from the western boundary.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 24 – 27, Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is required for these Lots.	Specific Engineering Design for Stormwater disposal is required for these Lots.
	The Lot is located subsoils consisting of various layers of original sand, sand fill and organic topsoil. The site has been shaped to form relatively level building platforms. Lot 24 has a fill batter along the western boundary which slopes at approximately 5H:1V and is 0.6 m in height. Lots 24 – 26 have a fill batter along the northern boundary which slopes at approximately 5H:1V and is 1.0 m in height. The subsoil conditions below the overlying topsoil layer do not meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is not suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. The sites are subject to Specific Engineering Design, SED for foundations. **The proposed dwellings shall have the following recommendations to be considered as part of SED for foundations:** **a) Proposed residential buildings within Lot 24 shall have a minimum offset from foundations of 1.0 m to the western boundary.** **b) Lot 24 must achieve a minimum finished floor level of RL 118.29 m.** **c) Lot 25 must achieve a minimum finished floor level of RL 118.36 m.** **d) Lot 26 must achieve a minimum finished floor level of RL 118.36 m.** **e) Lot 27 must achieve a minimum finished floor level of RL 118.36 m.**	The sites are relatively flat with some fall to the western and southern Lot boundaries. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling locations towards the west to the WDC undeveloped residential land or to the ROW servicing Lots 22 - 26. The sites were typical filled as part of the subdivision earthworks, therefore sand fill subgrade material within the Lots will have suitable permeability for on-site disposal of developed stormwater via ground soakage. Due to the presence of underlying unsuitable organic topsoil layers, the assessment and design of on-site stormwater soakage systems are subject to Specific Engineering Design, SED. **The proposed Lot shall have the following recommendations to be considered as part of SED for stormwater design:** **a) Proposed locations of stormwater soakage systems to be undercut of unsuitable organic soils and backfilled with suitable free draining material, to be designed by a suitably qualified engineer.** **A suitably qualified engineer shall undertake field testing to confirm the subsoil soakage rate in accordance with NZBC E1 clause 9.0.2 for design of on-site soakage systems.** **b) On-site soakage systems shall be located above the winter groundwater table.** **c) Lot 24 on-site soakage systems shall have a minimum offset of 3.0 m from the western boundary.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 28 – 32, Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is not required for these Lots provided our recommendations are complied with.	Specific Engineering Design for Stormwater disposal is not required for these Lots, provide our recommendations are complied with.
	The Lots are located on sand subgrade being a mixture of fill material and original material to at least 2.0 m depth bgl. The sites have been filled to form relatively level building platforms. Lot 32 has a fill batter along the southern boundary which slopes at approximately 6H:1V and is 0.5 m in height. The subsoil conditions below the overlying topsoil layer meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. **The proposed dwellings shall have the following recommendations or be subject to SED for foundations:** **a) Proposed residential buildings within Lot 32 shall have a minimum offset from foundations of 1.0 m to the southern boundary.** **b) Lot 28 must achieve a minimum finished floor level of RL 118.28 m.** **c) Lot 29 must achieve a minimum finished floor level of RL 118.44 m.** **d) Lot 30 must achieve a minimum finished floor level of RL 118.59 m.** **e) Lot 31 must achieve a minimum finished floor level of RL 118.69 m.** **f) Lot 32 must achieve a minimum finished floor level of RL 118.88 m.**	The sites are relatively flat with some fall towards the eastern and southern boundaries. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling locations towards the eastern and southern boundaries towards Tawhero Street extension. The sand fill subgrade material indicates that the subsoils on this site will have suitable permeability for on-site disposal of developed stormwater via ground soakage. The Lots are suitable for on-site disposal of stormwater by shallow conventional soakage systems. Refer note 3 below. **The proposed Lots shall have the following recommendations or be subject to SED for stormwater design:** **a) On-site soakage systems shall be located above the winter groundwater table and designed in accordance with NZBC E1 by suitably qualified person.** **b) Lot 32 on-site soakage system shall have a minimum offset of 3.0 m from the southern boundary.**

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Site	Building Platform Requirements	Stormwater Requirements & Overland Flow Paths
Lots 33 – 35, Tawhero Street Extension, Whanganui	Specific Engineering Design for Foundations is required for these Lots.	Specific Engineering Design for Stormwater disposal is required for these Lots.
	The Lot is located subsoils consisting of various layers of original sand, sand fill and organic topsoil. The site has been shaped to form relatively level building platforms. Lots 33 – 35 have a fill batter along the southern boundary which slopes at approximately 6H:1V and varies between 0.5 and 1.0 m in height. Lot 35 has a fill batter along the western boundary which slopes approximately 2.6H:1V and is 1.9 m in height. The subsoil conditions below the overlying topsoil layer do not meet the strength requirements as outlined in NZS 3604:2011 'good ground'. This material is not suitable for supporting residential buildings with conventional foundations or RibRaft foundations. Refer to notes 1 and 2 below. The sites are subject to Specific Engineering Design, SED for foundations. **The proposed dwellings shall have the following recommendations to be considered as part of SED for foundations:** **a) Proposed residential buildings within Lot 35 shall have a minimum offset from foundations of 2.0 m to the western boundary.** **b) For long term stability, all fill slopes to be shaped and appropriately vegetated in accordance with the original earthworks detail in engineering drawings DWG-100-365. Otherwise appropriately retained.** **c) Lot 33 must achieve a minimum finished floor level of RL 119.03 m.** **d) Lot 34 must achieve a minimum finished floor level of RL 119.20 m.** **e) Lot 35 must achieve a minimum finished floor level of RL 119.36 m.**	The sites are relatively flat with some fall to the northern and southern Lot boundaries. Care is to be taken to ensure secondary flow paths are not obstructed and secondary flow is directed away from the proposed dwelling locations towards the north to the WDC undeveloped residential land or the new Tawhero Street extension. The sites were typical filled as part of the subdivision earthworks, therefore sand fill subgrade material within the Lots will have suitable permeability for on-site disposal of developed stormwater via ground soakage. Due to the presence of underlying unsuitable organic topsoil layers, the assessment and design of on-site stormwater soakage systems are subject to Specific Engineering Design, SED. **The proposed Lot shall have the following recommendations to be considered as part of SED for stormwater design:** **a) Proposed locations of stormwater soakage systems to be undercut of unsuitable organic soils and backfilled with suitable free draining material, to be designed by a suitably qualified engineer.** **A suitably qualified engineer shall undertake field testing to confirm the subsoil soakage rate in accordance with NZBC E1 clause 9.0.2 for design of on-site soakage systems.** **b) On-site soakage systems shall be located above the winter groundwater table.** **c) Lot 35 on-site soakage systems shall have a minimum offset of 4.0 m from the western boundary.**

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4.1 STANDARD NOTES

1. Where "conventional foundations" is stated in the Table above, this refers principally to foundations complying with NZS 3604. The foundation types under NZS 3604 include concrete slab-on-grade floors and timber floor on timber piles.
   These foundation types should be excavated into original good ground subject to confirmation at the time of a Building Consent.
   Alternative foundation systems shall be provided as a specific engineering design.
2. Where "RibRaft foundations" is stated in the Table above, this refers to proprietary "rib-raft" floors with blocks of insulation between concrete ribs and shall be designed & constructed

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following Firth RibRaft Technical Manual October 2018 Rev A or other approved proprietary design.

3. Where "conventional soakage systems" is stated in the Table above, this refers to soakage trenches that are excavated into the sand subgrade to service a new residential building. Stormwater from roofs can be piped to storage tanks for residential use with overflow directed to soakage. The size of the soakage system shall be determined by a suitably qualified person in accordance with NZBC E1. Soakage systems are to be located a minimum of 1.5m from dwellings and 1.5m from boundaries.

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5. ENGINEERING SUMMARY

In summary, the investigation and geotechnical testing has found that:

1. There are suitable stable flood-free building platforms available within all Lots, however, Lots 19, 24 to 27 and 33 to 35 are subject to specific engineering design for foundations and subjects to specific engineering design for on-site stormwater disposal design.
2. Minimum finished floor levels have been stated for all Lots.
3. The topsoil and vegetation over all Lots shall be completely removed beneath building platform footprints and replaced with compacted hardfill as required to form a level building platform.
4. Further subsoil investigations will be required at the time of building consent to confirm ground conditions within the proposed building footprints.
5. Building restrictions apply to Lots 1 – 12, 14 – 15, 17 – 20, 22 – 24, 32 and 35 due to proximity to sloping ground.
6. For long term stability, all fill slopes where stated are to be formed and appropriately vegetated in accordance with the original earthworks detail in engineering drawings DWG-100-365. Otherwise appropriately retained.
7. Location restrictions for on-site stormwater soakage systems apply to Lots 1 – 12, 14 – 15, 17 – 20, 22 – 24, 32 and 35 due to proximity to sloping ground.

Refer to Section 4.0 above for the Engineering Schedule outlining detailed building platform restrictions and on-site stormwater soakage system requirements.

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6. LIMITATIONS

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Appendix A SUBSOIL TESTING RESULTS

Subsoil testing results attached to this report focus on the hand augered boreholes and scala penetrometer testing undertaken post-earthwork construction. All quality assurance testing undertaken by TestLab during earthworks construction have been supplied to WDC and are available on request.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Date	14/06/2021	Job No.	3485
By	WA	Page No.	1 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS

MAGNOLIA SUBDIVISION, WHANGANUI

Location Plan
(N.T.S)

Disclaimer:
These Soil Testing Results are prepared for the client of Red Jacket for the stated purpose, and cannot be used for any other purpose or by others unless authority is given by Red Jacket Consulting Engineers Ltd.

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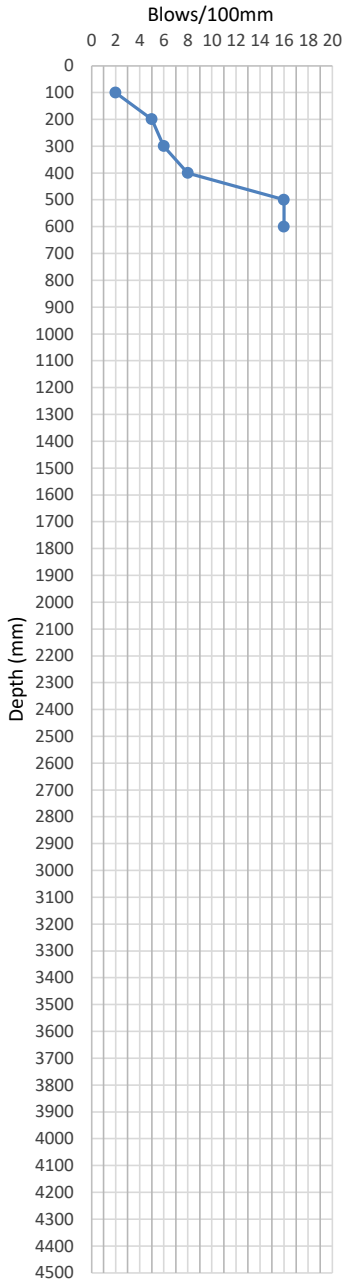
Date	14/06/2021	Job No.	3485
By	WA	Page No.	2 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 1

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Date	14/06/2021	Job No.	3485
By	WA	Page No.	3 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 2

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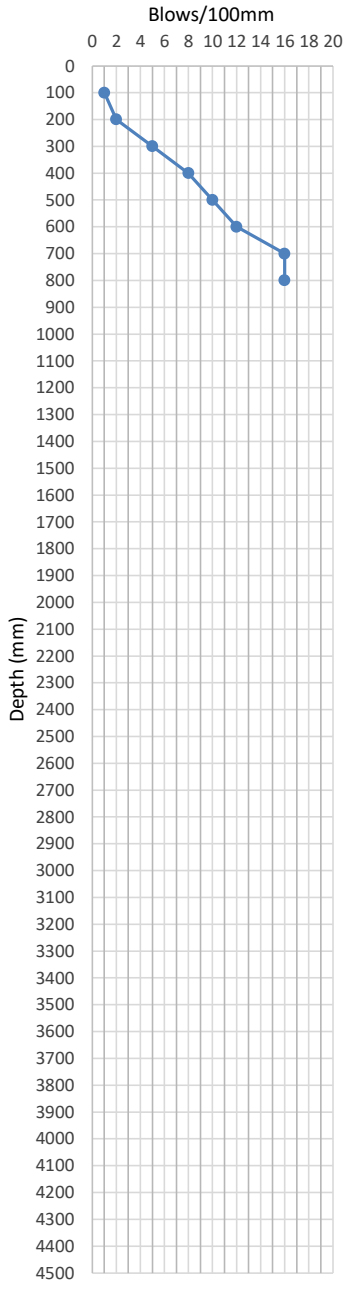
Scala Penetrometer



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic Topsoil.
	SW	Firm, moist dark grey SAND.
		Firm, moist dark brown SAND.

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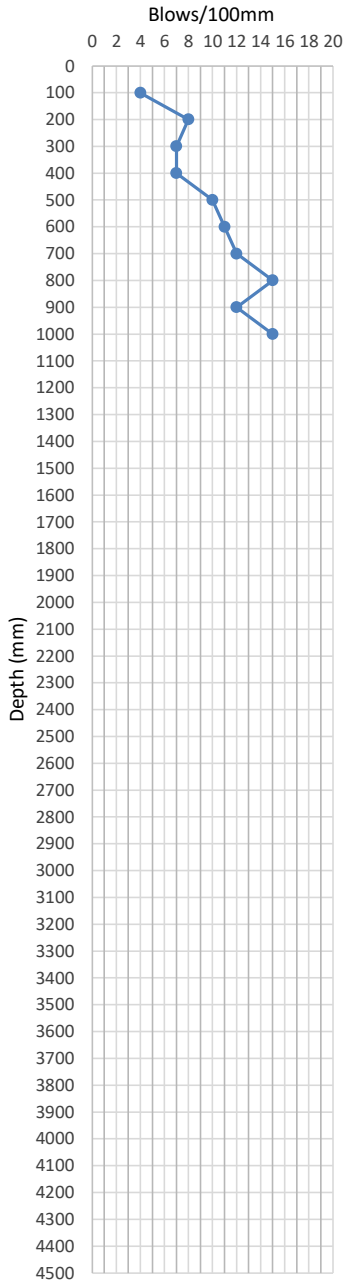
Date	14/06/2021	Job No.	3485
By	WA	Page No.	4 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 3

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Firm brown sand with significant organics.
	SW	Firm, moist grey SAND.

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

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Date	14/06/2021	Job No.	3485
By	WA	Page No.	5 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 4

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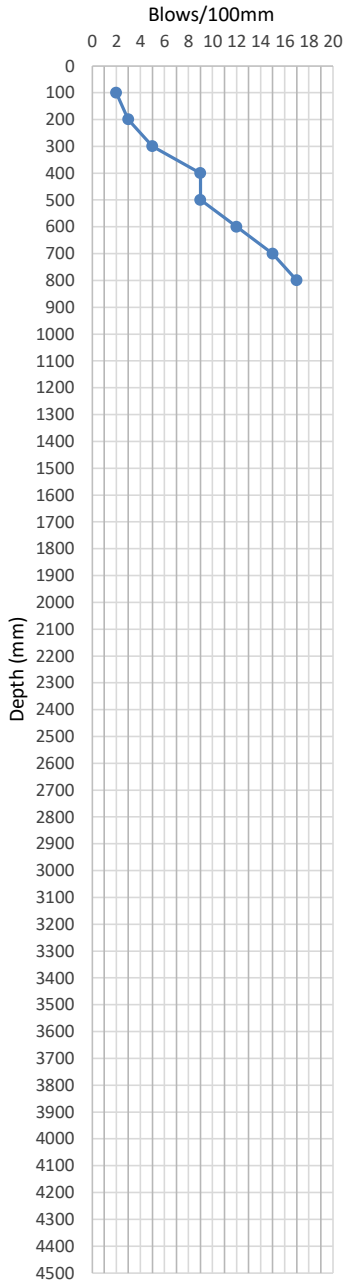
Scala Penetrometer



NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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Date	14/06/2021	Job No.	3485
By	WA	Page No.	6 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 5

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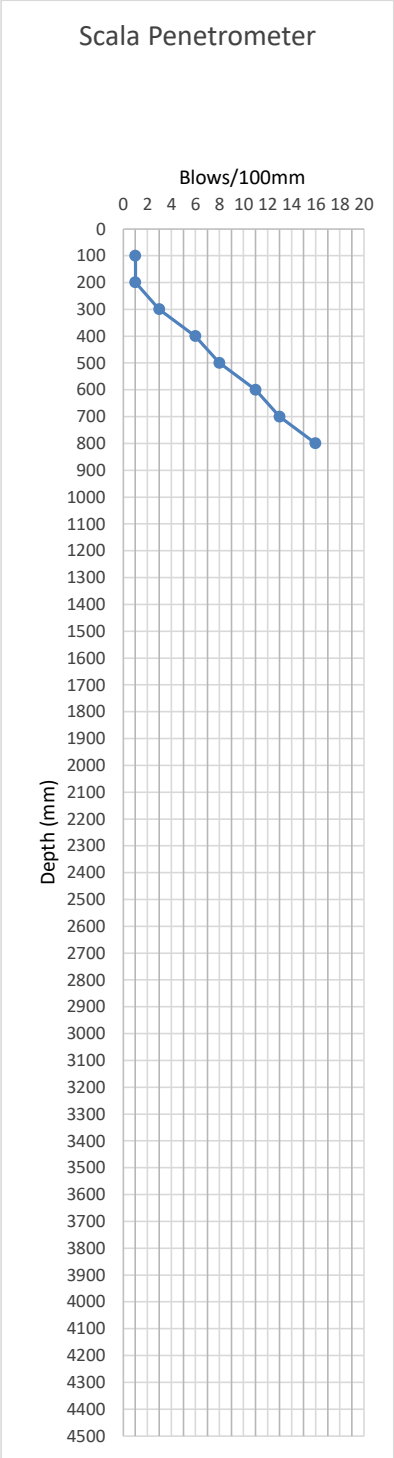

NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Date	14/06/2021	Job No.	3485
By	WA	Page No.	7 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 6

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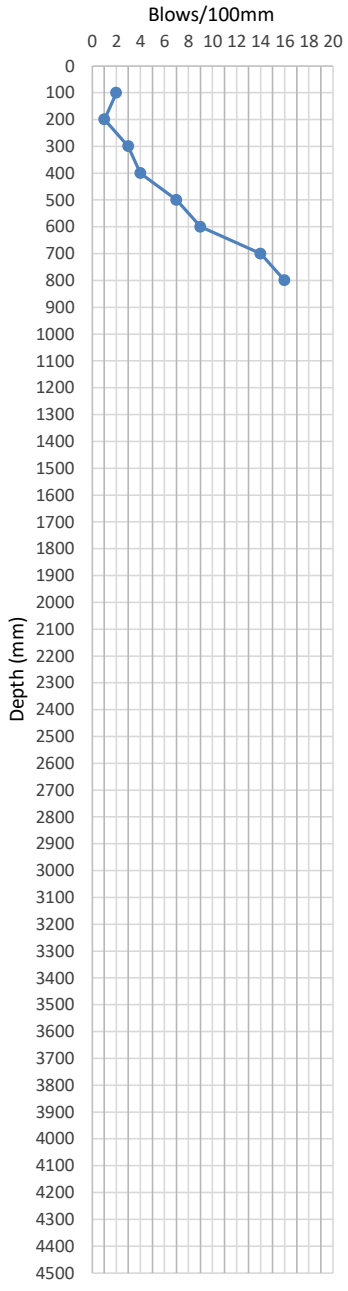
Scala Penetrometer



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Firm brown sand with significant organics.
	SW	Firm, moist grey SAND.

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Date	14/06/2021	Job No.	3485
By	WA	Page No.	8 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 7

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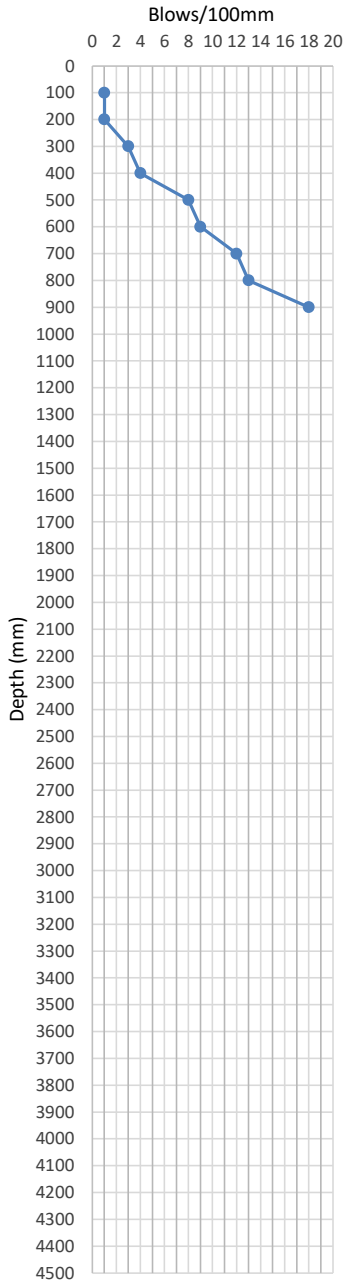
Scala Penetrometer



NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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Date	14/06/2021	Job No.	3485
By	WA	Page No.	9 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 8

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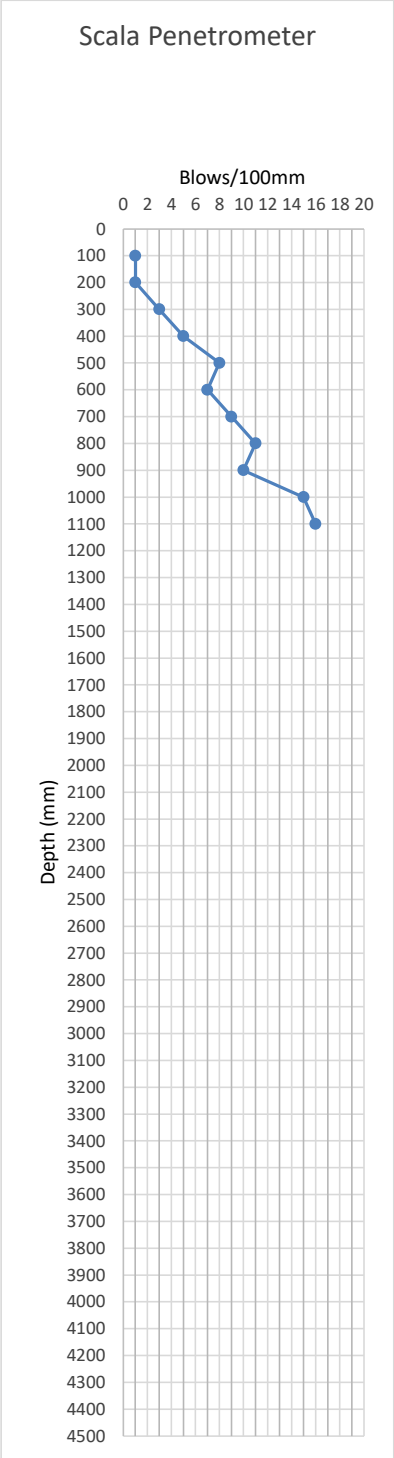

NOTES: Ground Water Table @ 1.5 m.

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Brown sand with significant organics.
		Firm, moist grey SAND.
	SW	Firm, moist brown SAND.
		GWT

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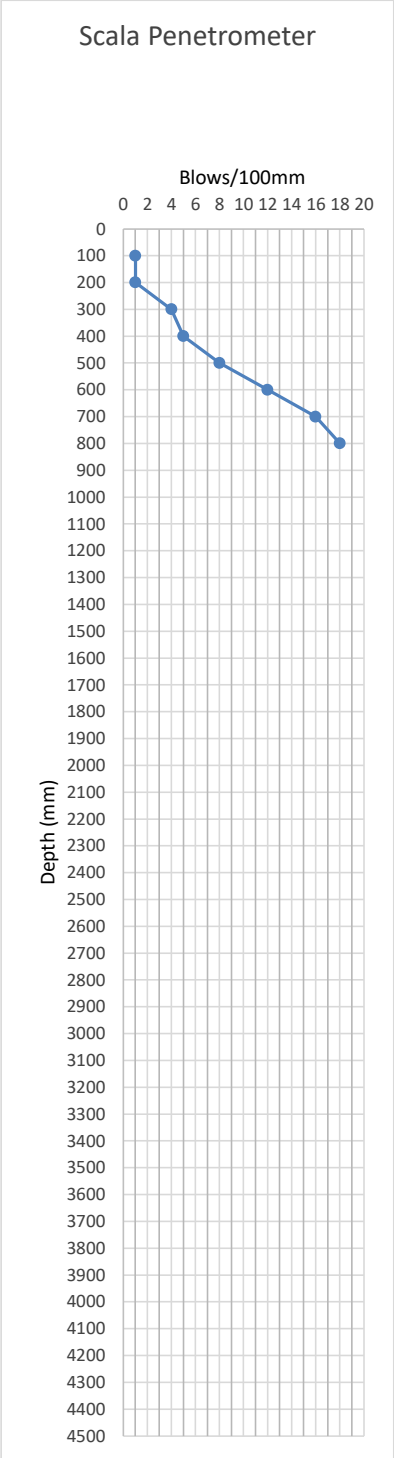
Date	14/06/2021	Job No.	3485
By	WA	Page No.	10 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 9

MAGNOLIA SUBDIVISION, WHANGANUI



NOTES: GWT @ 1.9 m

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic PEAT.
	SW	Firm, moist grey SAND.
		GWT

Red Jacket Limited - 3 Davidson Street, New Plymouth 4312, NZ
P.06 759 0999 - info@redjacket.nz - www.redjacket.nz

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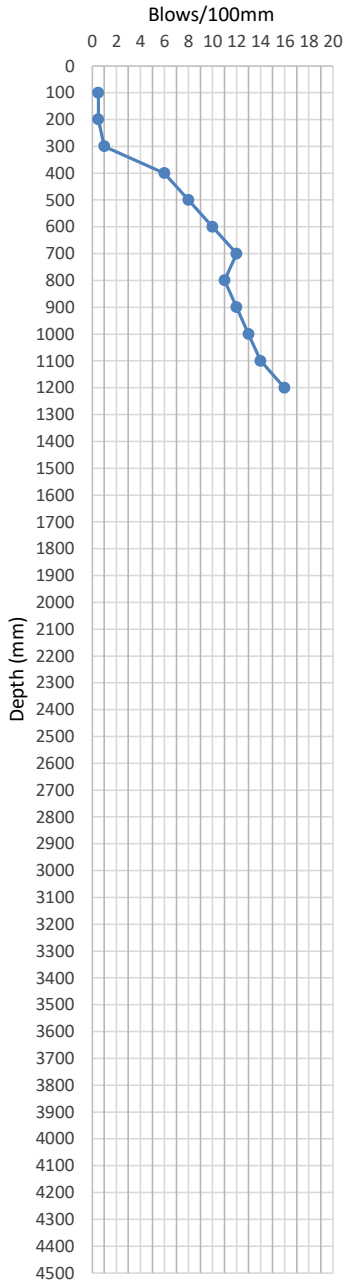
Date	14/06/2021	Job No.	3485
By	WA	Page No.	11 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 10

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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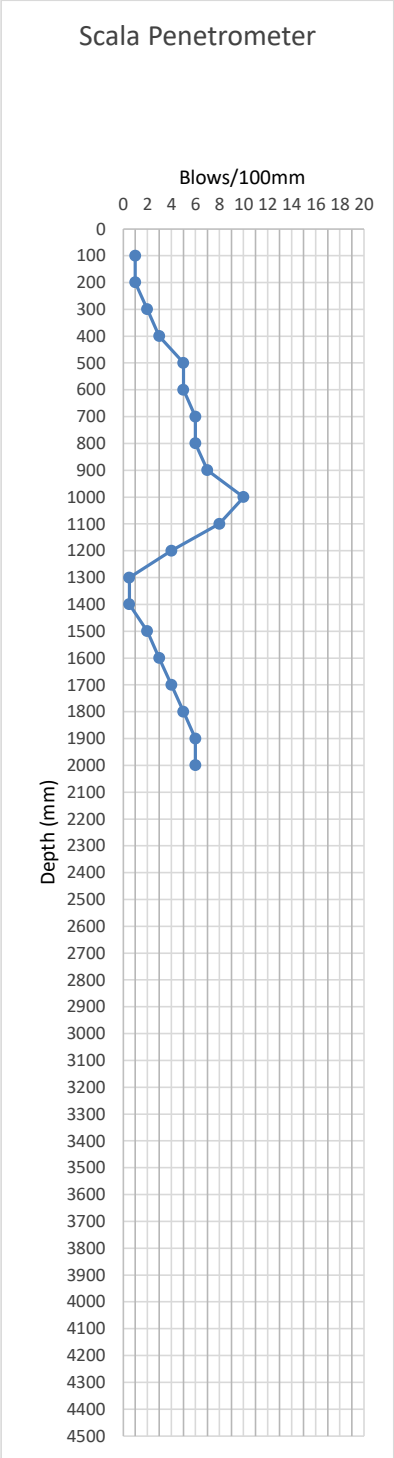
Date	14/06/2021	Job No.	3485
By	WA	Page No.	12 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 11

MAGNOLIA SUBDIVISION, WHANGANUI



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic PEAT.
	SW	Firm, moist grey/ brown SAND.
	OL	Black organic PEAT with grass, rootlets and some sand.
	SW	Frirm grey/ brown sand

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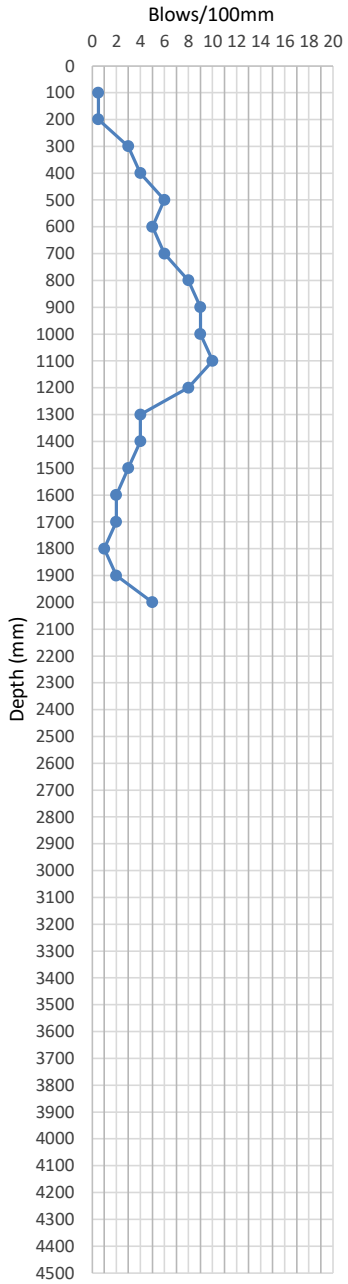
By	WA	Page No.	13 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 12

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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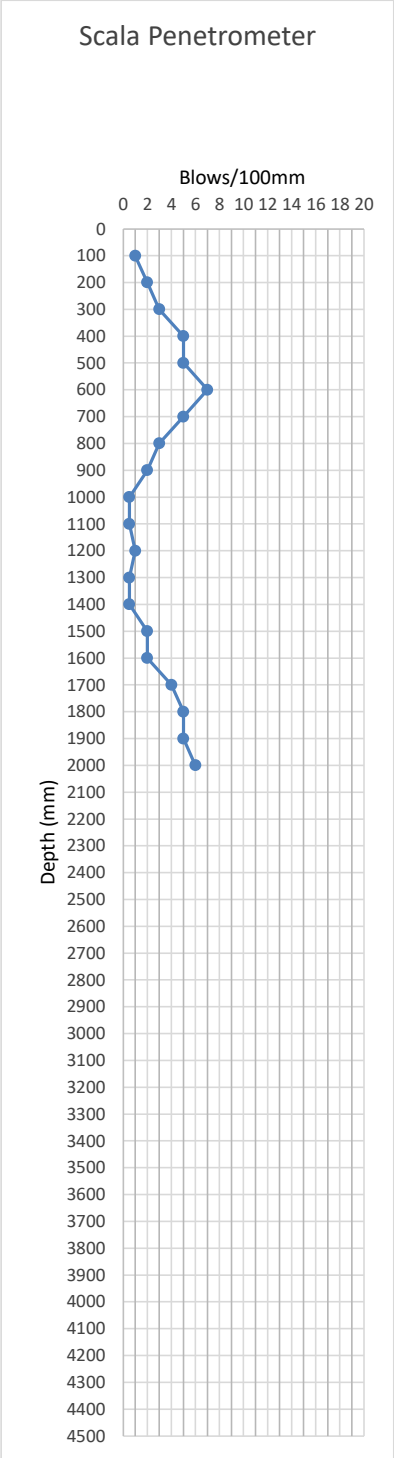
By	WA	Page No.	14 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 13

MAGNOLIA SUBDIVISION, WHANGANUI



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic PEAT.
	SW	Firm, moist grey/ brown SAND.
	OL	Black organic PEAT with grass, rootlets and some sand.
	SW	Frirm grey/ brown sand

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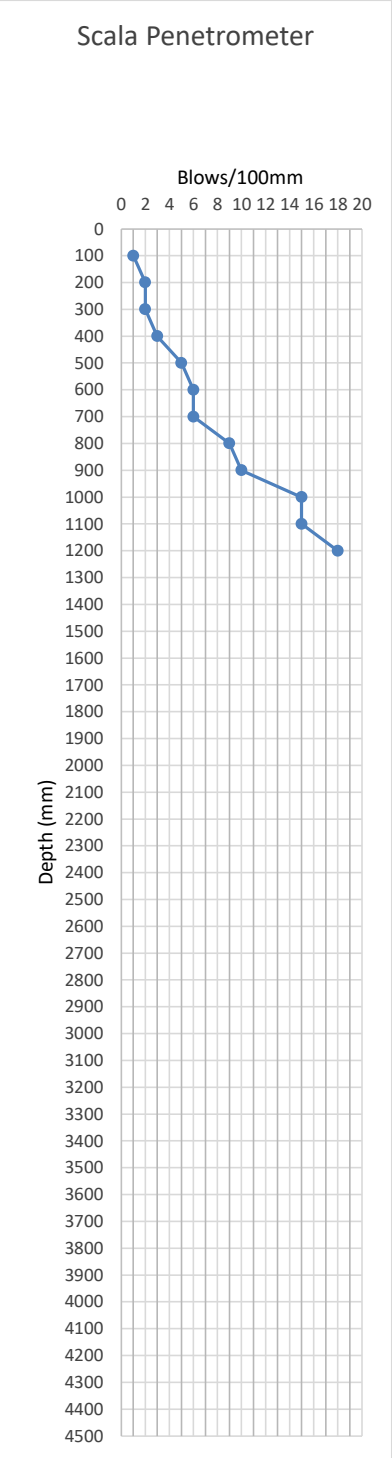
By	WA	Page No.	15 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 14

MAGNOLIA SUBDIVISION, WHANGANUI



NOTES:

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic PEAT.
	SW	Firm, moist grey/ brown SAND.

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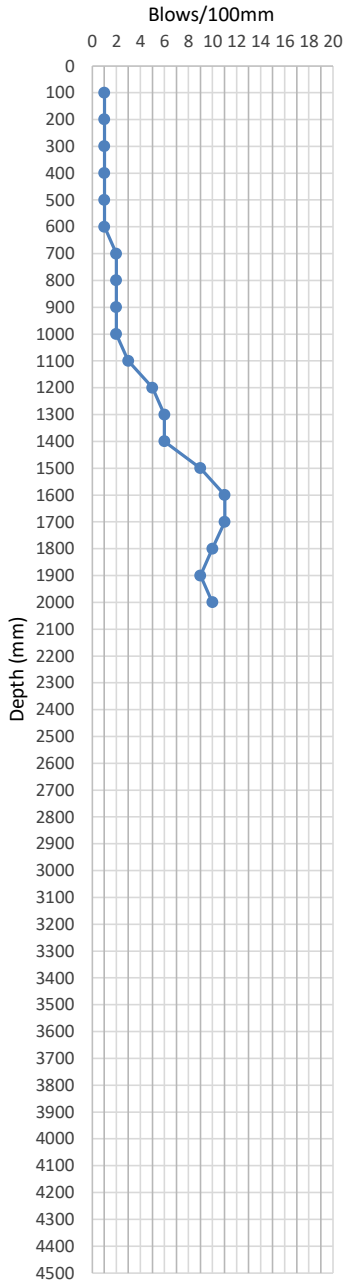
Date	14/06/2021	Job No.	3485
By	WA	Page No.	16 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 15

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES: GWT @ 1.4 m.

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type
	OL	Black, moist organic PEAT.
	SW	Firm brown sand with some iron staining.
		GWT

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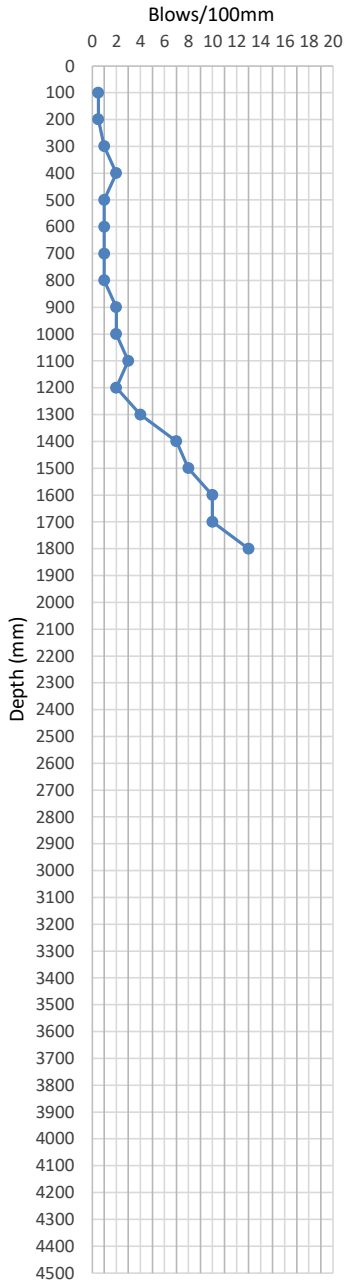
Date	14/06/2021	Job No.	3485
By	WA	Page No.	17 of 16
Doc No.	TST-3485-01		

SOIL TESTING RESULTS - Location No. 16

MAGNOLIA SUBDIVISION, WHANGANUI

Scala Penetrometer



NOTES: Scala Penetrometer Testing Only

Shear Vane Used: Serial Number 2011

Shear Strength (kPa)	Soil Class.	Soil Type

No Hand Augered Borehole Testing

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ACCREDITED IANZ TESTING LABORATORY Nº 546

LABORATORY TEST REPORT

TestLab CIVIL ENGINEERING MATERIALS TESTING SPECIALISTS
WANGANUI
Phone 06 348 4199 www.testlab.co.nz
Fax 06 348 4198 office@testlab.co.nz
83 Putiki Drive
PO Box 4256
Wanganui

Scala Investigation

Job	Magnolia Subdivision	Lab Ref	21/1490
Material/Origin	Insitu soils	Report No.	2114901
Condition	Insitu	Date of report	23/11/2021
Sampled by	TestLab Wanganui	Date sampled	18/11/2021
Sampling method	As per site plan	Date received	18/11/2021
Client	Red Jacket Consultants, attn: Mr Miller	Date tested	18/11/2021
Comments	NZS4402:1988: Test 6.5.2: Scala Penetrometer NZ Geomech. Soc. Guide: Soil logging (not accredited).		

Scala Results: **Auger Results:**

Lot No.	Test No.	Blows/100mm		Depth (mm)	Description
23	1	1/1/4/4/5/7/9/11/15/15/14/19/13/ 17/15/10/17/15/18/15		0-200	Dark grey sandy topsoil, and wet.
	2	4/8/8/9/11/11/10/11/7/10/4/12/18/ 18/16/9/10/11/15/15		200 – 1200	Dark grey sand, wet
				1200	Unable to test – over saturated
32	1	3/4/6/14/19/Refusal		0 - 100	Dark grey sandy topsoil, moist
	2	2/2/6/8/9/12/15/19/Refusal		100 - 300	Dark grey sand, moist
				300 - 1200	Dark grey sand, damp
				1200 – 1800	Dark grey sand, wet
				1800 – 2000	Dark grey sand, saturated
31	1	2/10/13/17/15/Refusal		0 - 200	Dark grey sandy topsoil, moist
	2	7/6/7/12/16/Refusal		200 - 1200	Dark grey sand, damp
				1200 - 1500	Dark grey sand, wet
				1500 – 2000	Dark grey sand, saturated
30	1	7/8/14/19/19/Refusal		0 – 200	Dark grey sandy topsoil, damp
	2	4/5/6/15/18/Refusal		200 – 400	Dark grey sand, moist
				400 – 1800	Dark grey sand, damp
				1800 – 2000	Dark grey sand, wet
29	1	4/5/5/12/18/Refusal		0 – 400	Dark grey sandy topsoil, moist
	2	8/6/9/16/20/Refusal		400 – 600	Dark grey sand, moist
				600 – 1300	Dark grey sand, damp
				1300 – 1800	Dark grey sand, wet
				1800 – 2000	Dark grey Dark grey sand, saturated
28	1	6/8/8/16/Refusal		0 – 400	Dark grey sandy topsoil, some granular fill, moist
	2	6/7/11/17/Refusal		400 – 1800	Dark grey sand, damp
				1800 – 2000	Dark grey sand, wet
27	1	9/15/20/Refusal		0 – 200	Dark grey sandy topsoil, some granular fill, moist
	2	4/8/12/20/Refusal		200 – 500	Dark grey sand, moist
				500 – 900	Dark grey sand, damp
				900 – 1800	Dark grey sand, wet
				1800 – 2000	Topsoil fines & dark grey sand, saturated

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83 Putiki Drive
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Wanganui
www.testlab.co.nz
office@testlab.co.nz

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Scala Investigation

Scala Results: **Auger Results:**

Lot No.	Test No.	Blows/100mm		Depth (mm)	Description
26	1	3/3/3/3/5/10/17/19/Refusal		0 – 700	Dark grey sandy topsoil, moist,
	2	5/6/12/17/20/Refusal		700 – 1300	Dark grey sand,
				1300 – 1500	Dark grey sandy topsoil fines, wet
				1500 – 2000	Dark grey sand, saturated
21	1	2/3/5/8/10/12/12/11/10/18/Refusal		0 – 200	Dark grey sandy topsoil, moist
	2	7/8/10/14/17/Refusal		200 – 1000	Dark grey sand, damp
				1000 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
22	1	3/9/12/18/19/Refusal		0 – 200	Dark grey sandy topsoil, moist
	2	10/13/16/20/Refusal		200 – 1000	Dark grey sand, damp
				1000 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
4	1	2/1/8/12/16/20/Refusal		0 – 300	Dark grey sandy topsoil, damp
	2	2/2/7/12/13/17/20/Refusal		300 – 1100	Dark grey sand, damp
				1100 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
3	1	2/5/9/13/15/15/16/12/15/14/14/ 17/20/20/Refusal		0 – 1000	Dark grey sand, damp
	2	1/2/5/9/11/12/11/13/14/11/14		1000 – 1600	Dark grey sand, wet
				1600 – 2000	Dark grey sand, saturated
2	1	2/3/5/9/12/16/17/20/Refusal		0 – 100	Dark grey sandy topsoil, damp
	2	1/3/6/10/13/17/15/17/19/20/ 19/Refusal		100– 1200	Dark grey sand, damp
				1200 – 1800	Dark grey sand, wet
				1800 – 2000	Dark grey sand, saturated
34	1	4/3/5/5/6/6/5/3/3/6/5/3/4/5/3/4/ 3/7		0 – 300	Topsoil, some dark grey sand, damp
	2	4/5/7/7/9/9/12/13/11/8/7/5/3/4/5/ 4/4/4/5/4		300 – 700	Dark grey sand, damp
				700 – 2000	Dark grey sandy topsoil, saturated
24	1	2/2/1/1/3/2/5/1/4/6/15/16/17/17/ 16/17/19/16/13/16/13		0 – 1000	Dark grey sandy topsoil, wet
	2	4/2/3/2/2/1/2/2/3/1/3/6/11/15/ 20/Refusal		1000 – 1200	Dark grey sand, wet
				1200	Unable to test – over-saturated
10	1	3/6/10/15/19/Refusal		0 – 200	Dark grey sand, dry
	2	3/6/10/15/19/Refusal		200 – 1400	Dark grey sand, damp
				1400 – 2000	Dark grey sand, saturated
9	1	3/6/11/16/Refusal		0 – 100	Dark grey sand, dry
	2	2/4/9/12/16/19/Refusal		100 - 1400	Dark grey sand, damp
				1400 – 2000	Dark grey sand, saturated
8	1	4/6/11/19/Refusal		0 – 200	Dark grey sandy topsoil, damp
	2	1/3/8/11/16/17/Refusal		200 – 1600	Dark grey sand, damp
				1600 – 2000	Dark grey sand, saturated

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83 Putiki Drive
PO Box 4256
Wanganui

LABORATORY TEST REPORT

Scala Investigation

Scala Results: **Auger Results:**

Lot No.	Test No.	Blows/100mm		Depth (mm)	Description
7	1	2/4/5/14/18/Refusal		0 – 100	Dark grey sand, dry
	2	2/4/8/11/14/14/17/Refusal		100 – 1600	Dark grey sand, damp
				1600 – 2000	Dark grey sand, saturated
6	1	5/9/12/17/Refusal		0 – 150	Dark grey sand topsoil, damp
	2	2/4/7/10/17/15/17/Refusal		150 – 900	Dark grey sand, damp
				900 – 1750	Dark grey sand, wet
				1750 – 2000	Dark grey sand, saturated
5	1	4/8/12/17/Refusal		0 – 100	Dark grey sandy topsoil, damp
	2	2/4/5/6/6/1/4/7/6/7/7/9/14/17/Ref		100 – 1200	Dark grey sand, damp
				1200 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
18	1	3/6/10/16/23/Refusal		0 – 100	Dark grey sand, topsoil, damp
	2	5/6/3/4/5/7/9/12/18/18/Refusal		100 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
17	1	6/6/11/16/18/Refusal		0 – 100	Dark grey sand, topsoil, damp
	2	3/3/8/13/19/Refusal		100 – 1700	Dark grey sand, damp
				1700 – 2000	Dark grey sand, saturated
16	1	4/4/7/9/12/15/Refusal		0 – 150	Dark grey sandy topsoil, damp
	2	2/6/8/11/14/11/15/15/11/12/Ref		150 – 1800	Dark grey sand, damp
				1800 – 2000	Dark grey sand, saturated
15	1	4/8/8/12/16/Refusal		0 – 150	Dark grey sandy top soil
	2	3/3/5/7/18/18/19/Refusal		150 – 1700	Dark grey sand, wet
				1700 – 2000	Dark grey sand, saturated
13	1	3/4/9/12/14/17/Refusal		0 – 100	Dark grey sandy topsoil, damp
	2	2/4/8/12/12/18/Refusal		100 – 1750	Dark grey sand, damp
				1750 – 2000	Dark grey sand, saturated
12	1	6/10/11/18/20/21/Refusal		0 – 100	Dark grey sandy, topsoil, damp
	2	1/3/6/10/12/14/18/Refusal		100 – 200	Dark grey sand, slightly damp
				200 – 1650	Dark grey sand, damp
				1650 – 2000	Dark grey sand, saturated
11	1	4/7/12/16/18/20/Refusal		0 – 200	Dark grey sand, topsoil, dry
	2	2/5/8/11/10/13/18/Refusal		200 – 500	Dark grey sand, moist
				500 – 1700	Dark grey sand, damp
				1700 – 2000	Dark grey sand, saturated
19	1	8/6/15/14/10/16/12/Refusal		0 – 150	Dark grey sandy topsoil, granular fill,
	2	8/11/16/20/Refusal		150 -200	Pumice layer, coarse white,
				200 – 400	Dark grey sandy, topsoil, moist,
				400 – 600	Light brown sandy topsoil, moist
				600 – 700	Dark grey sand, moist
				700 – 750	Pumice, topsoil, moist
				750 – 1000	Silty clay, dark grey sandy granular fill
				1000	Unable to test

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Approved Signatory:

R Fee

Robert Fee

Date: 23/11/2021

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Appendix B SITE PHOTOGRAPHS

Samples of photos shown. Additional photographs are available on demand.

Photo 1: Site looking south-west

Photo 2: Lots 1 – 8 looking west

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Photo 3: Lots 7 – 14 eastern boundaries looking south

Photo 4: Lots 10 – 11 unfinished link pathway looking east

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Photo 5: Lots 14 – 18 southern boundary looking west

Photo 6: Lots 35 – 32 on left with Lots 25 – 30 on right looking east

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Appendix C CONSTRUCTION MONITORING RECORDS

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WANGANUI
Phone 06 348 4199 www.testlab.
Fax 06 348 4198 office@testlab
83 Putiki Drive
PO Box 4256
Wanganui

Job	Magnolia Subdivision Visual Inspection	Lab Ref	20/1267
Material/Origin	Insitu Soils	Report No.	2012671
Condition	Insitu	Date of report	7/12/2020
Sampled by	N/A	Date sampled	3/12/2020
Sampling method	N/A	Date received	3/12/2020
Client	I D Loader Wanganui; Attn: Messrs Butcher & Loader	Date tested	3/12/2020
Comments			

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A section has been cut in preparation for fill and inspected on Thursday (3/12/2020).

This area covers (approximately) Lots 11, 10, 9, 8 & 7, and appears that the topsoil & organic material has been removed.
An estimated 100-200mm of material has been removed & stockpiled for capping purposes.

The Water table is exposed which correlates with independent testing carried out in late 2019.

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Approved Signatory

S B Grant

Date 7/12/2020

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TestLab CIVIL ENGINEERIN TESTING SPECIALI
WANGANUI
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Fax 06 348 4198 office@testlab
83 Putiki Drive
PO Box 4256
Wanganui

Job	Magnolia Subdivision Visual Inspection	Lab Ref	20/1267
Material/Origin	Insitu Soils	Report No.	2012672
Condition	Insitu	Date of report	17/12/2020
Sampled by	N/A	Date sampled	17/12/2020
Sampling method	N/A	Date received	17/12/2020
Client	I D Loader Wanganui; Attn: Messrs Butcher & Loader	Date tested	17/12/2020
Comments			

RECEIVED 3/08/2022

A section has been cut in preparation for fill and inspected on Thursday (17/12/2020, 11am).

This area covers (approximately) Lots 5, 29, 30, & 31, and appears that the topsoil & organic material has been removed. An estimated 100-200mm of material has been removed & stockpiled for capping purposes.

The Water table is exposed which correlates with independent testing carried out in late 2019.

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Approved Signatory

S B Grant

Date 17/12/2020

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REDJACKET

	CMR 3485-01
Project Name Magnolia Subdivision	Reviewed by W. Adlam
Project Address Magnolia - Tawhero Street, Whanganui	Date 04 December 2020

Observations

1) A general site inspection was carried out on the 4/12/2020.

2) At the time of the inspection the contractors (Goodmans) had stopped work on the site due to the discovery of a historical midden.

Comments

1) At the time of the inspection, the easternmost section of the site had been stripped of topsoil which had been stockpiled in the southeastern corner. The borrow site in the south western corner had also been stripped and the cut to fill had begun between the two areas.

2) The historical midden which had been discovered was on a high point within the borrow area to the west of the site.

3) The contractor explained the plan for the excavations going forward was to complete the current stage of filling, replace the topsoil to this stage before opening up the subsequent stage for fill.

4) Due to recent wet weather there was significant water ponding onsite. The contractor advised that the borrow area had been underwater for a time during the rain events.

5) At the time of inspection the erosion and sediment control systems had been implemented as per the RJL plan.

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REDJACKET

Project Name Magnolia Subdivision	CMR 3485-01	Date 04 December 2020
Project Address Magnolia - Tawhero Street, Whanganui	Reviewed by W. Adlam	

PHOTO 1 - Borrow site

Photo 2 - Standing water within borrow site.

PHOTO 3 - Historical midden

PHOTO 4 - Erosion and sediment control system

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Project Name Magnolia Subdivision	CMR 3485-01	Date 04 December 2020
Project Address Magnolia - Tawhero Street, Whanganui	Reviewed by W. Adlam	

PHOTO 5 - Erosion and sediment control drain

Photo 6 - Stage 1 fill area

PHOTO 7 - Stage 1 fill area

PHOTO 8 - Site offices and haul road

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REDJACKET

	CMR 3485-02
Project Name Magnolia Subdivision	Reviewed by C. Miller
Project Address Magnolia - Tawhero Street, Whanganui	Date 26 December 2020

Observations

1) A general site inspection was carried out on the 26/12/2020.

2) At the time of the inspection the contractor had stopped general work for the Christmas break.

Comments

1) At the time of the inspection, the southern half of the site had been filled approaching the proposed finished ground level. Material had been won from the borrow area to the south-west.

2) The historical midden site had been fenced off as per Hertitage NZ requirements and excavation within the borrow area was continuing.

3) The groundwater table had been encountered throughout the borrow area. It is understood WDC have approved excavation of clean sand fill below the GWT is acceptable. Unsuitable fill material cut from the main site will be backfilled through the borrow area.

5) At the time of inspection the erosion and sediment control systems had been implemented as per the RJL plan. The Goodmans representative on site had just finished spraying the site with water (water truck) as an approved method of dust control. It is understood this is a daily occurrence during fine days.

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Project Name Magnolia Subdivision		CMR 3485-02	Date 26 December 2020
Project Address Magnolia - Tawhero Street, Whanganui		Reviewed by C. Miller	

PHOTO 1 - Parked equipment for the break

PHOTO 2 - Sediment control pond.

PHOTO 3 - Borrow area.

PHOTO 4 - Borrow area.

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	CMR 3485-03
Project Name Magnolia Subdivision	Reviewed by C. Miller
Project Address Magnolia - Tawhero Street, Whanganui	Date 17 January 2021

Observations

1) A general site inspection was carried out on the 17/01/2021.

2) At the time of the inspection no contractors were on site as it was a Sunday (outside of approved work hours).

Comments

1) At the time of the inspection, the southern half of the site and the north-eastern side of the site had been filled to the proposed finished ground level. The FGL has been spread with topsoil and grassed as per the ESCP. Excavation for the link road embankment had begun.

2) Sand fill batters along the eastern and southern extents of site were noted. The design calls for retaining walls along these boundaries, but it is understood the principal is in talks with the adjacent land owners to fill across the southern boundary and remove the need for a retaining wall. The retaining wall along the eastern boundary will still be required.

3) Large stockpiles of topsoil and unsuitable cut material were present on site. It is understood these stockpiles will be spread over the borrow area and proposed Lots as part of the reinstatement.

4) The historical midden site was still fenced off as per Hertitage NZ requirements and excavation within the borrow area was continuing.

5) The excavation throughout the borrow area was extensive, with the groundwater table visible over the whole area.

6) At the time of inspection the erosion and sediment control systems had been implemented as per the RJL plan i.e. sediment ponds, bunding, catch drains.

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Project Name Magnolia Subdivision		CMR 3485-03	Date 17 January 2021
Project Address Magnolia - Tawhero Street, Whanganui		Reviewed by C. Miller	

PHOTO 1 - Site looking north-east.

PHOTO 2 - Borrow area.

PHOTO 3 - Eastern fill batter.

PHOTO 4 - Reinstated FGL - north-east end of site.

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	CMR 3485-04
Project Name Magnolia Subdivision	Reviewed by C. Miller
Project Address Magnolia - Tawhero Street, Whanganui	Date 11 March 2021

Observations

1) A general site inspection was carried out on the 11/03/2021.

2) At the time of the inspection contractors were on site spreading topsoil.

Comments

1) At the time of the inspection, most of the site including proposed lots and road had been constructed to the proposed finished ground level. The FGL has been spread with topsoil and grassed as per the ESCP.

2) The subgrade for the link road embankment was almost at the proposed levels. The next stage of constructed was for the 3 waters services.

3) Sand fill batters along the eastern and southern extents of site are still to be confirmed for retaining requirements.

4) Manholes and pipe works for the stormwater network were stockpiled on site.

5) The excavation throughout the borrow area was mostly shaped, reinstated and grassed.

6) At the time of inspection the erosion and sediment control systems had been implemented as per the RJL plan i.e. sediment ponds, bunding, catch drains, grassing.

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Project Name Magnolia Subdivision		CMR 3485-04	Date 11 March 2021
Project Address Magnolia - Tawhero Street, Whanganui		Reviewed by C. Miller	

PHOTO 1 - Site overview provided by client.

PHOTO 2 - Reinstated borrow area (background).

PHOTO 3 - Reinstated/grassed Lots.

PHOTO 4 -

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	CMR 3485-05
Project Name Magnolia Subdivision	Reviewed by C. Miller
Project Address Magnolia - Tawhero Street, Whanganui	Date 14 June 2021

Purpose of site visit

1) A general site inspection was carried out on the 14/06/2021.

2) A site soil investigation was undertaken to assess the road subgrade and also building platform testing as part of tee Geotechnical Completion Report.

Observations

1) The contractor was installing water supply and utility services within the roadway. The services trenches were open with stockpiles of sand piled within the road way. The stormwater and sewer infrastructure appears to have been installed and trenches backfilled.

2) The road subgrade was tested using scala penetrometer to confirm the CBR as per the assumptions made in the pavement design outlined in RPT-3485-01. The tests were undertaken at 20 m intervals, and are detailed in the attached TST-3485-02. Overall, the upper 200 mm was identified to be loose sand material which was due to the trenching work being undertaken in the roadway. Below the upper loose layer, the sand subgrade was dense and well compacted giving a 5 % minimum CBR or greater.

3) Lots 1, 7, 10, 14, 20, 25, 33 and 35 were tested for foundation suitability as outlined in attached TST-3485-01. Generally the Lot subsoil testing was acceptable. A layer of unsuitable organic soil was identified within Lots 25, 33 and 35.

4) At the time of inspection the erosion and sediment control systems had been implemented as per the RJL plan i.e. sediment ponds, bunding, catch drains, grassing.

RECOMMENDATIONS

1) The upper 200 mm bgl of subgrade required further compaction once the open trenches had been backfilled. This is to be confirmed by TestLab as part of the quality assurance testing for the road subgrade prior to construction of the pavement.

2) Unsuitable subsoil within Lots 25, 33 and 35 will be identified in the Geotechnical Completion Report as Lots required Specific Engineering Design for foundations.

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Project Name Magnolia Subdivision	CMR 3485-05
Project Address Magnolia - Tawhero Street, Whanganui	Reviewed by C. Miller

Date 14 June 2021

PHOTO 1 - Roadway construction.

PHOTO 2 - Trenching adjacent roadway.

PHOTO 3 - Reinstated/grassed Lots.

PHOTO 4 - Road formed subgrade.

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	CMR 3485-06
Project Name Magnolia Subdivision	Reviewed by C. Miller
Project Address Magnolia - Tawhero Street, Whanganui	Date 24 October 2021

Observations

1) A general site inspection was carried out on the 24/10/2021 to assess progress for final completion.

2) At the time of the inspection no contractors were on site.

Comments

1) At the time of the inspection, most of the Lots appears to have been constructed to the proposed finished ground level and topsoiled. Lots 23 - 26 appeared too low, it is understood additional fill is required to complete these Lots, although topsoil had already been spread over them.

2) The Road 1 and ROW 1 and 2 had been fully formed and sealed. No line marking or intersection control had been installed. Some minor chip and debris was in the kerb channels. Earthworks fill batters from the road were completed and appeared stable. The berms were mainly completed and grassed.

3) Sand fill batters along the eastern and southern extents of site are still to be confirmed for retaining requirements. The batters are un-grassed and relatively steep, not stable long term for grass.

4) Stormwater outlet pipe was operational into the formed detention pond. The detention pond was not lined with coconut matting or hydroseeded, there was some minor erosion at the outlet bund top of the pond. The outlet open swale drain was suitable lined and flowing, but there was no rock lining at the tie-in with the existing drain at CH 137.

5) Utility services were visible along the formed road including power boxes/transformer, street lighting, water mains/tobys, Lot sewer connections.

6) There was some minor ponding observed at the parking bay dish channel at CH 275.

7) The northern boundary drain in Lots 1 - 7 had the subsoil drains flowing suitably. The drain itself needs to be protected from owner re-shaping in future.

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Project Name Magnolia Subdivision		CMR 3485-06	Date 24 October 2021
Project Address Magnolia - Tawhero Street, Whanganui		Reviewed by C. Miller	

PHOTO 1 - Magnolia intersection tie-in.

PHOTO 2 - Finished roadway CH140.

PHOTO 3 - Eastern boundary unfinished batters/walls.

PHOTO 4 - Detention pond.

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Project Name Magnolia Subdivision		CMR 3485-06	Date 24 October 2021
Project Address Magnolia - Tawhero Street, Whanganui		Reviewed by C. Miller	

PHOTO 5 - Lot 1 subsoil drain outlet.

PHOTO 6 - Transformer, unfinished walkway to School.

PHOTO 7 - Detention pond outlet.

PHOTO 8 - Outlet swale drain.

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Buildable Consent Layout

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FTMA NEW ZEALAND

For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone. Or a pair of CT200's at 900mm centres for extra high wind zone.This fixing is to meet the minimum requirements as per NZS3604.

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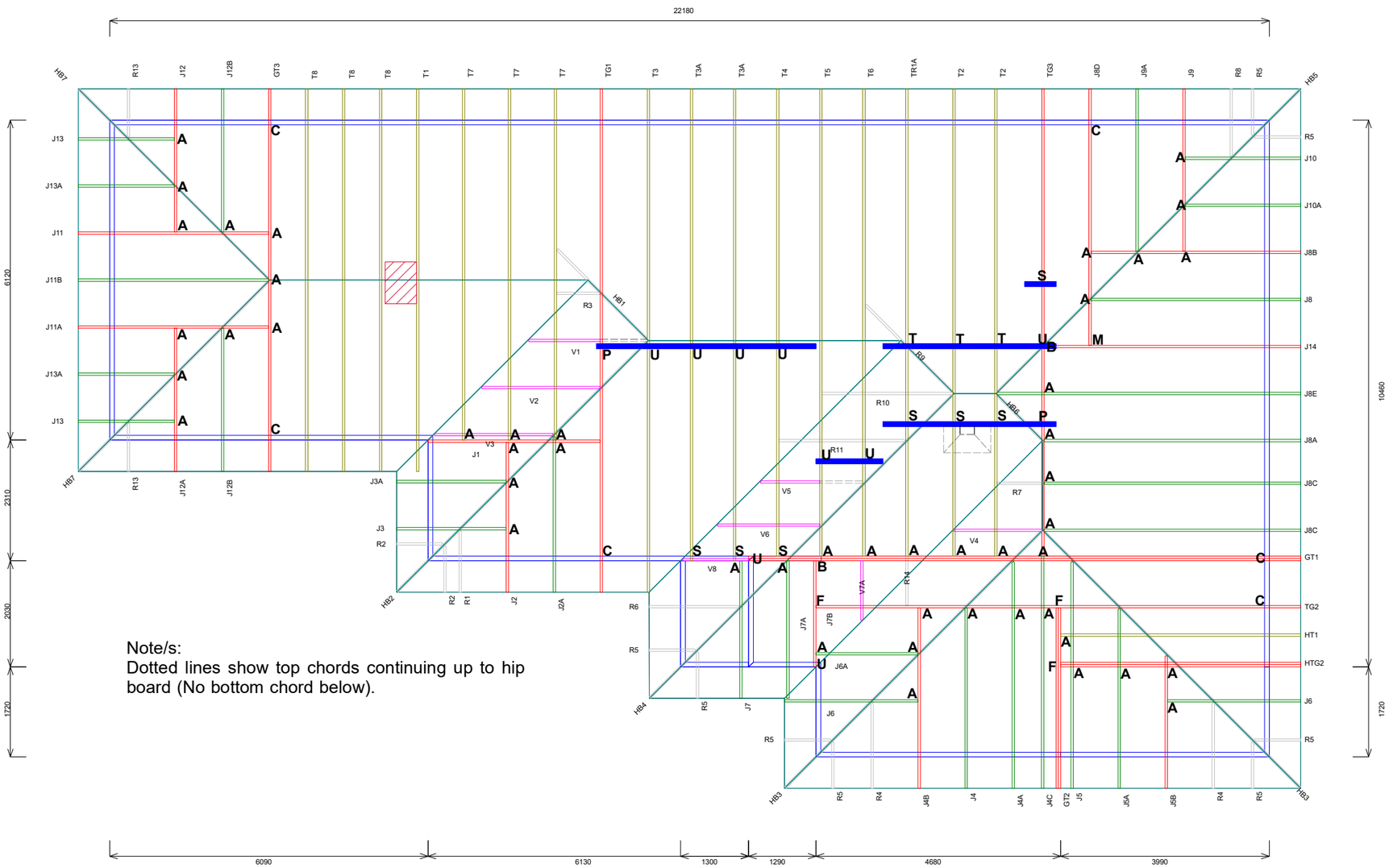

Note/s:
Dotted lines show top chords continuing up to hip board (No bottom chord below).

Beams
Loadbearing Internal Walls
Ceiling Access
Rangehood

Truss Fixings

A = 47x90 Joist Hanger
B = 47x120 Joist Hanger
C = CT200 (pair)
D = 47x190 Joist Hanger
E = 95x165 Joist Hanger
F = SH-140 Split Hanger
G = SH-180 Split Hanger
H = SH-220 Split Hanger
J = 2x6kN Strap (12kN)
K = 6kN Strap
L = Multigrip (single)
M = Multigrips (pair)
N = Nailon Plate (240x110x1)
P = 16kN Pack
Q = 9kN Pack
S = CPC 40 Single Cleat
T = CPC 40 Short (pair)
U = CPC 80 Single Cleat
V = 16kN Uplift
Z = Engineers Design

Unless otherwise indicated, all specified truss fixings are to use L/Lok product nail fasteners or Type 17 - 14g Hex Head Screws (as per the MiTek On-site Guide)

All truss to frame fixings require 2 additional 2/90x3.15dia skew nails.

All truss fixings not indicated as above must have 2 wire dogs for cross joints and 2/90x3.15dia nails for butt joins.

Fixings shown are for fixing trusses to the top plate. Any other point load uplift fixings down through the framing stud to top plate, stud to bottom plate, bottom plate to floor remain the responsibility of the architect / draughtsman.

Any roof loads as stated on this layout over 16kN lift are outside the scope of NZS3604, and the architect / draughtsperson is responsible for the design to transfer the loads to the ground.

Snow Zone:	Other [User Defined] (N1)
Wind Area:	High
TC Restraints:	370 mm
Roof Material:	Metal Tiles
Roof Pitch:	25.00 °
Snow Altitude:	100.000 m
Design Wind Speed:	44.0 m/s
BC Restraints:	400 mm
Ceiling Material:	Standard Plaster Board 10mm
Ground Snow Load:	0.000 kPa
Truss Centres:	900 mm

MiTek SAPPHIRE™ Every Facet an Advantage.

Drawn:	Jolaign Villanueva
Date:	14/07/2022

Job No: **WN1370931C1**
Customer: CASTLE HOMES WANGANUI LTD
Job Name: Sekharath New Home
Address: 55 TAWHERO STREET
Gonville, WHANGANUI 4501

If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.
The truss fixings can be substitttuted for other fixings of the same or greater capacity.
All verge framing to be fixed according to the MiTek On-Site Guide if not covered by NZS3604.
If bottom chord restraints are 35mm Metal battens, then they must be fixed with either two nails or screws.
If the metal battens are fixed with a single nail or screw then 90x45mm bottom chords restraints will be required at 1800mm centres

All loads shown on this page regarding the truss fixings are characteristic loads

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Buildable Consent Layout

FTMA NEW ZEALAND

All internal walls shown on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson

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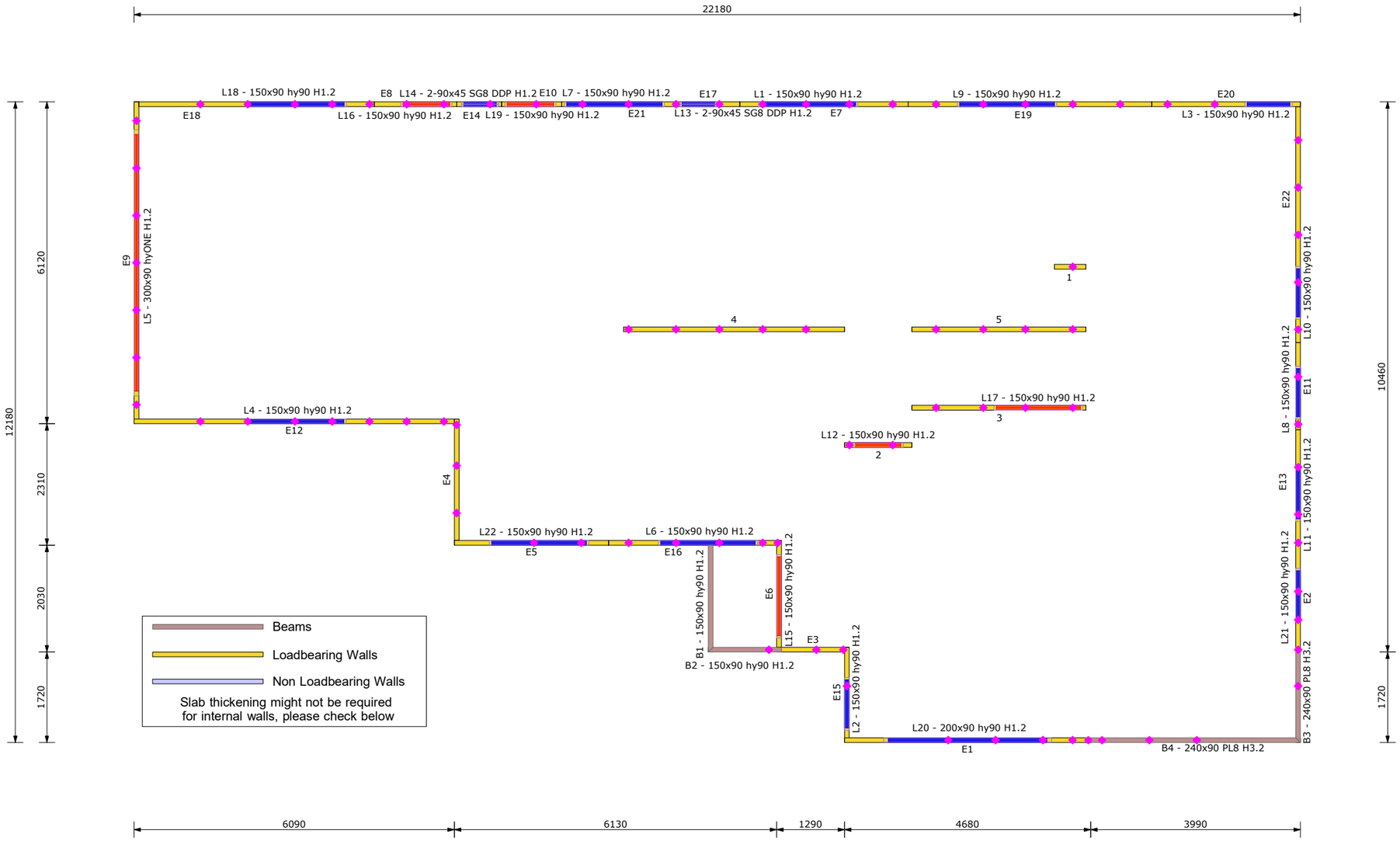
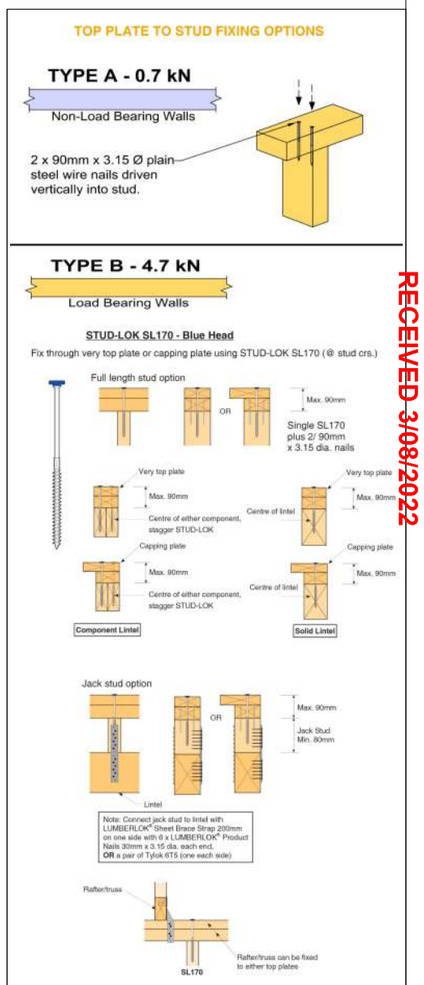


Lintel Fixings are as per the included reports.



Note: These top plate to stud fixing options do not apply to walls under floors, just walls with trusses or rafters attached.

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Drawn:	Jolaign Villanueva
Date:	**14/07/2022**

Job No: **WN1370931C1**
Customer: CASTLE HOMES WANGANUI LTD
Job Name: Sekharath New Home
Address: 55 TAWHERO STREET
Gonville, WHANGANUI 4501

Notification of point loaded lintels or point loads on internal walls where the downward load is higher than 8kN (85mm raft type slab) or 10kN (100mm standard slab), or the upward load is greater than 10kN. These loads are Ultimate Limit State Loads

If no loads are shown, no thickening is required.

The lintels have been sized using one of the following:

The MiTek SAPPHIRE Component Design Software.
hy90, hyONE and hySPAN lintels have been sized using the designIT for houses - New Zealand series 6 software.
GANGLAM and FLITCH BEAMS have been sized using the MiTek Beam Program V1.10 June 2011.

Unless otherwise stated the timber grade for all lintels is SG8. Lintels not shown are to be selected as per NZS3604: 2011 or designed by an engineer as required.
The lintels have not been designed to support brick shelf angles. The Architect or Engineer is required to design all lintels supporting brick shelf angles.

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MiTek New Zealand Limited

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www.miteknz.co.nz

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

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 **370931C1** 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, July 14, 2022**

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

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CARTERS
Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: 370931C1

Client: A Customer
Phone:

Site: Sekharath New Home
55 TAWHERO STREET
Gonville
WHANGANUI 4501

Description: Sekharath New Home
Building Consent No.:

Phone:

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, 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

Roof Truss		Importance Level :	2	Design Working Life :	50 years
Timber Group:	MSG8 DDP H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		**Ceiling**		**Wind**	
Material:	Metal Tiles	Material:	Gib 10mm/Rondo Screwed	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:	370 mm centres	Restraints:	400 mm centres		
Live Load:	Qur = 0.250 kPa Qc = 1.100 kN	Live Load:	Qc = 1.400 kN		

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)
GT1	1D	9960	25.000	900	J4B	1	2850	25.000	900	V3	1	2258	25.000	900
GT2	1D	2850	25.000	900	J4C	1	2850	25.000	900	V4	1	1681	25.000	900
GT3	1	6120	25.000	900	J5	1	1720	25.000	900	V5	1	1129	25.000	900
HTG2	1D	3990	25.000	900	J5A	1	1720	25.000	900	V6	1	1953	25.000	900
J1	1	3292	25.000	900	J5B	1	1720	25.000	900	V7A	1	1130	25.000	900
J7B	1	2030	25.000	900	J6	2	1950	25.000	900	V8	1	1255	25.000	900
J8A	1	4307	25.000	900	J6A	1	1950	25.000	900	*HB1	1	2429	18.249	900
J8C	2	4307	25.000	900	J7	1	2030	25.000	900	*HB2	1	6755	18.249	900
J8D	1	4307	25.000	900	J7A	1	2030	25.000	900	*HB3	2	6925	18.249	900
J8E	1	4307	25.000	900	J8	1	3407	25.000	900	*HB4	1	8168	18.249	900
J14	1	4307	25.000	900	J8B	1	3407	25.000	900	*HB5	1	8191	18.249	900
T2	2	8340	25.000	900	J9	1	2507	25.000	900	*HB6	1	1251	18.249	900
T3	1	8430	25.000	824	J9A	1	2507	25.000	900	*HB7	2	5122	18.249	900
T3A	2	8430	25.000	824	J10	1	1607	25.000	900	*R1	1	1183	25.000	900
T4	1	8340	25.000	824	J10A	1	1607	25.000	900	*R2	2	891	25.000	900
T5	1	8340	25.000	824	J11	1	3038	25.000	900	*R3	1	833	-25.000	900
T6	1	8340	25.000	824	J11A	1	3038	25.000	900	*R4	2	1641	25.000	900
TG1	1	8430	25.000	900	J11B	1	3038	25.000	900	*R5	8	891	25.000	900
TG2	1	8670	25.000	900	J12	1	2138	25.000	900	*R6	1	1721	25.000	900
TG3	1	8340	25.000	900	J12A	1	2138	25.000	900	*R7	1	901	-25.000	900
TR1A	1	8340	25.000	900	J12B	2	2138	25.000	900	*R8	1	1298	25.000	900
HT1	1	3990	25.000	900	J13	2	1238	25.000	900	*R9	1	2375	18.248	900
J2	1	2265	25.000	900	J13A	2	1238	25.000	900	*R10	1	2503	25.000	900
J2A	1	2265	25.000	900	T1	1	6120	25.000	878	*R11	1	2418	25.000	900
J3	1	1492	25.000	900	T7	3	6120	25.000	878	*R13	2	929	25.000	900
J3A	1	1492	25.000	900	T8	3	6120	25.000	708	*R14	1	945	-25.000	900
J4	1	2850	25.000	900	V1	1	1364	25.000	900					
J4A	1	2850	25.000	900	V2	1	2264	25.000	900					

Total quantity : 105

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The computer design input has been carried out by:

MiTek 20/20 Software Operator: Jolaign Villanueva

MiTek Candidate Number and Qualifications:

Accredited Fabricator:

CARTERS
Your Building Partner

Thursday, July 14, 2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

MiTek New Zealand Limited

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PRODUCER STATEMENT PS1 for MiTek SAPPHIRE™ LINTEL DESIGN

ISSUED BY: **MiTek New Zealand Limited**

TO: **Carters Building Supplies Limited**

IN RESPECT OF: **MiTek SAPPHIRE™**

This producer statement covers the MiTek SAPPHIRE™ lintel for the job reference **WN1370931C1** and be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek SAPPHIRE™ lintel design program has been developed by MiTek New Zealand Limited for the design of lintels in New Zealand. The lintel designs computed by MiTek SAPPHIRE™ are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents issued by MBIE and Verification Method B1/VM1, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code. Complience documents used are:

1) AS/NZS 1170 set - Structural Design Actions
2) NZS 3603:1993 - Timber Structures Standard
3) NZS 3604:2011 - Timber-framed buildings

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 input of Lintel Design Parameters as shown in the Lintel Summary for this job
iv) The design being undertaken by the accredited fabricator under the terms of the software licence
v) Timber is graded to the requirements of NZS3603:1993
vi) Minimum timber treatment for these lintels shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

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I believe on reasonable grounds that the lintels, if constructed in accordance with the drawings, specifications and other documents provided, 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, July 14, 2022**

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

Bcon22/0511 - WDC Approved Plans - 16/09/2022

LINTEL SUMMARY

This Lintel Summary is issued by MiTek accredited fabricator Carters Estimating Services being licensed to use the MiTek SAPPHIRE™ software, and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

Design Parameters

The MiTek SAPPHIRE™ design for this job is based on the following design parameters entered into the program. The Detailer/Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek SAPPHIRE™ lintels.

Job Details

Importance Level : 2 **Design Working Life :** 50 years

Details :

Roof Pitch :	25.000 °	**Loading :** **Roof :**	Metal Tiles	0.19 kPa	
Ceiling Pitch :	0.000 °	**Ceiling :**	Standard Plaster Board 10mm	0.16 kPa	
Overhang :	600 mm	**Wind :**	High	44.0 m/s	**Cpe :** Varies **Cpi :** Varies
Truss Spacing :	900 mm	**Snow :**	N1 (Sub-Alpine) at 100.000 m		
		Open Ground Snow (Sg) :		0.000 kPa	

Lintel Schedule

Label	Span (mm)	Size	Panel	Level	Design Status
L12 - 150x90 hy90 H1.2	950	1/150x90 hy90 H1.2	2	Level 1	Designed
L17 - 150x90 hy90 H1.2	1690	1/150x90 hy90 H1.2	3	Level 1	Designed
L19 - 150x90 hy90 H1.2	972	1/150x90 hy90 H1.2	E10	Level 1	Designed
L8 - 150x90 hy90 H1.2	1005	1/150x90 hy90 H1.2	E11	Level 1	Designed
L4 - 150x90 hy90 H1.2	1890	1/150x90 hy90 H1.2	E12	Level 1	Designed
L11 - 150x90 hy90 H1.2	1005	1/150x90 hy90 H1.2	E13	Level 1	Designed
L14 - 2-90x45 SG8 DDP H1.2	705	1/90x45 SG8 DDP H1.2	E14	Level 1	Designed
L2 - 150x90 hy90 H1.2	1005	1/150x90 hy90 H1.2	E15	Level 1	Designed
L6 - 150x90 hy90 H1.2	1890	1/150x90 hy90 H1.2	E16	Level 1	Designed
L13 - 2-90x45 SG8 DDP H1.2	705	1/90x45 SG8 DDP H1.2	E17	Level 1	Designed
L18 - 150x90 hy90 H1.2	1905	1/150x90 hy90 H1.2	E18	Level 1	Designed
L9 - 150x90 hy90 H1.2	1890	1/150x90 hy90 H1.2	E19	Level 1	Designed
L20 - 200x90 hy90 H1.2	3195	1/200x90 hy90 H1.2	E1	Level 1	Designed
L3 - 150x90 hy90 H1.2	905	1/150x90 hy90 H1.2	E20	Level 1	Designed
L7 - 150x90 hy90 H1.2	1905	1/150x90 hy90 H1.2	E21	Level 1	Designed
L10 - 150x90 hy90 H1.2	1005	1/150x90 hy90 H1.2	E22	Level 1	Designed
L21 - 150x90 hy90 H1.2	1005	1/150x90 hy90 H1.2	E2	Level 1	Designed
L22 - 150x90 hy90 H1.2	1890	1/150x90 hy90 H1.2	E5	Level 1	Designed
L15 - 150x90 hy90 H1.2	1590	1/150x90 hy90 H1.2	E6	Level 1	Designed
L1 - 150x90 hy90 H1.2	1890	1/150x90 hy90 H1.2	E7	Level 1	Designed
L16 - 150x90 hy90 H1.2	972	1/150x90 hy90 H1.2	E8	Level 1	Designed
L5 - 300x90 hyONE H1.2	5060	1/300x90 hyONE H1.2	E9	Level 1	Designed

Total Quantity: 24

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The lintel design input has been carried out by:

Sapphire Software Operator: Jolaign Villanueva

Accredited Fabricator:

Date: Thursday, 14 July 2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD
Phone:

Site:
55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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Lintel Reaction and Fixing Summary

Panel ID	Lintel Length	Material	Design Status
2	950.0001	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-4.790 **Type G**

Panel ID	Lintel Length	Material	Design Status
3	1690	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-10.606 **Type H**

Panel ID	Lintel Length	Material	Design Status
E1	3195	1/200x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-1.904 **Type F**

Panel ID	Lintel Length	Material	Design Status
E10	972	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-1.881 **Type F**

Panel ID	Lintel Length	Material	Design Status
E11	1005	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.950 **Type E**

Panel ID	Lintel Length	Material	Design Status
E12	1890	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-4.599 **Type G**

Panel ID	Lintel Length	Material	Design Status
E13	1005	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.970 **Type E**

Panel ID	Lintel Length	Material	Design Status
E14	705.0001	2/90x45 SG8 DDP H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-2.397 **Type F**

Panel ID	Lintel Length	Material	Design Status
E15	1005	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD
Phone:

Site:
55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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-0.714 **Type E**

Panel ID	Lintel Length	Material	Design Status
E16	1890	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.943 **Type E**

Panel ID	Lintel Length	Material	Design Status
E17	705.0001	2/90x45 SG8 DDP H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.386 **Type E**

Panel ID	Lintel Length	Material	Design Status
E18	1905	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-4.694 **Type G**

Panel ID	Lintel Length	Material	Design Status
E19	1890	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-1.152 **Type E**

Panel ID	Lintel Length	Material	Design Status
E2	1005	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-5.724 **Type G**

Panel ID	Lintel Length	Material	Design Status
E20	905	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

0.000 **Type E**
0.000 **Type E**
0.000 **Type E**

Panel ID	Lintel Length	Material	Design Status
E21	1905	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-3.978 **Type F**

Panel ID	Lintel Length	Material	Design Status
E22	1005	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.938 **Type E**

Panel ID	Lintel Length	Material	Design Status
E5	1890	1/150x90 hy90 H1.2	Designed

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD
Phone:

Site:
55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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MAXIMUM SUPPORT REACTION (Characteristic Load)

-1.220 **Type E**

Panel ID	Lintel Length	Material	Design Status
E6	1590	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-0.137 **Type E**

Panel ID	Lintel Length	Material	Design Status
E7	1890	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-3.183 **Type F**

Panel ID	Lintel Length	Material	Design Status
E8	972	1/150x90 hy90 H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-2.721 **Type F**

Panel ID	Lintel Length	Material	Design Status
E9	5060	1/300x90 hyONE H1.2	Designed

MAXIMUM SUPPORT REACTION (Characteristic Load)

-2.439 **Type F**

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Carters Building Supplies Ltd

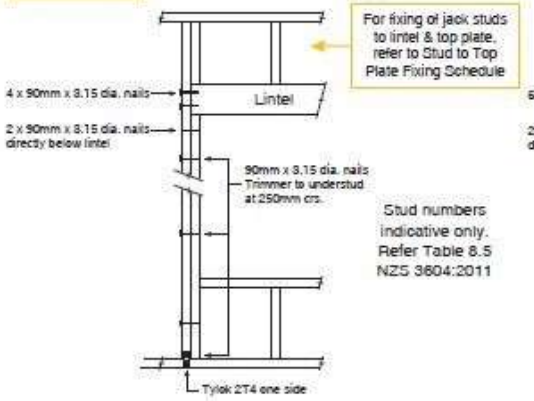
Job: WN1370931C1

Lintel Fixing Details

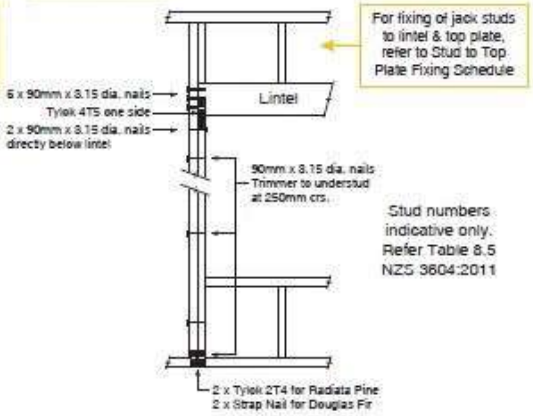
LUMBERLOK®

LINTEL FIXING OPTIONS

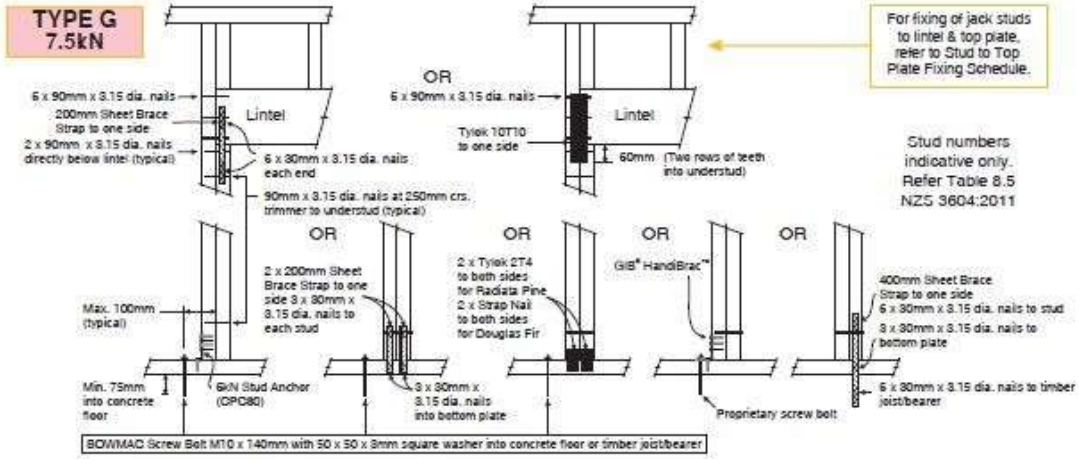
TYPE E 1.4kN



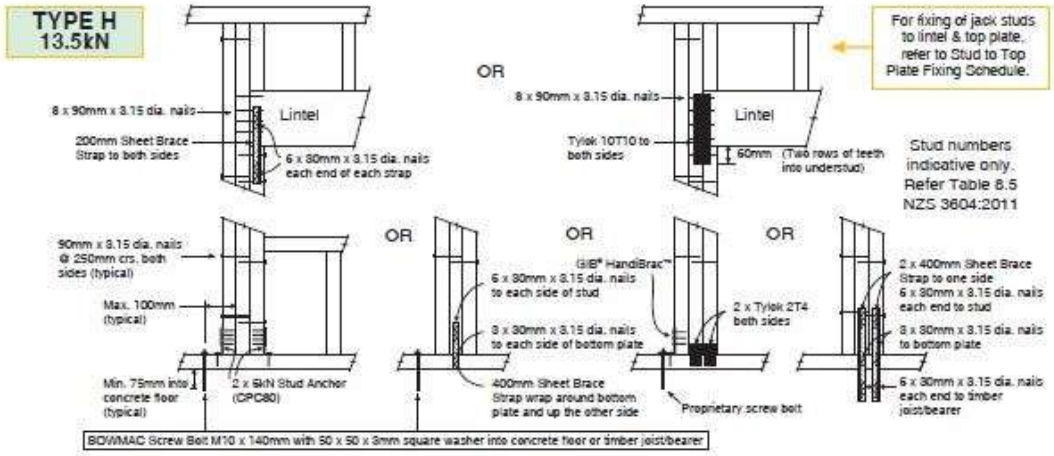
TYPE F 4.0kN



TYPE G 7.5kN



TYPE H 13.5kN



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MiTek New Zealand Limited

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PRODUCER STATEMENT PS1 for MiTek SAPPHIRE™ BEAM DESIGN

ISSUED BY: **MiTek New Zealand Limited**

TO: **Carters Building Supplies Limited**

IN RESPECT OF: **MiTek SAPPHIRE™**

This producer statement covers the MiTek SAPPHIRE™ beam for the job reference **WN1370931C1** and be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek SAPPHIRE™ beam design program has been developed by MiTek New Zealand Limited for the design of beams in New Zealand. The beam designs computed by MiTek SAPPHIRE™ are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents issued by MBIE and Verification Method B1/VM1, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code. Complience documents used are:

1) AS/NZS 1170 set - Structural Design Actions
2) NZS 3603:1993 - Timber Structures Standard
3) NZS 3604:2011 - Timber-framed buildings

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 input of Beam Design Parameters as shown in the Beam Summary for this job
iv) The design being undertaken by the accredited fabricator under the terms of the software licence
v) Timber is graded to the requirements of NZS3603:1993
vi) Minimum timber treatment for these beams shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the beams, if constructed in accordance with the drawings, specifications and other documents provided, 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, July 14, 2022**

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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BEAM SUMMARY

This Beam Summary is issued by MiTek accredited fabricator Carters Building Supplies Ltd being licensed to use the MiTek SAPPHIRE™ software, and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

Design Parameters

The MiTek SAPPHIRE™ design for this job is based on the following design parameters entered into the program. The Detailer/Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek SAPPHIRE™ beams.

Job Details

Importance Level : 2 **Design Working Life :**

Details :

Roof Pitch :	25.000 °	**Loading :**			
Ceiling Pitch :	0.000 °	**Roof :**	Metal Tiles	0.19 kPa	
Overhang :	600 mm	**Ceiling :**	Standard Plaster Board 10mm	0.16 kPa	
Truss Spacing :	900 mm	**Wind :**	High	44.0 m/s	
		Snow :	N1 (Sub-Alpine) at 100.000 m	**Cpe :** Varies	**Cpi :** Varies
		Open Ground Snow (Sg) :		0.000 kPa	

Beam Schedule

Level	Label	Type	Quantity	Plies	Length	Size	Design Status
Level 1	B1 - 150x90 hy90 H1.2	Beams	1	1	2030	150x90 hy90 H1.2	Designed With Warnings
Level 1	B2 - 150x90 hy90 H1.2	Beams	1	1	1390	150x90 hy90 H1.2	Designed With Warnings
Level 1	B4 - 240x90 PL8 H3.2	Beams	1	1	4080	240x90 PL8 H3.2	Designed With Warnings
Level 1	B3 - 240x90 PL8 H3.2	Beams	1	1	1810	240x90 PL8 H3.2	Designed With Warnings

Total Quantity: 4

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Beam Design Warning: Contributary area could not be determined. The beam has been designed for a large contributary area.

The Beam design input has been carried out by:

Sapphire Software Operator: Jolaign Villanueva

Accredited Fabricator:

Date: Thursday, 14 July 2022

Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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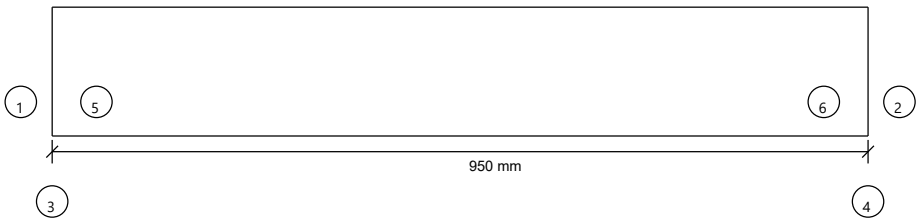
LINTEL DESIGN CALCULATION

Panel ID	Design Tag	Lintel Length	Material	Design Status
2	E1	950.0001	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	950	0.085 kN/m	Down
	Point Load	23		1.430 kN	Down
		459		1.055 kN	Down
		928		0.309 kN	Down
ExtWind	Point Load	23		-3.776 kN	Down
		459		-2.743 kN	Down
		928		-0.767 kN	Down
Qur	Point Load	23		0.802 kN	Down
		459		0.582 kN	Down
		928		0.171 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.355	0.07	-0.2
2	0.525	0.06	0.0
3	-0.420	0.05	0.0
4	-0.347	0.04	0.0
5	0.263	0.00	-0.1
6	0.263	0.00	-0.1
7	-0.657	0.00	0.2
8	-0.584	0.00	0.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.715 kN
Strength: 2) 1.2G + 1.5Qur	4.058 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-3.353 kN

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Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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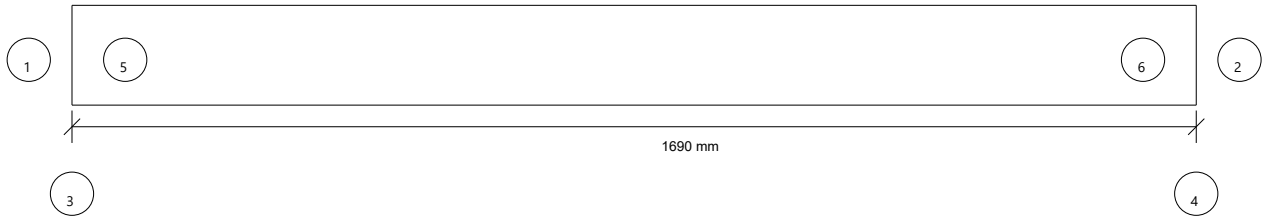
Panel ID	Design Tag	Lintel Length	Material	Design Status
3	E1	1690	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1690	0.085 kN/m	Down
	Point Load	22		2.504 kN	Down
		564		1.545 kN	Down
		1164		0.573 kN	Down
		1668		0.144 kN	Down
ExtWind	Point Load	22		-7.457 kN	Down
		564		-4.472 kN	Down
		1164		-1.379 kN	Down
		1668		-0.372 kN	Down
Qur	Point Load	22		1.362 kN	Down
		564		0.836 kN	Down
		1164		0.341 kN	Down
		1668		0.074 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.965	0.19	-1.5
2	1.422	0.17	0.0
3	-1.292	0.15	0.0
4	-1.077	0.13	0.0
5	0.715	0.00	-0.8
6	0.715	0.00	-1.1
7	-1.936	0.00	-0.1
8	-1.721	0.00	1.8

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	5.107 kN
Strength: 2) 1.2G + 1.5Qur	7.566 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-7.424 kN

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Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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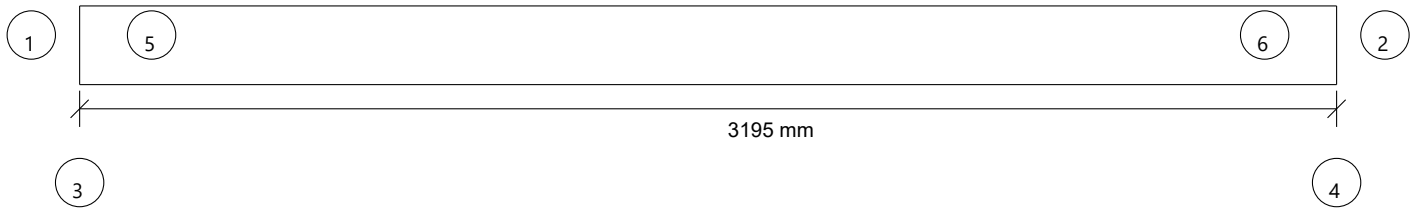
Panel ID	Design Tag	Lintel Length	Material	Design Status
E1	F1	3195	1/200x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	3195	0.113 kN/m	Down
	Point Load	23		0.016 kN	Down
		570		0.006 kN	Down
		1170		0.813 kN	Down
		1770		0.457 kN	Down
		2370		0.506 kN	Down
		2970		0.297 kN	Down
		3173		0.256 kN	Down
ExtWind	Point Load	23		-0.007 kN	Down
		570		0.057 kN	Down
		1170		-1.903 kN	Down
		1770		-0.916 kN	Down
		2370		-0.968 kN	Down
		2970		-0.488 kN	Down
		3173		-0.451 kN	Down
Qur	Point Load	23		0.001 kN	Down
		570		-0.014 kN	Down
		1170		0.519 kN	Down
		1770		0.301 kN	Down
		2370		0.341 kN	Down
		2970		0.198 kN	Down
		3173		0.178 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	-0.013	0.17	-3.8
2	-0.022	0.16	0.0
3	-1.090	0.07	0.0
4	-0.860	0.06	0.0
5	-0.010	0.00	-1.9

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Load Case	Moment (kNm)	CSI	Panel Defln (mm)
6	-0.010	0.00	-2.7
7	-2.073	0.00	-0.2
8	-1.842	0.00	-0.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.248 kN
Strength: 2) 1.2G + 1.5Qur	3.463 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-1.333 kN

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Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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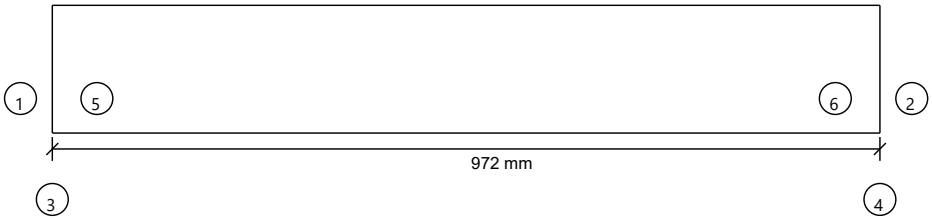
Panel ID	Design Tag	Lintel Length	Material	Design Status
E10	**E1**	**972**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	972	0.085 kN/m	Down
	Point Load	23		0.063 kN	Down
		354		1.287 kN	Down
		950		0.137 kN	Down
ExtWind	UDL Load	0	972	0.110 kN/m	Down
	Point Load	23		-0.143 kN	Down
		354		-3.145 kN	Down
		950		-0.299 kN	Down
IntWind	UDL Load	0	972	0.047 kN/m	Down
Qur	Point Load	23		0.040 kN	Down
		354		0.874 kN	Down
		950		0.083 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 7) 1.2G + W (Down) North Wind Ext + Int -
4	Strength: 8) 1.2G + W (Out-of-plane) North Wind Ext + Int -
5	Strength: 9) 0.9G + W (Up) North Wind Ext + Int +
6	Strength: 10) 1.2G + W (Down,Out-of-plane) North Wind Ext + Int -
7	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext + Int +
8	Serviceability: 17) G (Short Term)
9	Serviceability: 19) G + ψsQur (Short Term)
10	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext + Int +
11	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext + Int +
12	Strength: 9) 0.9G + W (Up) South Wind Ext + Int +
13	Strength: 11) 0.9G + W (Up,Out-of-plane) South Wind Ext + Int +
14	Serviceability: 26) W (Out-of-plane) (Short Term) South Wind Ext + Int +
15	Serviceability: 27) W (Down,Out-of-plane) (Short Term) South Wind Ext + Int +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.394	0.08	-0.2
2	0.637	0.07	0.0
3	-0.339	0.04	0.0
4	-0.339	0.04	0.0
5	-0.426	0.05	0.0
6	-0.262	0.03	0.0
7	-0.350	0.04	0.0
8	0.292	0.00	-0.1

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Load Case	Moment (kNm)	CSI	Panel Defln (mm)
9	0.292	0.00	-0.1
10	-0.689	0.00	0.2
11	-0.612	0.00	0.2
12	-0.426	0.05	0.0
13	-0.350	0.04	0.0
14	-0.689	0.00	0.2
15	-0.612	0.00	0.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.258 kN
Strength: 2) 1.2G + 1.5Qur	2.016 kN
Strength: 7) 1.2G + W (Down) North Wind Ext + Int -	-1.037 kN
Strength: 9) 0.9G + W (Up) North Wind Ext + Int +	-1.317 kN
Strength: 9) 0.9G + W (Up) South Wind Ext + Int +	-1.317 kN

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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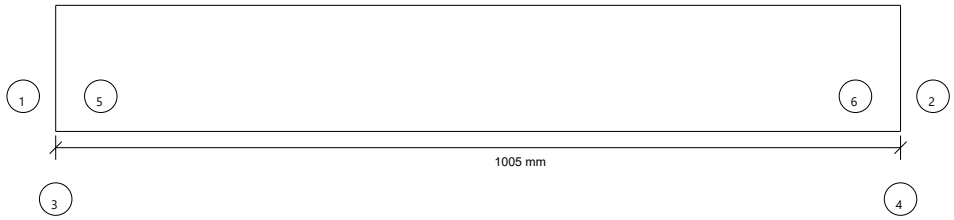
Panel ID	Design Tag	Lintel Length	Material	Design Status
E11	**E1**	**1005**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1005	0.085 kN/m	Down
	Point Load	22		0.067 kN	Down
		485		0.442 kN	Down
		983		0.626 kN	Down
ExtWind	Point Load	22		-0.141 kN	Down
		485		-0.752 kN	Down
		983		-1.105 kN	Down
Qur	Point Load	22		0.040 kN	Down
		485		0.294 kN	Down
		983		0.429 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.166	0.03	-0.1
2	0.259	0.03	0.0
3	-0.080	0.01	0.0
4	-0.058	0.01	0.0
5	0.123	0.00	0.0
6	0.123	0.00	-0.1
7	-0.190	0.00	0.1
8	-0.169	0.00	0.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.188 kN
Strength: 2) 1.2G + 1.5Qur	1.907 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.665 kN

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Job: WN1370931C1

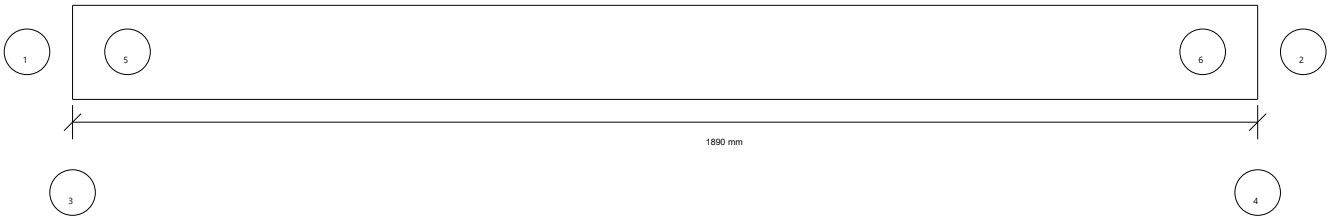
Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

Printed: 17:14:02 14-07-2022

Panel ID	Design Tag	Lintel Length	Material	Design Status
E12	E1	1890	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1890	0.085 kN/m	Down
	Point Load	23		0.225 kN	Down
		369		0.347 kN	Down
		969		2.203 kN	Down
		1569		0.716 kN	Down
		1867		0.275 kN	Down
ExtWind	Point Load	23		-0.321 kN	Down
		369		-0.842 kN	Down
		969		-5.869 kN	Down
		1569		-1.622 kN	Down
		1867		-0.637 kN	Down
Qur	Point Load	23		0.154 kN	Down
		369		0.186 kN	Down
		969		1.227 kN	Down
		1569		0.449 kN	Down
		1867		0.169 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	1.678	0.33	-3.2
2	2.506	0.29	0.0
3	-2.023	0.24	0.0
4	-1.674	0.20	0.0
5	1.243	0.00	-1.6
6	1.243	0.00	-2.2
7	-3.142	0.00	-0.1
8	-2.793	0.00	-0.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction

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Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.912 kN
Strength: 2) 1.2G + 1.5Qur	4.401 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-3.219 kN

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Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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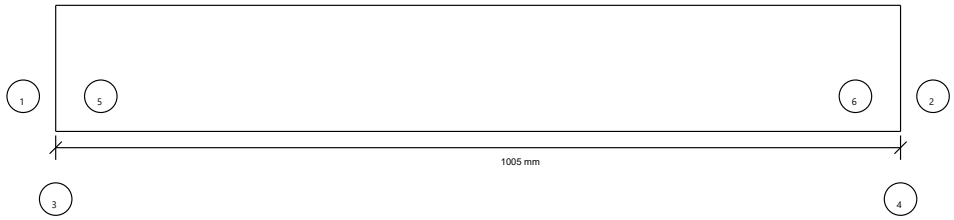
Panel ID	Design Tag	Lintel Length	Material	Design Status
E13	**E1**	**1005**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1005	0.085 kN/m	Down
	Point Load	22		0.600 kN	Down
		535		0.231 kN	Down
		983		0.392 kN	Down
ExtWind	Point Load	22		-1.164 kN	Down
		535		-0.419 kN	Down
		983		-0.793 kN	Down
Qur	Point Load	22		0.422 kN	Down
		535		0.149 kN	Down
		983		0.266 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.097	0.02	-0.1
2	0.146	0.02	0.0
3	-0.047	0.01	0.0
4	-0.035	0.00	0.0
5	0.072	0.00	0.0
6	0.072	0.00	0.0
7	-0.112	0.00	0.0
8	-0.099	0.00	0.0

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.016 kN
Strength: 2) 1.2G + 1.5Qur	1.638 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.679 kN

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Carters Building Supplies Ltd

Job: WN1370931C1

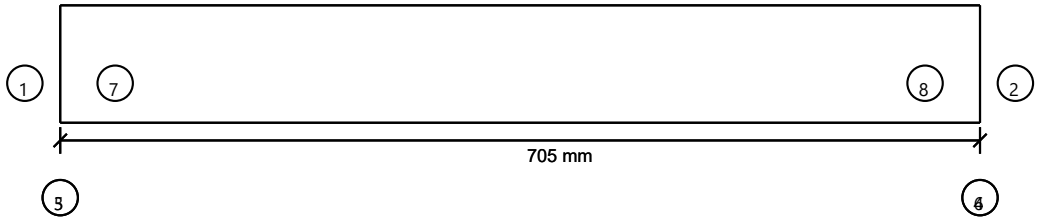
Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

Printed: 17:14:02 14-07-2022

Panel ID	Design Tag	Lintel Length	Material	Design Status
E14	E1,E2	705.0001	2/90x45 SG8 DDP H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	705	0.044 kN/m	Down
	Point Load	23		0.867 kN	Down
		464		0.701 kN	Down
		683		-0.077 kN	Down
ExtWind	Point Load	23		-2.134 kN	Down
		464		-1.703 kN	Down
		683		0.202 kN	Down
Qur	Point Load	23		0.593 kN	Down
		464		0.473 kN	Down
		683		-0.056 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.150	0.18	-0.2
2	0.243	0.18	0.0
3	-0.164	0.12	0.0
4	-0.135	0.10	0.0
5	0.111	0.00	-0.1
6	0.111	0.00	-0.2
7	-0.264	0.00	0.3
8	-0.235	0.00	0.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.491 kN
Strength: 2) 1.2G + 1.5Qur	2.439 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-1.678 kN

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Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

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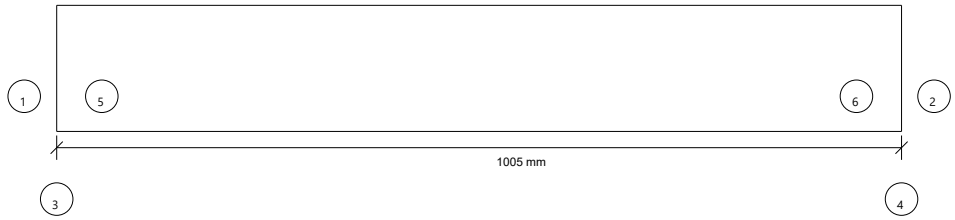
Panel ID	Design Tag	Lintel Length	Material	Design Status
E15	**E1**	**1005**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1005	0.085 kN/m	Down
	Point Load	22		0.112 kN	Down
		137		0.497 kN	Down
		737		0.084 kN	Down
		983		-0.013 kN	Down
ExtWind	Point Load	22		-0.206 kN	Down
		137		-0.936 kN	Down
		737		-0.121 kN	Down
		983		0.034 kN	Down
Qur	Point Load	22		0.070 kN	Down
		137		0.320 kN	Down
		737		0.041 kN	Down
		983		-0.012 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.085	0.02	0.0
2	0.130	0.02	0.0
3	-0.051	0.01	0.0
4	-0.039	0.00	0.0
5	0.063	0.00	0.0
6	0.063	0.00	0.0
7	-0.108	0.00	0.0
8	-0.096	0.00	0.0

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	0.827 kN
Strength: 2) 1.2G + 1.5Qur	1.274 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.500 kN

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: WN1370931C1

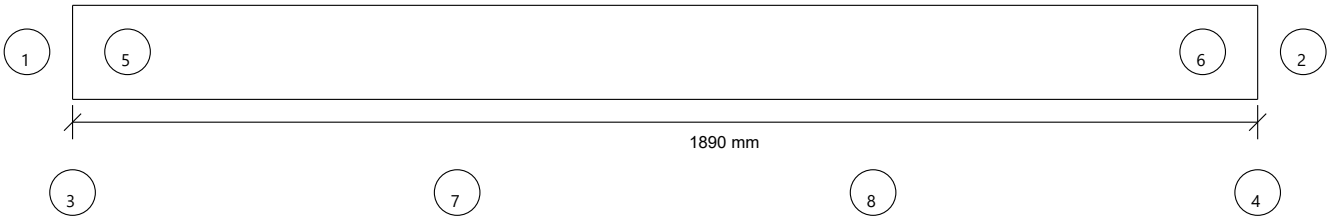
Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

Printed: 17:14:02 14-07-2022

Panel ID	Design Tag	Lintel Length	Material	Design Status
E16	E1	1890	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1890	0.085 kN/m	Down
	Point Load	337		0.508 kN	Down
		997		0.233 kN	Down
		1161		0.377 kN	Down
		1551		0.052 kN	Down
ExtWind	Point Load	337		-1.049 kN	Down
		997		-0.330 kN	Down
		1161		-0.823 kN	Down
		1551		-0.086 kN	Down
Qur	Point Load	337		0.319 kN	Down
		997		0.087 kN	Down
		1161		0.210 kN	Down
		1551		0.022 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.508	0.10	-1.1
2	0.709	0.08	0.0
3	-0.305	0.04	0.0
4	-0.235	0.03	0.0
5	0.376	0.00	-0.5
6	0.376	0.00	-0.7
7	-0.637	0.00	0.9
8	-0.566	0.00	0.8

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.041 kN
Strength: 2) 1.2G + 1.5Qur	1.509 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.660 kN

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Bcon22/0511 - WDC Approved Plans - 16/09/2022

Job: **WN1370931C1**

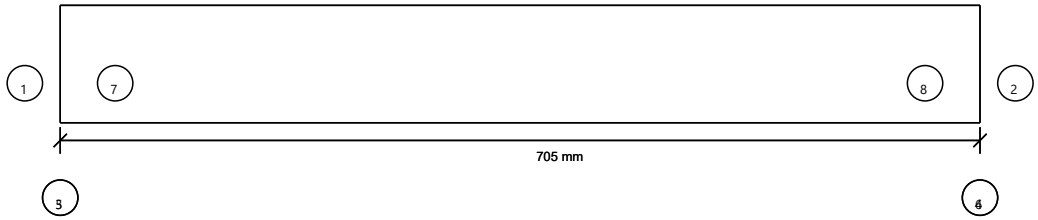
Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

MiTek SAPPHIRE™ 8.6.0.209.Update2.11

Printed: 17:14:02 14-07-2022

Panel ID	Design Tag	Lintel Length	Material	Design Status
E17	E1,E2	705.0001	2/90x45 SG8 DDP H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	705	0.044 kN/m	Down
	Point Load	23		0.213 kN	Down
		415		0.013 kN	Down
		682		0.003 kN	Down
ExtWind	Point Load	23		-0.488 kN	Down
		415		0.007 kN	Down
		682		0.005 kN	Down
Qur	Point Load	23		0.169 kN	Down
		415		-0.002 kN	Down
		682		-0.002 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.007	0.01	0.0
2	0.007	0.01	0.0
3	0.004	0.00	0.0
4	0.004	0.00	0.0
5	0.006	0.00	0.0
6	0.006	0.00	0.0
7	-0.005	0.00	0.0
8	-0.004	0.00	0.0

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	0.311 kN
Strength: 2) 1.2G + 1.5Qur	0.526 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.270 kN

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Job: WN1370931C1

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Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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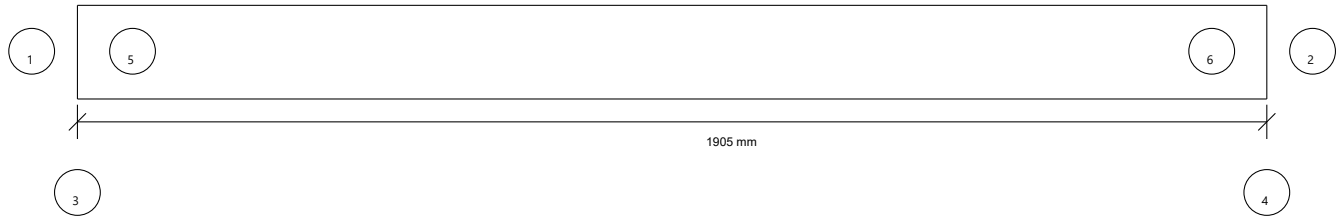
Panel ID	Design Tag	Lintel Length	Material	Design Status
E18	E1	1905	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1905	0.085 kN/m	Down
	Point Load	22		0.457 kN	Down
		574		1.434 kN	Down
		1174		1.758 kN	Down
		1774		-0.145 kN	Down
		1883		0.240 kN	Down
ExtWind	Point Load	22		-0.981 kN	Down
		574		-3.619 kN	Down
		1174		-4.700 kN	Down
		1774		0.571 kN	Down
		1883		-0.420 kN	Down
Qur	Point Load	22		0.297 kN	Down
		574		0.833 kN	Down
		1174		0.969 kN	Down
		1774		-0.071 kN	Down
		1883		0.152 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	1.511	0.29	-3.3
2	2.252	0.26	0.0
3	-1.820	0.21	0.0
4	-1.506	0.18	0.0
5	1.119	0.00	-1.6
6	1.119	0.00	-2.3
7	-2.828	0.00	-0.1
8	-2.514	0.00	-0.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction

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Site: 55 TAWHERO STREET
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Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.987 kN
Strength: 2) 1.2G + 1.5Qur	4.525 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-3.286 kN

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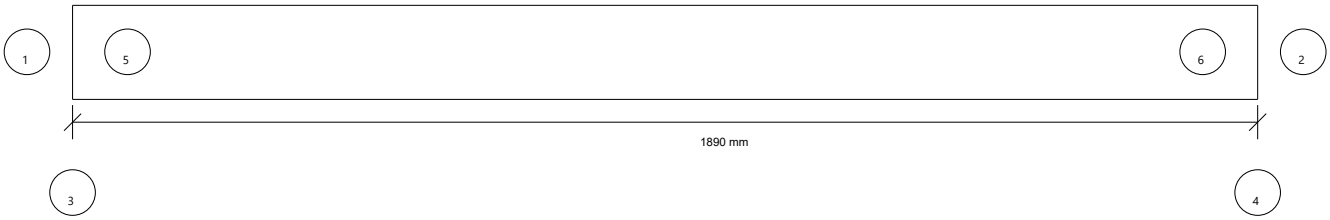
Panel ID	Design Tag	Lintel Length	Material	Design Status
E19	E1	1890	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1890	0.085 kN/m	Down
	Point Load	23		-0.049 kN	Down
		277		0.506 kN	Down
		877		0.646 kN	Down
		1477		0.615 kN	Down
		1868		0.007 kN	Down
ExtWind	Point Load	23		0.102 kN	Down
		277		-0.981 kN	Down
		877		-1.244 kN	Down
		1477		-1.189 kN	Down
		1868		0.005 kN	Down
Qur	Point Load	23		-0.043 kN	Down
		277		0.362 kN	Down
		877		0.460 kN	Down
		1477		0.444 kN	Down
		1868		-0.002 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.709	0.14	-1.5
2	1.150	0.13	0.0
3	-0.464	0.05	0.0
4	-0.360	0.04	0.0
5	0.525	0.00	-0.7
6	0.525	0.00	-1.1
7	-0.936	0.00	1.3
8	-0.832	0.00	1.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction

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Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.284 kN
Strength: 2) 1.2G + 1.5Qur	2.055 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.806 kN

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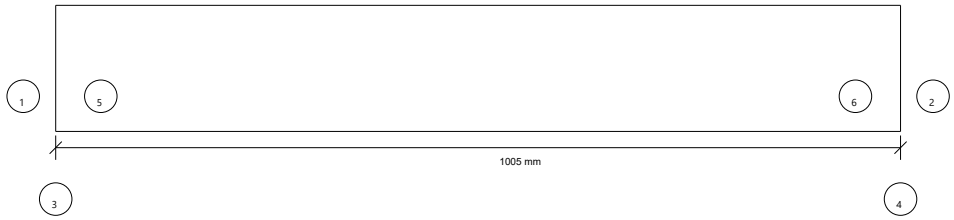
Panel ID	Design Tag	Lintel Length	Material	Design Status
E2	F1	1005	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1005	0.085 kN/m	Down
	Point Load	23		1.064 kN	Down
		635		3.373 kN	Down
		983		-0.125 kN	Down
ExtWind	Point Load	23		-2.618 kN	Down
		635		-9.638 kN	Down
		983		0.373 kN	Down
Qur	Point Load	23		0.623 kN	Down
		635		1.972 kN	Down
		983		-0.078 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	1.052	0.20	-0.5
2	1.609	0.19	0.0
3	-1.494	0.17	0.0
4	-1.250	0.15	0.0
5	0.779	0.00	-0.3
6	0.779	0.00	-0.4
7	-2.196	0.00	0.7
8	-1.952	0.00	0.6

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	3.143 kN
Strength: 2) 1.2G + 1.5Qur	4.796 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-4.007 kN

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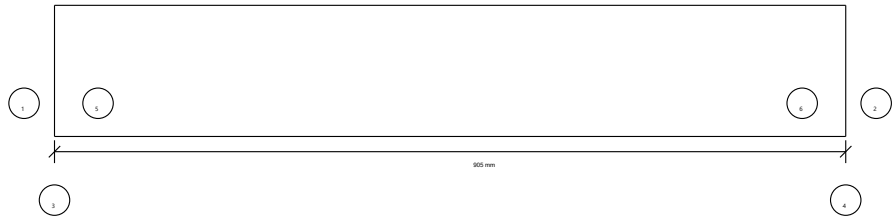
Panel ID	Design Tag	Lintel Length	Material	Design Status
E20	**E1**	**905**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	905	0.085 kN/m	Down
	Point Load	23		0.018 kN	Down
		557		-0.003 kN	Down
		883		0.010 kN	Down
ExtWind	Point Load	23		-0.006 kN	Down
		557		0.051 kN	Down
		883		-0.001 kN	Down
Qur	Point Load	23		0.002 kN	Down
		557		-0.016 kN	Down
		883		0.001 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 7) 1.2G + W (Down) North Wind Ext +
4	Strength: 8) 1.2G + W (Out-of-plane) North Wind Ext +
5	Strength: 10) 1.2G + W (Down,Out-of-plane) North Wind Ext +
6	Serviceability: 17) G (Short Term)
7	Serviceability: 19) G + ψsQur (Short Term)

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.012	0.00	0.0
2	0.007	0.00	0.0
3	0.020	0.00	0.0
4	0.020	0.00	0.0
5	0.019	0.00	0.0
6	0.009	0.00	0.0
7	0.009	0.00	0.0

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	0.079 kN
Strength: 2) 1.2G + 1.5Qur	0.064 kN
Strength: 7) 1.2G + W (Down) North Wind Ext +	0.091 kN

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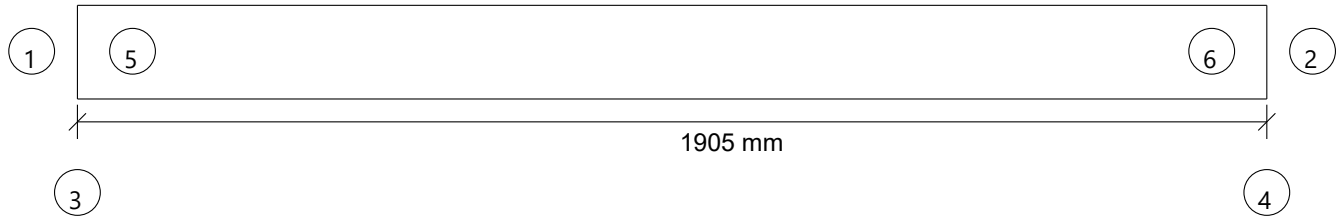
Panel ID	Design Tag	Lintel Length	Material	Design Status
E21	E1	1905	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1905	0.085 kN/m	Down
	Point Load	22		-0.007 kN	Down
		620		0.441 kN	Down
		1220		0.771 kN	Down
		1820		1.245 kN	Down
		1883		0.107 kN	Down
ExtWind	Point Load	22		0.037 kN	Down
		620		-0.725 kN	Down
		1220		-1.813 kN	Down
		1820		-3.076 kN	Down
		1883		-0.257 kN	Down
Qur	Point Load	22		-0.018 kN	Down
		620		0.270 kN	Down
		1220		0.513 kN	Down
		1820		0.850 kN	Down
		1883		0.071 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.709	0.14	-1.5
2	1.111	0.13	0.0
3	-0.613	0.07	0.0
4	-0.492	0.06	0.0
5	0.525	0.00	-0.8
6	0.525	0.00	-1.1
7	-1.086	0.00	1.5
8	-0.965	0.00	1.3

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction

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Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.740 kN
Strength: 2) 1.2G + 1.5Qur	4.393 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-2.784 kN

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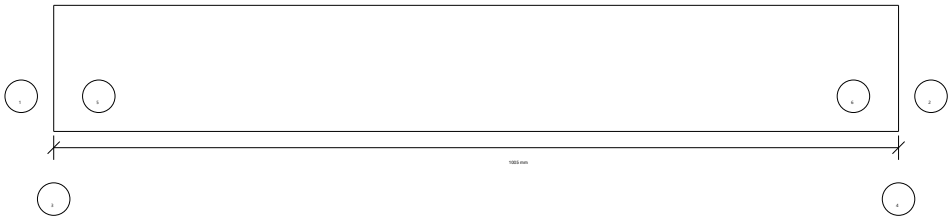
Panel ID	Design Tag	Lintel Length	Material	Design Status
E22	**E1**	**1005**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1005	0.085 kN/m	Down
	Point Load	22		-0.012 kN	Down
		385		0.480 kN	Down
		983		0.500 kN	Down
ExtWind	Point Load	22		0.010 kN	Down
		385		-0.902 kN	Down
		983		-0.975 kN	Down
Qur	Point Load	22		-0.020 kN	Down
		385		0.344 kN	Down
		983		0.364 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.166	0.03	-0.1
2	0.269	0.03	0.0
3	-0.101	0.01	0.0
4	-0.078	0.01	0.0
5	0.123	0.00	0.0
6	0.123	0.00	-0.1
7	-0.212	0.00	0.1
8	-0.188	0.00	0.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	0.978 kN
Strength: 2) 1.2G + 1.5Qur	1.605 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.656 kN

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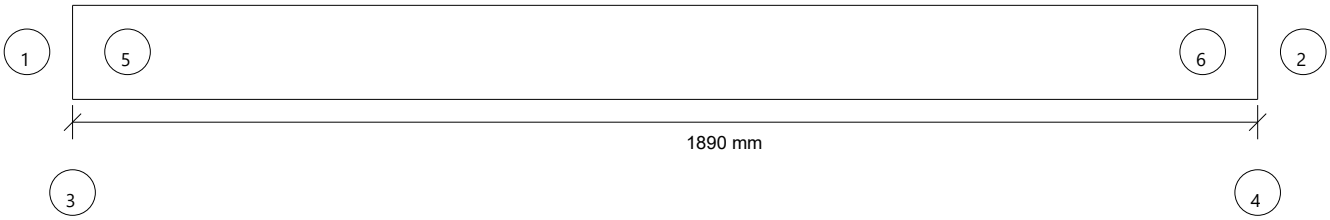
Panel ID	Design Tag	Lintel Length	Material	Design Status
E5	E1	1890	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1890	0.085 kN/m	Down
	Point Load	45		-0.075 kN	Down
		647		0.546 kN	Down
		1247		0.410 kN	Down
		1845		0.424 kN	Down
ExtWind	Point Load	45		0.214 kN	Down
		647		-1.206 kN	Down
		1247		-0.839 kN	Down
		1845		-0.766 kN	Down
Qur	Point Load	45		-0.064 kN	Down
		647		0.366 kN	Down
		1247		0.283 kN	Down
		1845		0.348 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.482	0.09	-1.1
2	0.754	0.09	0.0
3	-0.370	0.04	0.0
4	-0.293	0.03	0.0
5	0.357	0.00	-0.5
6	0.357	0.00	-0.8
7	-0.691	0.00	1.0
8	-0.615	0.00	0.9

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.300 kN
Strength: 2) 1.2G + 1.5Qur	2.138 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.854 kN

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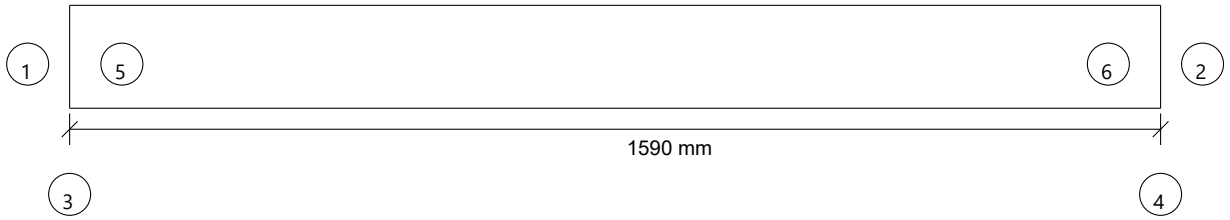
Panel ID	Design Tag	Lintel Length	Material	Design Status
E6	**E1**	**1590**	**1/150x90 hy90 H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1590	0.085 kN/m	Down
	Point Load	22		-0.070 kN	Down
		447		-0.021 kN	Down
		1047		0.035 kN	Down
		1568		0.010 kN	Down
ExtWind	UDL Load	0	1590	0.110 kN/m	Down
	Point Load	22		0.232 kN	Down
		447		0.132 kN	Down
		1047		-0.023 kN	Down
		1568		0.006 kN	Down
IntWind	UDL Load	0	1590	0.047 kN/m	Down
Qur	Point Load	22		-0.047 kN	Down
		447		-0.027 kN	Down
		1047		0.005 kN	Down
		1568		-0.001 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 7) 1.2G + W (Down) North Wind Ext + Int -
4	Strength: 8) 1.2G + W (Out-of-plane) North Wind Ext + Int -
5	Strength: 10) 1.2G + W (Down,Out-of-plane) North Wind Ext + Int -
6	Serviceability: 17) G (Short Term)
7	Serviceability: 19) G + ψsQur (Short Term)
8	Strength: 7) 1.2G + W (Down) West Wind Ext + Int -
9	Strength: 8) 1.2G + W (Out-of-plane) West Wind Ext + Int -
10	Strength: 10) 1.2G + W (Down,Out-of-plane) West Wind Ext + Int -

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.046	0.01	-0.1
2	0.037	0.00	0.0
3	0.066	0.01	0.0
4	0.066	0.01	0.0
5	0.062	0.01	0.0
6	0.034	0.00	0.0
7	0.034	0.00	0.0
8	0.066	0.01	0.0
9	0.066	0.01	0.0
10	0.062	0.01	0.0

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MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	0.135 kN
Strength: 2) 1.2G + 1.5Qur	0.111 kN
Strength: 7) 1.2G + W (Down) North Wind Ext + Int -	0.318 kN
Strength: 7) 1.2G + W (Down) West Wind Ext + Int -	0.318 kN

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Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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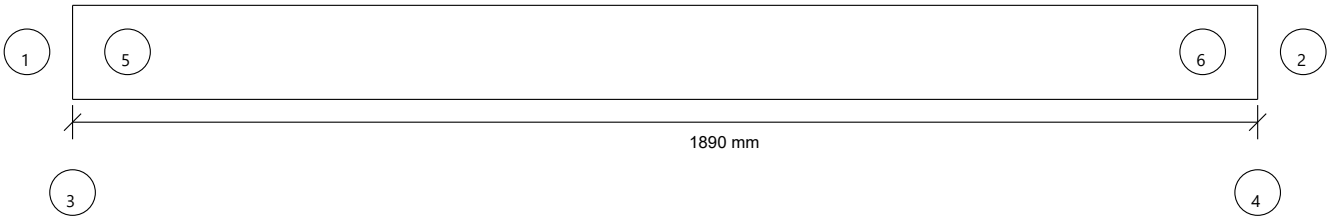
Panel ID	Design Tag	Lintel Length	Material	Design Status
E7	E1	1890	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1890	0.085 kN/m	Down
	Point Load	23		0.206 kN	Down
		97		0.931 kN	Down
		697		0.606 kN	Down
		1297		0.462 kN	Down
		1868		0.338 kN	Down
ExtWind	Point Load	23		-0.498 kN	Down
		97		-2.306 kN	Down
		697		-1.245 kN	Down
		1297		-0.895 kN	Down
		1868		-0.803 kN	Down
Qur	Point Load	23		0.132 kN	Down
		97		0.606 kN	Down
		697		0.401 kN	Down
		1297		0.319 kN	Down
		1868		0.277 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 9) 0.9G + W (Up) North Wind Ext +
4	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 19) G + ψsQur (Short Term)
7	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext +
8	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.609	0.12	-1.3
2	0.956	0.11	0.0
3	-0.455	0.05	0.0
4	-0.359	0.04	0.0
5	0.451	0.00	-0.7
6	0.451	0.00	-0.9
7	-0.860	0.00	1.2
8	-0.765	0.00	1.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction

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Carters Building Supplies Ltd

Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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Load Case Name	Vertical Reaction
Strength: 1) 1.35G	2.309 kN
Strength: 2) 1.2G + 1.5Qur	3.649 kN
Strength: 9) 0.9G + W (Up) North Wind Ext +	-2.228 kN

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Job: WN1370931C1

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Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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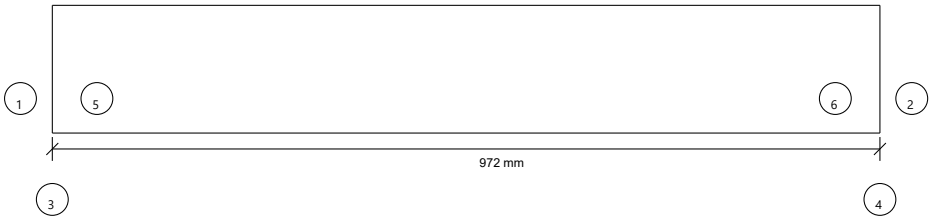
Panel ID	Design Tag	Lintel Length	Material	Design Status
E8	E1	972	1/150x90 hy90 H1.2	Designed



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	972	0.085 kN/m	Down
	Point Load	23		0.329 kN	Down
		177		0.987 kN	Down
		777		0.641 kN	Down
		950		0.360 kN	Down
ExtWind	UDL Load	0	972	0.110 kN/m	Down
	Point Load	23		-0.813 kN	Down
		177		-2.408 kN	Down
		777		-1.485 kN	Down
		950		-0.837 kN	Down
IntWind	UDL Load	0	972	0.047 kN/m	Down
Qur	Point Load	23		0.226 kN	Down
		177		0.669 kN	Down
		777		0.400 kN	Down
		950		0.224 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 7) 1.2G + W (Down) North Wind Ext + Int -
4	Strength: 8) 1.2G + W (Out-of-plane) North Wind Ext + Int -
5	Strength: 9) 0.9G + W (Up) North Wind Ext + Int +
6	Strength: 10) 1.2G + W (Down,Out-of-plane) North Wind Ext + Int -
7	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext + Int +
8	Serviceability: 17) G (Short Term)
9	Serviceability: 19) G + ψsQur (Short Term)
10	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext + Int +
11	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext + Int +
12	Strength: 9) 0.9G + W (Up) South Wind Ext + Int +
13	Strength: 11) 0.9G + W (Up,Out-of-plane) South Wind Ext + Int +
14	Serviceability: 26) W (Out-of-plane) (Short Term) South Wind Ext + Int +
15	Serviceability: 27) W (Down,Out-of-plane) (Short Term) South Wind Ext + Int +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	0.222	0.04	-0.1
2	0.356	0.04	0.0
3	-0.186	0.02	0.0
4	-0.186	0.02	0.0
5	-0.236	0.03	0.0

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Load Case	Moment (kNm)	CSI	Panel Defln (mm)
6	-0.144	0.02	0.0
7	-0.193	0.02	0.0
8	0.164	0.00	-0.1
9	0.164	0.00	-0.1
10	-0.383	0.00	0.2
11	-0.341	0.00	0.1
12	-0.236	0.03	0.0
13	-0.193	0.02	0.0
14	-0.383	0.00	0.2
15	-0.341	0.00	0.1

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	1.773 kN
Strength: 2) 1.2G + 1.5Qur	2.858 kN
Strength: 7) 1.2G + W (Down) North Wind Ext + Int -	-1.511 kN
Strength: 9) 0.9G + W (Up) North Wind Ext + Int +	-1.905 kN
Strength: 9) 0.9G + W (Up) South Wind Ext + Int +	-1.905 kN

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Job: **WN1370931C1**

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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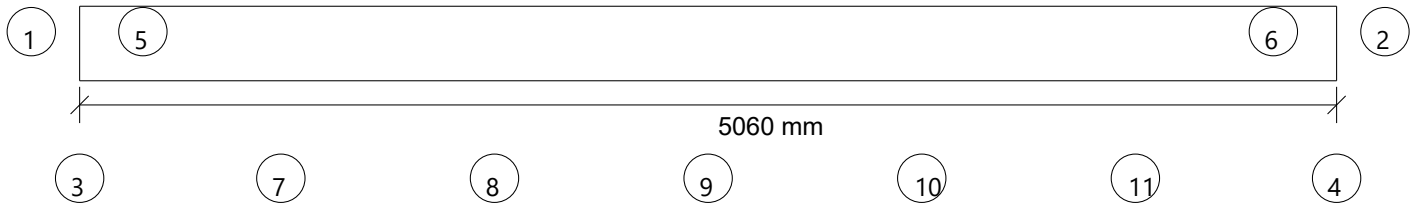
Panel ID	Design Tag	Lintel Length	Material	Design Status
E9	**G1**	**5060**	**1/300x90 hyONE H1.2**	**Designed**



MAXIMUM UDL LOADS AND POINT LOADS

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	5060	0.164 kN/m	Down
	Point Load	340		-0.006 kN	Down
		730		0.386 kN	Down
		1180		0.056 kN	Down
		1630		0.959 kN	Down
		2080		0.068 kN	Down
		2530		0.758 kN	Down
		2980		0.068 kN	Down
		3430		0.959 kN	Down
		3880		0.055 kN	Down
		4330		0.387 kN	Down
		4720		-0.014 kN	Down
ExtWind	UDL Load	0	5060	0.220 kN/m	Down
	Point Load	340		0.036 kN	Down
		730		-0.668 kN	Down
		1180		-0.093 kN	Down
		1630		-2.221 kN	Down
		2080		-0.119 kN	Down
		2530		-1.416 kN	Down
		2980		-0.119 kN	Down
		3430		-2.221 kN	Down
		3880		-0.092 kN	Down
		4330		-0.671 kN	Down
		4720		0.051 kN	Down
IntWind	UDL Load	0	5060	0.094 kN/m	Down
Qur	Point Load	340		-0.009 kN	Down
		730		0.377 kN	Down
		1180		0.031 kN	Down
		1630		0.566 kN	Down
		2080		0.034 kN	Down
		2530		0.466 kN	Down
		2980		0.034 kN	Down
		3430		0.566 kN	Down
		3880		0.030 kN	Down
		4330		0.379 kN	Down
		4720		-0.015 kN	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 7) 1.2G + W (Down) West Wind Ext + Int -
4	Strength: 8) 1.2G + W (Out-of-plane) West Wind Ext + Int -

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Load Case Number	Load Case Name
5	Strength: 9) 0.9G + W (Up) North Wind Ext + Int +
6	Strength: 10) 1.2G + W (Down,Out-of-plane) West Wind Ext + Int -
7	Strength: 11) 0.9G + W (Up,Out-of-plane) North Wind Ext + Int +
8	Serviceability: 17) G (Short Term)
9	Serviceability: 19) G + ψsQur (Short Term)
10	Serviceability: 26) W (Out-of-plane) (Short Term) North Wind Ext + Int +
11	Serviceability: 27) W (Down,Out-of-plane) (Short Term) North Wind Ext + Int +

MAXIMUM BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)
1	4.654	0.13	-5.3
2	6.864	0.12	0.0
3	-1.885	0.03	0.0
4	-1.885	0.03	0.0
5	-2.918	0.05	0.0
6	-1.216	0.02	0.0
7	-2.249	0.04	0.0
8	3.447	0.00	-2.6
9	3.447	0.00	-3.6
10	-6.019	0.00	-0.2
11	-5.350	0.00	-0.2

MAXIMUM SUPPORT JOINT REACTIONS

Load Case Name	Vertical Reaction
Strength: 1) 1.35G	3.098 kN
Strength: 2) 1.2G + 1.5Qur	4.602 kN
Strength: 7) 1.2G + W (Down) West Wind Ext + Int -	-1.019 kN
Strength: 9) 0.9G + W (Up) North Wind Ext + Int +	-1.707 kN

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Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET Gonville WHANGANUI 4501

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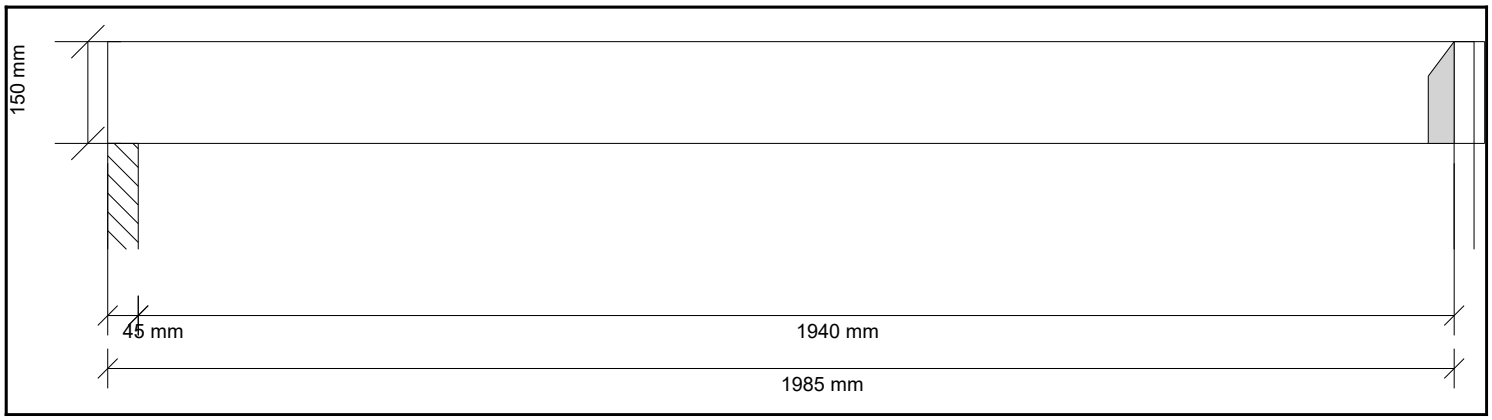
BEAM DESIGN CALCULATIONS

Member Label	Quantity	Length	Weight
B1 - 150x90 hy90 H1.2	1	2030	17.539



Individual Member Design Information

Occupancy Category: A1 - General
Distributed Live Load: 1.500 kPa
Concentrated Live Load: 1.800 kN
Member Depth: 150 mm
Member Spacing: 406 mm
Grid Factor (k9): Based on 1 member
Building Class: Class1
Importance Level: 2
Timber: Floor Truss Materials x35 x45

JOINT CO-ORDINATES USED FOR ANALYSIS

Joint	X-Cord	Y-Cord
1	0	75
2	1985	75
3	35	75

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	UDL Load	0	1985	0.085 kN/m	Down

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Serviceability: 17) G (Short Term)

DESIGNED TIMBER SIZES AND GRADES

Mem	Species	Size	Grade	Rstr/Brc	Inventory	Description	Str.Grp.	UnderSize Width	UnderSize Depth
T1	LVL	150x90	hy90				Unknown	0	0

MAXIMUM AXIAL FORCES,BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
1	0.000	0.00	0.0	0.0	0.0
2	0.000	0.00	0.0	0.0	0.0
1	0.054	0.01	-0.1	0.0	0.0
2	0.040	0.00	-0.1	0.0	0.0

SUPPORT JOINTS AND REACTIONS

Joint No	Load Case Name	Vertical Reaction	Horizontal Reaction
2	Strength: 1) 1.35G	0.111	0.000
3	Strength: 1) 1.35G	0.116	0.000

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Carters Building Supplies Ltd

Job: WN1370931C1

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Site: 55 TAWHERO STREET Gonville WHANGANUI 4501

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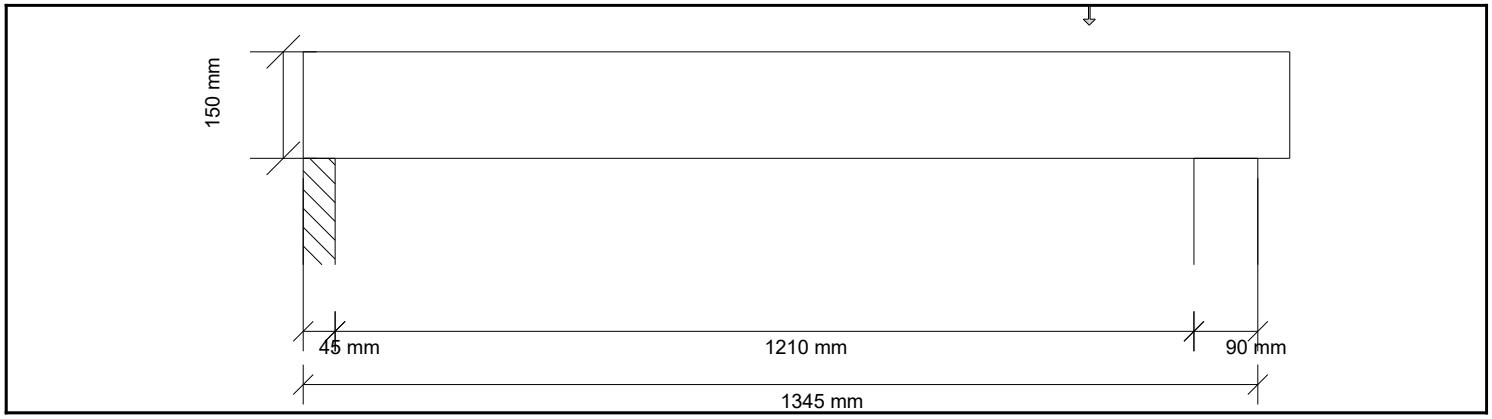
Member Label	Quantity	Length	Weight
B2 - 150x90 hy90 H1.2	1	1390	12.010



Individual Member Design Information

Occupancy Category: A1 - General
Member Depth: 150 mm
Building Class: Class1
Timber: Floor Truss Materials x35 x45

Distributed Live Load: 1.500 kPa
Member Spacing: 406 mm
Importance Level: 2

Concentrated Live Load: 1.800 kN
Grid Factor (k9): Based on 1 member

JOINT CO-ORDINATES USED FOR ANALYSIS

Joint	X-Cord	Y-Cord
1	0	75
2	1345	75
3	35	75
4	1300	75

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	Point Load	1108		0.600 kN	Down
	UDL Load	0	1345	0.085 kN/m	Down
ExtWind	Point Load	1108		1.170 kN	Up
Qur	Point Load	1108		0.400 kN	Down
Moving	Point Load	0		1.400 kN	Down
		633		1.400 kN	Down
		1265		0.700 kN	Up

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 3) 1.2G + 1.5Qcr
4	Strength: 9) 0.9G + W (Up) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 18) G + ψsQcr (Short Term)
7	Serviceability: 19) G + ψsQur (Short Term)

DESIGNED TIMBER SIZES AND GRADES

Mem	Species	Size	Grade	Rstr/Brc	Inventory	Description	Str.Grp.	UnderSize Width	UnderSize Depth
T1	LVL	150x90	hy90				Unknown	0	0

MAXIMUM AXIAL FORCES,BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
1	0.000	0.00	0.0	0.0	0.0
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0

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Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
5	0.000	0.00	0.0	0.0	0.0
6	0.000	0.00	0.0	0.0	0.0
7	0.000	0.00	0.0	0.0	0.0
1	0.144	0.03	-0.1	0.0	0.0
2	0.226	0.03	0.0	0.0	0.0
3	0.754	0.09	0.0	0.0	0.0
4	-0.095	0.01	0.0	0.0	0.0
5	0.107	0.00	-0.1	0.0	0.0
6	0.107	0.00	-0.2	0.0	0.0
7	0.107	0.00	-0.1	0.0	0.0
1	0.000	0.00	0.0	0.0	0.0
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0
5	0.000	0.00	0.0	0.0	0.0
6	0.000	0.00	0.0	0.0	0.0
7	0.000	0.00	0.0	0.0	0.0

SUPPORT JOINTS AND REACTIONS

Joint No	Load Case Name	Vertical Reaction	Horizontal Reaction
3	Strength: 1) 1.35G	0.200	0.000
4	Strength: 1) 1.35G	0.764	0.000
3	Strength: 2) 1.2G + 1.5Qur	0.269	0.000
4	Strength: 2) 1.2G + 1.5Qur	1.188	0.000
3	Strength: 3) 1.2G + 1.5Qcr	0.177	0.000
4	Strength: 3) 1.2G + 1.5Qcr	0.679	0.000
3	Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.045	0.000
4	Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.482	0.000

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Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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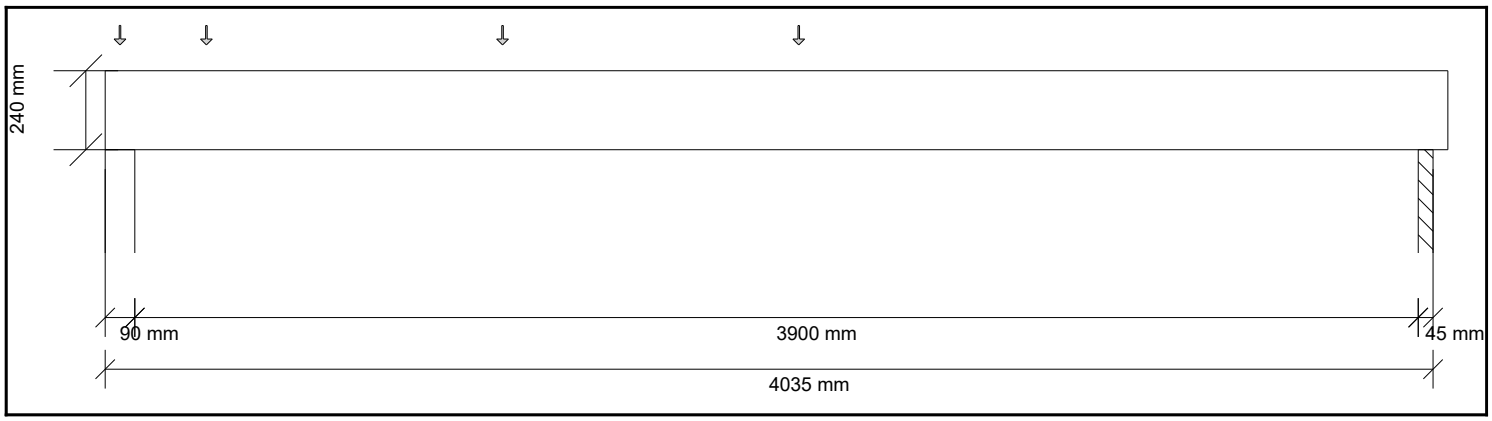
Member Label	Quantity	Length	Weight
B4 - 240x90 PL8 H3.2	1	4080	48.470



Individual Member Design Information

Occupancy Category: A1 - General
Distributed Live Load: 1.500 kPa
Concentrated Live Load: 1.800 kN
Member Depth: 240 mm
Member Spacing: 406 mm
Grid Factor (k9): Based on 1 member
Building Class: Class1
Importance Level: 2
Timber: Floor Truss Materials x35 x45

JOINT CO-ORDINATES USED FOR ANALYSIS

Joint	X-Cord	Y-Cord
1	0	120
2	4035	120
3	45	120
4	4000	120

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	Point Load	45		1.200 kN	Down
		308		0.500 kN	Down
		1207		0.500 kN	Down
		2108		0.600 kN	Down
	UDL Load	0	4035	0.117 kN/m	Down
ExtWind	Point Load	45		3.060 kN	Up
		308		0.540 kN	Up
		1207		0.630 kN	Up
		2108		1.170 kN	Up
Qur	Point Load	45		0.800 kN	Down
		308		0.400 kN	Down
		1207		0.400 kN	Down
		2108		0.400 kN	Down
Moving	Point Load	0		1.400 kN	Down
		1978		1.400 kN	Down
		3955		0.700 kN	Up

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 3) 1.2G + 1.5Qcr
4	Strength: 9) 0.9G + W (Up) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 18) G + ψsQcr (Short Term)
7	Serviceability: 19) G + ψsQur (Short Term)

DESIGNED TIMBER SIZES AND GRADES

Mem	Species	Size	Grade	Rstr/Brc	Inventory	Description	Str.Grp.	UnderSize Width	UnderSize Depth

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Carters Building Supplies Ltd

Job: WN1370931C1

Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET
Gonville
WHANGANUI 4501

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Mem	Species	Size	Grade	Rstr/Brc	Inventory	Description	Str.Grp.	UnderSize Width	UnderSize Depth
T1	GLU	240x90	PL8				Unknown	0	0

MAXIMUM AXIAL FORCES,BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
1	0.000	0.00	0.2	0.2	0.0
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0
5	0.000	0.00	0.1	0.1	0.0
6	0.000	0.00	0.1	0.1	0.0
7	0.000	0.00	0.1	0.1	0.0
1	1.567	0.20	-4.3	0.0	0.0
2	2.394	0.18	0.0	0.0	0.0
3	3.458	0.26	0.0	0.0	0.0
4	-0.529	0.04	0.0	0.0	0.0
5	1.161	0.00	-2.1	0.0	0.0
6	1.161	0.00	-3.7	0.0	0.0
7	1.161	0.00	-3.0	0.0	0.0
1	0.000	0.00	0.1	0.0	0.1
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0
5	0.000	0.00	0.1	0.0	0.1
6	0.000	0.00	0.1	0.0	0.1
7	0.000	0.00	0.1	0.0	0.1

SUPPORT JOINTS AND REACTIONS

Joint No	Load Case Name	Vertical Reaction	Horizontal Reaction
3	Strength: 1) 1.35G	3.433	0.000
4	Strength: 1) 1.35G	0.982	0.000
3	Strength: 2) 1.2G + 1.5Qur	5.522	0.000
4	Strength: 2) 1.2G + 1.5Qur	1.402	0.000
3	Strength: 3) 1.2G + 1.5Qcr	3.051	0.000
4	Strength: 3) 1.2G + 1.5Qcr	0.873	0.000
3	Strength: 9) 0.9G + W (Up) North Wind Ext +	-2.281	0.000
4	Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.176	0.000

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Client: CASTLE HOMES WANGANUI LTD

Site: 55 TAWHERO STREET Gonville WHANGANUI 4501

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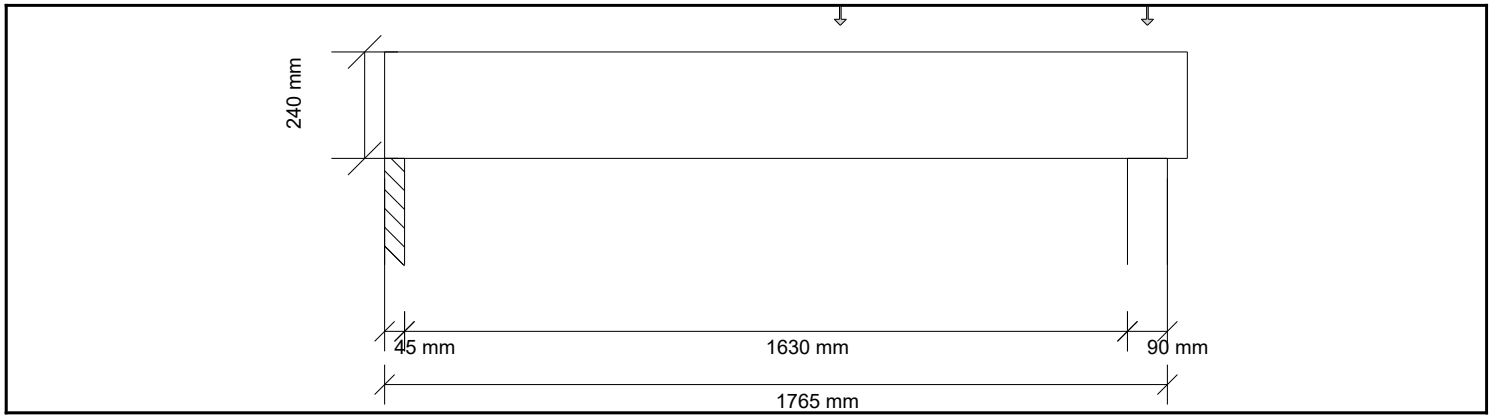
Member Label	Quantity	Length	Weight
B3 - 240x90 PL8 H3.2	1	1810	21.503



Individual Member Design Information

Occupancy Category: A1 - General
Member Depth: 240 mm
Building Class: Class1
Timber: Floor Truss Materials x35 x45

Distributed Live Load: 1.500 kPa
Member Spacing: 406 mm
Importance Level: 2

Concentrated Live Load: 1.800 kN
Grid Factor (k9): Based on 1 member

JOINT CO-ORDINATES USED FOR ANALYSIS

Joint	X-Cord	Y-Cord
1	0	120
2	1765.1	120
3	35	120
4	1720.1	120

Load Set	Type	Location(mm) Start	Finish	Load Magnitude	Direction
Dead	Point Load	1028		0.600 kN	Down
		1720		1.200 kN	Down
	UDL Load	0	1765	0.117 kN/m	Down
ExtWind	Point Load	1028		1.170 kN	Up
		1720		2.880 kN	Up
Qur	Point Load	1028		0.400 kN	Down
		1720		0.700 kN	Down
Moving	Point Load	0		1.400 kN	Down
		843		1.400 kN	Down
		1685		0.700 kN	Up

Load Case Number	Load Case Name
1	Strength: 1) 1.35G
2	Strength: 2) 1.2G + 1.5Qur
3	Strength: 3) 1.2G + 1.5Qcr
4	Strength: 9) 0.9G + W (Up) North Wind Ext +
5	Serviceability: 17) G (Short Term)
6	Serviceability: 18) G + ψsQcr (Short Term)
7	Serviceability: 19) G + ψsQur (Short Term)

DESIGNED TIMBER SIZES AND GRADES

Mem	Species	Size	Grade	Rstr/Brc	Inventory	Description	Str.Grp.	UnderSize Width	UnderSize Depth
T1	GLU	240x90	PL8				Unknown	0	0

MAXIMUM AXIAL FORCES,BENDING MOMENTS AND DEFLECTIONS

Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
1	0.000	0.00	0.0	0.0	0.0

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Load Case	Moment (kNm)	CSI	Panel Defln (mm)	Joint Deflection	
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0
5	0.000	0.00	0.0	0.0	0.0
6	0.000	0.00	0.0	0.0	0.0
7	0.000	0.00	0.0	0.0	0.0
1	0.384	0.05	-0.2	0.0	0.0
2	0.586	0.04	0.0	0.0	0.0
3	1.183	0.09	0.0	0.0	0.0
4	-0.221	0.02	0.0	0.0	0.0
5	0.285	0.00	-0.1	0.0	0.0
6	0.285	0.00	-0.2	0.0	0.0
7	0.285	0.00	-0.1	0.0	0.0
1	0.000	0.00	0.0	0.0	0.0
2	0.000	0.00	0.0	0.0	0.0
3	0.000	0.00	0.0	0.0	0.0
4	0.000	0.00	0.0	0.0	0.0
5	0.000	0.00	0.0	0.0	0.0
6	0.000	0.00	0.0	0.0	0.0
7	0.000	0.00	0.0	0.0	0.0

SUPPORT JOINTS AND REACTIONS

Joint No	Load Case Name	Vertical Reaction	Horizontal Reaction
3	Strength: 1) 1.35G	0.471	0.000
4	Strength: 1) 1.35G	2.237	0.000
3	Strength: 2) 1.2G + 1.5Qur	0.665	0.000
4	Strength: 2) 1.2G + 1.5Qur	3.392	0.000
3	Strength: 3) 1.2G + 1.5Qcr	0.419	0.000
4	Strength: 3) 1.2G + 1.5Qcr	1.988	0.000
3	Strength: 9) 0.9G + W (Up) North Wind Ext +	-0.167	0.000
4	Strength: 9) 0.9G + W (Up) North Wind Ext +	-2.078	0.000

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Demand Calculation Sheet

Job Details

Name:	B Vijayan & S Sekharath Job
Street and Number:	55 tawhero Street
Lot and DP Number:	Lot 24 DP569376
City/Town/District:	Whanganui
Designer:	Shane Taylor
Company:	GJ Gardner Homes Whanganui
Date:	Tuesday, 28 June 2022

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Heavy
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.95
Building Height to Apex (m)	5.15
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.4
Building Length (m)	22.18
Building Width (m)	12.18
Building Plan Area (m²)	201.16

Building Location

Wind Zone = High

Earthquake Zone 2

Soil Type D & E (Deep to Very Soft)

Annual Prob. of Exceedance: 1 in 500 (Default)

Bracing Units required for Wind

	Along	Across
Single Level	**673**	**1357**

Bracing Units required for Earthquake

	Along & Across
Single Level	**1175**

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Single Level Along Resistance Sheet

Job Name: B Vijayan & S Sekharath Job

									Wind	EQ
									Demand	
									673	1175
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1116 166%	1219 104%
a	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	3	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 22.18								432 OK	486 OK
b	1	2.00		2.4	GS1-N	GIB®	138	120		
									138 OK	120 OK
c	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 6.09								288 OK	324 OK
d	1	0.65		2.4	EP1 0.6	CHH	62	68		
	2	0.55		2.4	EP1 0.4	CHH	44	52		
	External Length = 6.1								106 OK	121 OK
e	1	0.80		2.4	EP1 0.6	CHH	76	84		
	2	0.80		2.4	EP1 0.6	CHH	76	84		
	External Length = 7.5								152 OK	168 OK

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Single Level Across Resistance Sheet

Job Name: B Vijayan & S Sekharath Job

									Wind	EQ
									Demand	
									1357	1175
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1435 106%	1395 119%
m	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 6.1								114 OK	126 OK
n	1	2.10		2.4	GS1-N	GIB®	145	126		
	2	1.20		2.4	EP1 1.2	CHH	144	162		
	External Length = 2.3								289 OK	288 OK
o	1	3.00		2.4	GS2-N	GIB®	294	258		
									294 OK	258 OK
p	1	1.40		2.4	GS1-N	GIB®	97	84		
	2	2.10		2.4	GS1-N	GIB®	145	126		
	3	0.50		2.4	EP1 0.4	CHH	40	48		
	External Length = 1.7								282 OK	258 OK
q	1	2.60		2.4	GS1-N	GIB®	179	156		
	External Length = 1.7								179 OK	156 OK
r	1	1.20		2.4	EP1 1.2	CHH	144	162		
	2	0.80		2.4	EP1 0.6	CHH	76	84		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 10.46								277 OK	309 OK

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Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
CHH	EP1 0.4	0.4	80	95
CHH	EP1 0.6	0.6	95	105
CHH	EP1 1.2	1.2	120	135
Eng Design	Protal		70	36
Kirkyl	Kirkyl-1	1	150	150
Kirkyl	Kirkyl-2	1	60	29

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BRICK VENEER BEST PRACTICE GUIDE

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BRICK & BLOCK LAYERS
- FEDERATION OF NEW ZEALAND -

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BRICK & BLOCK LAYERS
- FEDERATION OF NEW ZEALAND -

BRICK VENEER BEST PRACTICE GUIDE - PREFACE

Preface

This document is the result of a collaboration between the collective of Brick and Blocklayers associations within New Zealand and the manufacturing and distribution sector under the guise of the 'Brick and Blocklayers Federation of New Zealand (BBFNZ).

Since 1991, New Zealand has had a 'performance based' Building Code in place. What this means is that there is no set, one way that buildings within New Zealand MUST be built but instead focus is placed on how a building should perform once built.

The Ministry of Business, Innovation and Employment (MBIE) provides to the industry a set of 'Acceptable solutions' as a means of complying with the Building Code. These documents however are not compulsory and at times the Best Practice Guide for Brick Veneer makes recommendations that are not part of, or contradict the Acceptable solutions. In these areas, we have endeavoured to point you towards information or independent study reports that show that these 'alternative solution proposals' should also meet the performance requirements of the NZ Building Code.

As an Industry, we believe that we also need to consider Workmanship Quality with our guidance. Workmanship Quality describes the brick work that is not related to building performance but the aesthetic finish that customers expect from Brick work.

An acceptable Workmanship Quality standard has been met if a brick veneer has been laid to meet the performance requirements of the Building Code and achieves no visible defects when viewed by a 6.1m with diffused light viewing distance as per manufacturer's specifications. This may be achieved without meeting all of the tolerances contained within this Best Practice Guide.

It is recommended, when planning the design of a Brick Veneer that you engage a bricklayer early on for their knowledge of design and product.

BBFNZ asks that you consider engaging the products and services of our members who have contributed and made this document possible.

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THE BRICK CAVITY

The brick cavity has meant that most brick homeowners' managed to avoid owning a leaky home

Designing and building brick cavities

A ‘cavity’ or ‘cavity gap’ is an area of space between the timber framing and the brick veneer that enables sufficient airflow and drainage to dry any moisture that may penetrate the brick veneer.
Without a cavity, any moisture would be trapped between the brick and timber and may cause the timber to rot which has been the case with other cladding products, particularly prior to 2004 resulting in ‘leaky home syndrome’.

CAVITY WIDTH
Unless a building consent states otherwise, a cavity should be between **40–75mm** to comply with
E2/AS1 which is the acceptable solution for claddings.
Designers and bricklayers should familiarise themselves with Section 9.2.6 Cavities and review Figure
73Dof E2/AS1. You can read this documentation here: E2/AS1 (part4).
It is important to remember that measurements for cavities are taken from the point where the brick tie is secured to the framing (which may not necessarily be the line of the supporting structure).
The cavity width should be clearly marked on all working drawings.
The Brick and Blocklayers Federation recommends that cavity gaps are designed to a 50mm cavity.
This provides a 10mm tolerance for variations in the framing or slab and accommodates should plywood bracing be a requirement. E2/AS1 allows for a maximum overhang of 20mm.

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SLAB RECESSES

As a further weather tight design precaution brick veneers should be designed and constructed with a slab recess. This means that the veneer should be extended below the final floor level to ensure that any moisture that penetrates the cavity drains past the flooring level and out through the weep holes. This is intended to prevent moisture from potentially pooling and running to the inside of the dwelling.

Designers and Bricklayers should familiarise themselves with Section 9.2.5 and Figure 73DofE2/AS1 for options of slab recess. You can read this document here: E2/AS1 (part4)

E2/AS1 requires a step down of 50mm or more.

The Brick and Blocklayers Federation recommends a step down of 90-100mm and the placement of a sloping fillet at the base of the cavity to direct water to the outside.

DAMP PROOFING OF SLAB RECESSES

The slab edge and the bottom of the cavity should be sealed to prevent any moisture sitting in the bottom of the cavity from entering the dwelling.

E2/AS1 requires that damp proofing material be either:

Rebates lower than the ground; or

Two coats of a bituminous liquid; or

1mm of butyl rubber or bituminous sheet; or

0.25mm polythene or polyethylene damp proof membrane.

If the rebate is above ground level then either 1mm of butyl rubber or bituminous sheet or 0.25mm polythene or polyethylene damp proof membrane are the only options available.

WIDTH OF SLAB RECESSES

The width of the recess at the base of the veneer, where the brick sits upon, is governed by three factors:

The desired cavity width;

The width of the brick;

The amount, if any, that the brick will overhang the foundation.

If the brick product has not yet been selected, or if it is subject to change then it is important to ensure that this ledge is designed with flexibility.

The Brick and Blocklayers Federation recommends designing a 120mm wide ledge and planning to overhang the brick 10mm to provide a drip edge.

ENSURING THE CAVITY IS CLEAR

A clean cavity, free of mortar bridging the gap, is essential for preventing moisture transference. NZS4210:2001 Section2.7.1.7 advises that mortar should not encroach into the cavity more than 5mm.

The Brick and Blocklayers Federation recommends specifying and installing 'wash-outs'.

A 'wash- out' involves laying every corner brick and every subsequent brick at 800mm centres on a bed of sand (thus coinciding with weep hole requirements). Once the veneer is approximately 800mm high, these bricks are removed to facilitate the regular washing out of mortar at the base of the cavity.

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MORTAR

Mortar is used to hold bricks together and fill and seal any gaps around them. Basically mortar used in brick veneer is a mixture of sand, cement, ad mixture and water. It is however critical that the components of mortar are properly proportioned and mixed correctly.

MIXING MORTAR

For brick veneer to function correctly it is important that the bricks are stronger than the mortar. This will ensure that in the event of seismic activity the tensile bond strength or adhesion of the mortar will fracture rather than the bricks themselves.

NZS4210:2001 provides for a strength requirement for structural masonry but not for brick veneer and states that mortars for veneers shall follow the strength requirement of the masonry suppliers.

In 2011 BRANZ released SR258 – Critical properties of Mortar for good seismic performance of brick veneer.
You can read this report here:
http://www.branz.co.nz/cms_show_download.php?id=8270db8e7e10636a60e5faedc2cd280ee6041b62

This research indicates that mortar strength should be at least 6MPa and advises that this can be achieved with mortar mixes of 4:1 sand to cement.
A hydration process occurs between the water and cement which causes the cement to harden and bind with the sand and therefore cause the mortar to 'set'. If the mortar shows signs of powdering that may mean that hydration has not occurred properly and the resulting veneer will need to be pulled down.
One of the most common causes of mortar powdering is rapid loss of moisture when the bricks are first laid. If the temperature exceeds 27 degrees Celsius then it is important to ensure that the bricks are kept damp for the first 24 hours.
In summer any mortar which is more than 1.5 hours old should be discarded and for temperatures below 5 degrees Celsius mortar should be discarded after 2 hours.
NZS4210:2001 Section 2.2.2.2(e) advises that bricklayers should avoid re-tempering mortar with water.
Mixing good mortar is a skill obtained through experience. Mixing times, humidity levels and even the type of sand used can all have an effect on the final product. Bricklayers should consider using bagged mortar for quality control issues and to obtain compliant mortar strength.
Chemical admixture shall comply with NZS 3113:1979 or AS 1478.1:2000 Admixtures shall be dosed in accordance with the manufacturer's instructions.
The Brick and Blocklayers Federation ask that if you do use bagged mortar that you support our manufacturing members:
Dricon (Firth)
http://www.firth.co.nz/product-information/dricon/dricon-product-range/trade-mortar.aspx

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MORTAR JOINTS

'Mortar joint' is the term for the space of mortar between bricks. According to NZS4210:2001 the average thickness of a mortar bed, cross or perpend joint should be 10mm +/- 3mm. A joint thickness of up to 20mm may be accepted on the bottom course to accommodate any slab level issues.
While the thickness of mortar needs to ensure that an adequate seal and bond is achieved, the mortar joint itself also provides an aesthetic value to the brick veneer. Different looks and weather tight properties can be achieved by creating different patterns in the mortar joint.
Varying mortar joint styles are created by bricklayers by running jointers, rakes or beaders across the mortar before it sets to achieve the desired look.
The most common mortar joint types are – grooved, weathered, 'V', raked, extruded or flush.

GROOVED JOINT – Also known as Concaved or rolled. This type of joint is formed by using a curved steel jointing tool. Its recessed profile and tight seal mean that it is very effective at resisting moisture penetration. This type of joint can be good for hiding small irregularities.
Should be tooled to a maximum depth of 6mm after initial stiffening has occurred. The delay of tooling is vital if a tight weatherproof joint is to be produced in horizontal but particularly, vertical joints. It is recommended that all slurry coated bricks should use a grooved joint.

WEATHERED JOINT – The mortar forms a joint that is recessed from the bottom to the top. This type of joint can give brickwork a neat, ordered appearance. While not as weathertight as Grooved and 'V' joints, it can be used on external walls and should be tooled to after initial stiffening has occurred. The delay of tooling is vital if a tight weatherproof joint is to be produced in horizontal but particularly, vertical joints.

'V' JOINT – This type of joint is formed with a V-shape jointer (or trowel). This type of joint can be good for hiding small irregularities. This joint has good weathertight properties. Should be tooled to a maximum depth of 6mm after initial stiffening has occurred. The delay of tooling is vital if a tight weatherproof joint is to be produced in horizontal but particularly, vertical joints.

RAKED JOINT – For this type of joint the mortar is raked out and once pointed and tooled shall not exceed a maximum depth of 6mm. It is important to compact the mortar to improve its weather tight performance, this design creates a form of ledge where water can pool.

EXTRUDED JOINT – This type of joint is formed without tooling. It is caused naturally as excessive mortar squeezes out between the bricks. Exposure to weather may degrade an Extruded joints appearance.

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FLUSH JOINT – The Brick and Blocklayers Federation does not recommend the use of flush joints unless they are compacted. If the mortar is flush jointed and not compacted it can lead to the following issues:

- When veneer is to be honed, the mortar can 'flick' out with honing process.
- When brick is to be plastered it can lead to hairline cracking in the plaster where the outline of the brick can be seen.

The type of brick selected plays a part in which type of mortar joint will work best. Straight edged bricks with a 'Vitratectm 'or 'slurry' coat must use grooved (rolled) joints whereas colour through bricks with rumbled edges are better with raked joints.
It is important to adhere to the recommendations of your brick manufacturer when deciding on which type or mortar joint to use.

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BRICK TIES

Brick ties provide strength and flexibility to brick veneer.

Brick tie secured to framing

Dry tie bedding

Brick Tie

As the name suggests, a brick tie is a connector that ties the brick veneer to the structural framing of a building. This feature both prevents the bricks from simply falling away from the framing and they also increase the strength of the brick veneer by transferring some of the force away from the brick and on to the structural element.

BRICK TIE DURABILITY
As brick ties are considered a structural element they are required under the New Zealand Building Code to have a 50 year durability.
If a building is within 500m of the high water mark or within 100m of a tidal estuary (also known as the 'sea spray zone') then stainless steel brick ties will be required. If you are unsure of this then we recommend talking with your local council before commencing design or construction work.

BRICK TIE LENGTH
The length of the brick tie is dependent on two factors– the width of the brick cavity and the width of the brick being laid.
Brick ties generally come in four sizes– 85mm, 105mm, 115mm and 135mm.
To determine the minimum tie length required you need to ensure that the tie can sit flush with the framing and reaches at least half way across the width of the brick.
For example: If your cavity was 50mm and your brick was 70mm wide then you would need to ensure that a 85mm brick tie was used (50mm+35mm).

BRICK TIE INSTALLATION
Brick ties must be screw tied using a 35mm X12g screw and must be installed with a 5 degrees slope down from the frame. The slope ensures that any water is moved away from the framing.

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BRICK TIE BEDDING

Brick ties are required to be bedded into the brick with mortar. You need to ensure that there is a minimum mortar cover of 15mm of the end of the tie.

There are two trade practices for the bedding of brick ties. Wet-bedding is the process where the brick tie is held with a layer of mortar both above and below the tie. With dry-bedding the brick tie is placed directly on top of the brick and mortar is only placed on the top of the tie.

Tie bedding is an area of the trade where regulation has not kept up with building science. The current acceptable solutions for tie bedding are:

On timber framing E2/AS1 requires wet-bedding

On concrete block work E2/AS3 allows for either bedding methods.

In general, bricklayers prefer to dry-bed brick ties. This is because it is a more efficient, productive and a proven method of installation. In 2006 BRANZ released a report that confirms that dry bedding is an acceptable procedure in brick veneer construction. You can read a copy of this report here: BRANZ DryBeddingMasonry Ties StudyReportno156:2006

The Brick and Blocklayers Federation recommends that designers ensure they specify dry-tie bedding until NZS4210:2001 is updated. This may mean that you will need to identify your building consent application as an alternative solution proposal–were commend including the above reference to the BRANZ study report.

BRICK TIE PLACEMENT

Brick veneer is not assumed to have any structural strength and relies on support from the ties securing it to the structural timber framing. The ties themselves are designed to support a certain tributary area of masonry and it is important that the area per tie is not exceeded.

The bottom brick tie, when the rebate is sealed with a liquid applied damp –proof course, must be within 300mm or two courses (whichever is smaller) of the base of the veneer.

Brick ties are to be fixed to studs only with a maximum of 600mm centres horizontally and a maximum of 400mm vertically. Ties should also be positioned within 300mm horizontally of openings (BBFNZ recommends 200mm vertical spacing to meet the 220kg/m2 mass requirement in any seismic zone)

Designers and bricklayers should familiarise themselves with Section 9.2.7 Wall Ties and Tables 18A and 18B of E2/AS1. You can read this documentation here: E2/AS1 (part4)

The Brick and Blocklayers Federation ask that when selecting brick ties that you support our manufacturing members:

INNOVATIVE BUILDING PRODUCTS LTD– www.brickties.co.nz

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BRICK BONDING

The way that bricks are arranged affects a veneers stability and strength and is referred to as a 'bond' or 'bonding'.

Brick Bonds

The way that bricks are arranged affects a veneers stability and strength and is referred to as a 'bond' or 'bonding'.

RUNNING OR STRETCHER BOND

Section 9.2.2 of E2/AS1 requires that bricks are laid with a "running" bond (also referred to as "stretcher" bond). You can read this document here: E2/AS1 (part4)

This means that the bricks of each course overlap the previous course by between 25% and 75% of the length of the bricks as per NZS4210: 2001 Section 1.3 Definitions

NZS3604:2011 Section 11.7.2.2 advises that no length of veneer wall or return can be less than 230mm.

While 70mm brick maybe laid to 1/3 bond (also known as metric bond) it is recommended that bricks always be laid to 1/2 bond (50%). This may mean cutting all 70mm corner bricks to 190mm in length.

Internal corners and junctions need to be stitch bonded.

STACKBONDING

Stackbonding provides the ability to create a brick cladding that presents both vertical and horizontal lines and patterns that add new dimensions to the aesthetic appeal of the veneer.

Stackbonding is not recognised under the acceptable solution for brick veneers (E2/AS1) and therefore requires specific engineering design.

To assist with the design of stack bonded systems, the New Zealand Concrete Masonry Association (NZCMA) has released design guidance that provides the following specification and limitations for stackbond use:

Studs are to be positioned at a maximum 400mm centres.

Screw fixed brick ties are to be installed at maximum 400mm centres horizontally and 400mm centres vertically (every 4th course commencing at two courses above the base or equivalent in the case of a double height brick)

In-joint reinforcement is to be installed every 4th course (or maximum of 400mm) alternating with the rows of brick ties.

The maximum permitted height is 4.0m unless Specific Engineering Design has been undertaken to cover the additional required height specified.

You can read this information here: NZCMA information on Stackbonding design

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LAYING BRICKS

A good bricklayer carefully plans their work prior to laying. This involves:

- Carefully reading **ALL** building consent documents and familiarising themselves with any standard cited in the documents before starting,
- Checking that the substrate has been properly prepared and sealed where required,
- Calculating how many bricks are going to be required (and ensuring that factors such as mortar thickness are taken into account),
- Checking the bricks supplied are correct as per the building consent and contract,
- Checking that there are no obvious issues/defects with the brick pallets provided,
- Checking that all pallets display the same batch number
- Identifying what cuts may be required.

Bricks should be laid to a straight line which generally involves running a string line at both ends of the wall. Bricks should be buttered to form perpends ("perps").

NZS4210:2001 sets out the following tolerances for brick veneers walls:

Item	Tolerance
Deviation from vertical within a storey	10 mm per 3m of height
Deviation from vertical in total height of bldg.	20 mm
Relative vertical displacement between masonry courses.	5mm on structural face
Deviation from line in plan:	
(a)In any length up to 10m	5mm
(b) In any length over 10m	10 mm total
Average thickness of bed joint, cross joint or perpend joint.	10mm+/-3mm on thickness specified

Tolerances cannot breach minimum cavity width requirements.

BRICK BLENDING

Bricks are natural products that are subject to colour variance between batches. 'Blending' is the process used to vary brick pallets as they are laid as a means of avoiding any unwanted patterns caused by a variance.

The Brick and Blocklayers Federation recommends that bricklayers select bricks and blend vertically from at least three pallets in order to achieve an adequate colour mix.

A bricklayer should also regularly check the veneer while laying from a viewing distance of 6.1m for obvious pockets of colour forming that may be unacceptable.

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WEEP HOLES AND VENTS

Air flow and drainage are essential design features that ensure dry homes.

Weep holes and Vents

Weep holes and vents are components of brick design intended to assist with drainage and airflow within the brick cavity.

WEEP HOLES

It is important to remember that while brick veneers are an excellent rain shield, they are not waterproof. A considerable amount of water would be required before moisture is likely to flow down the back of the veneer.

In the event that this saturation does occur, a series of gaps or 'weep holes' are required to be placed along the bottom course.

A weep hole of 75mm x 10mm is required to be placed every 800mm along the base or alternatively 1000mm2/linear meter of wall.

Any weep hole wider than 13mm requires vermin proofing.

Weep hole requirements also need to be met across the heads of doors, windows and openings.

VENTS (VENTILATION)

Ventilation is the process of replacing air in any space with the intention of improving air quality. For the brick cavity this means replacing moist air within the cavity with drier air from the outside.

E2/AS1 provides two acceptable methods for venting brick veneer:

- Vertical vents installed as per the earlier weep holes; or
- Leaving a 5mm gap around the top of the veneer.

You can view these E2/AS1 requirements in Section 9.2.6(d) and Figure 73E here: E2/AS1 (part4).

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The Brick and Blocklayers Federation recommends that if you are installing vertical vents that you install these in the second brick from the top.

This ensures that the bond of the bricks on the top row is not weakened.

Vent holes are generally not required under window sills as air can move freely around the frame.

The Brick and Blocklayers Federation recommends that where windows exceed 2.4m in length that 1 or 2 vent holes are evenly spaced under the sill.

PLASTERED OR PAINTED BRICK VENEER

Where a brick veneer is plastered or painted, the brick veneer exterior cladding is effectively a waterproof system. This means the need to have air circulation to dry the cavity and the weep holes to drain the veneer become less important.

The acceptable approach to weep holes in this scenario is 50mm x 10mm weep holes at 1m centres or 500mm2/linear meter of wall.

Vent holes are still required at the top of the plastered or painted veneer however designers should check with their local council as requirements vary.

The Brick and Blocklayers Federation ask that when selecting vents that you support our members:

Victor Vents: http://www.victorvents.co.nz/

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BRICK VENEER FLASHINGS

It is the bricklayer's responsibility to ensure that all flashings have been correctly installed prior to the bricks being laid.

Brick veneer flashings

A flashing is an impervious material designed to prevent water from entering the brick cavity from joints such as those found in windows and doors.

The brick veneer system has functioned in New Zealand very successfully for many years with minimal flashings being installed; however, in the modern environment, flashings are an essential part of any cladding systems.

Designers and bricklayers should familiarise themselves with Figure 73 Cof E2/AS1 which can be viewed here: E2/AS1 (part4)

It is the bricklayer's responsibility to ensure that all flashings have been correctly installed prior to the bricks being laid.

HEADFLASHINGS

If a metal head flashing is used and fixed to the framing, you should ensure it is kept 5mm short at each end and the ends of the flashing should be turned up. This will allow for any movement in the framing without interfering with the bricks.

A 5-10mm gap between the underside of the lintel bar and the flashing allows for both drainage and ventilation eliminating the need for weep holes in the bricks across the head of the opening.

JAMB FLASHINGS

Jamb flashings are simple and inexpensive. Use a 200mm wide polyethylene flashing, tucked into the joinery flange. The open end of the flashing is to be held off the building wrap using a kick-out batten or protruding clouts. The junction between the bricks and the joinery does not need to be sealed.

SILL FLASHINGS

Any moisture being driven up the sill brick needs to be stopped from reaching the timber framing and redirected into the bottom of the cavity. NZS 3604S11.7.7 requires that flashings be extended

200mm past the sides of any openings where practical to do so.

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DESIGNING AND CONSTRUCTING BRICK SILLS AND LINTEL BARS

Designing and Constructing Brick Sills and Lintel Bars

BRICK SILLS

Brick sills must overhang the brick work below by 30 - 50mm with a minimum slop of 15 degrees. Bricks must be evenly spread and of equal thickness across the width of the sill.

Another option is to have a header course spread evenly over the sill width. This applies to the heads of the windows as well.

LINTEL BARS

A lintel bar is a load-bearing building component that spans across openings such as windows and doors to provide structural support.

Designers and Bricklayers should familiarise themselves with Paragraph 9.2.9 and Table 18D and Table 18E of E2/AS1. You can read this here: E2/AS1 (part 4).

Lintel seating – lintels shall have a minimum seating into adjacent veneer of

(i) 100mm for spans up to, and including 2m

(ii) 200mm for spans over 2m

There are two methods of installing a lintel bar with brick veneer:

Acceptable solution for lintel bar – E2/AS1 provides a method where the angle spans the brick from one side to the other. The lintel should be kept either solely in the brick or the timber framing but not both. The angle sizes within Table 18E of E2/AS1 should be applied.

Alternative solution for lintel bar – The second method involves sitting the lintel back 20mm from the face of the veneer, and have correct seating. With this method, the angle is attached directly to the structure and kept 5mm short of the opening at each end to accommodate any movement in the frame. The below table applies to this method.

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Max.Span(mm)	Size of Angle
3000mm	80X80X6
3500mm	100 x 100 x 6 or 125 x 75 x 6
4500mm	125 x 75 x 8
4800mm	125 x 75 x 10

The durability requirements for lintel bars can be seen in Table 18D of E2/AS1 (part 4).

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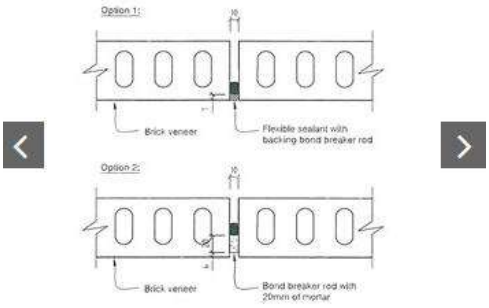
CONTROL JOINTS

Control joints allow concrete brick veneer to respond to minor movement of the building.



Alternative Control Joint options.

Control Joints

Buildings and building components generally move slightly after construction. Often this relates to normal expansion due to acceptable moisture absorption. Control joints are vertical gaps, usually filled with in elastic materials, which allow brick veneer to respond to these movements usually by opening in response to expansion.

Generally clay brick veneer does not require control joints. Slight expansion can occur soon after manufacture but this does not appear to present any issues in normal construction.

Concrete brick veneer however typically requires control joints. Designers and bricklayers should check manufacturers' specifications and familiarise themselves with Section 9.2.8.2 of E2/AS1 which you can read here: E2/AS1 (part4).

DESIGNING OF CONTROL JOINTS

Control joints should also be designed and constructed as shown in Figure 73A of E2/AS1.

This requires that control joints consist of:

- A backer rod of compressible foam; and
- Sealant that complies with either Type F, Class 20 LM or 25 LM of ISO11600 or Low modulus Type II Class A of Federal Specification TI-S-00230C

PLACEMENT OF CONTROL JOINTS

To allow for the potential shrinkage in the length of concrete brick veneer E2/AS1 requires that vertical control joints are placed at not more than 6m centres.

Vertical control joints are also required to be located:

- Within 600mm of Tjoints;
- Within 600mm of L shaped corners or by restricting the space to the next control joint to 3.2m maximum
- At changes in wall height that exceed 600mm;
- At changes in wall thickness.

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It is not uncommon to read reports from Geo-Tech Engineering control joints in clay brick veneers due to expansive clay soils but this is not necessary. Where such soil types occur an appropriate foundation should be designed to manage this and there is no evidence that control joints would be necessary.

Control joints should be considered however in clay and concrete brick veneer in the following circumstances:

- If a wall is 10m or longer and has no window or door openings– a control joint should be installed at an intermediate point.
- Where a small panel of brick work adjoins a large panel of brickwork, as movement within the framing may cause a crack, a control joint may be considered. An alternative however would be to strengthen the framing using additional brick ties and using reinforcing in mortar joints in these areas.

Where a control joint is used it is important to ensure that the framing details provide a stud within 200mm of each side of the joint for the fitting of brick ties.

If possible, position a control joint behind down pipes to hide them.

It is important to remember that if a crack develops in an otherwise well-constructed brick veneer it is an aesthetic issue only and should cause no problems as to weather tightness or the overall integrity of the veneer. A control joint is in effect a controlled crack.

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BRICK VENEER HEIGHTS

Brick Veneer Heights

E2/AS1 sets the limitations for Brick Veneer heights in Section 9.2.3 and Figure 73B . You can read this document here: E2/AS1 (part 4)

It advises that brick veneers with timber framing shall have:

- A maximum height of veneer above finished ground level of 7m;
- A maximum height of 4m from the foundation;
- A maximum height of 5.5m to the apex of a gabled area.

If the veneer is supported by a masonry structure, NZZS4229:2001 permits a veneer height of 6.0 for the wall and up to 10m in a gable area.

The Clay Brick and Paver Manufacturers Association have developed a combined 2 storey system for clay brick veneer- Design Note TB 1. Designers and Bricklayers should familiarise themselves with this document which you can read here: 2StoreyClayBrickVeneerConstruction- MadeEasy

You may also want to consider the following concrete brick 2Storeysolutions:

Firth 2StoreyBrickVeneersolutionforDevonstoneand70mmBrickVeneers

Firth 2StoreyBrickVeneersolutionforFirth 10seriesHollowMasonry, Manorstoneand 90mmBrick Veneers

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BRICK STAINING

Staining generally has only an aesthetic effect on brick veneer.

Stain removal

Vanadium Staining

Manganese stains

While it is perfectly normal for clay bricks to have a slight variance in colour, this is different than brick stains. All care should be taken during construction to prevent staining occurring, however this is not always possible.

Stain removal depends on the cause of the stain.

The Brick and Blocklayers Federation recommends that you consult your bricklayer or brick supplier before attempting stain identification and removal.

VANADIUM STAINS

Light-coloured clays often contain vanadium salt that are generally colourless but under certain conditions may appear as yellow, green or reddish-brown discolouration of the brick. Vanadium stains are neither permanent nor harmful and do not indicate a defect in the brick.

Vanadium stains are often generated by the use of too strong a concentration of hydrochloric acid during the initial cleaning process, or from excessive water penetration.

While vanadium stains will wash off overtime, an application of 4% Sodium Hypochlorite (Janola) or a mixture of Sodium Bicarbonate and water (60g per litre of water) will assist in their removal.

Hydrochloric acid may turn vanadium salts black and make it difficult to remove. It is therefore important that vanadium salts are removed before attempting to clear mortar residue from clay brick veneer with hydrochloric acid.

MANGANESE STAINS

This stain occurs characteristically along the edges of grey or brown clay bricks. It appears as a dark-blue brown discolouration.

If you suspect manganese staining, contact your brick company for them to inspect and advise on a resolution.

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COPPER AND BRONZE STAINS

Sometimes clay brick veneer may be in close proximity to metals such as copper or bronze. Water washing over these metal surfaces can result in a bluish-green stain appearing on the surface of the bricks.

These stains may be removed using a solution of 1 part acetic acid (80% or stronger): 1 part hydrogen peroxide (30%-35%strength):6 parts water.

IRON OXIDE (RUST)

Rust can be the result of using hydrochloric acid on clay bricks. This may be able to be removed by applying a solution of 1 part phosphoric acid to 4 parts of water. Allow up to 24 hours for it to work.

SMOKE STAINS

Common around domestic fireplaces but can also be an issue with fire damaged buildings.

Minor smoke stains can be removed with sugar soap–which is a highly alkaline mixture. Mix approximately 500g in to 2 litres of water and apply liberally by brush. After the smoke stains disappear, scrub with a mixture of detergent and household scouring powder containing Sodium Hypochlorite (Janola).

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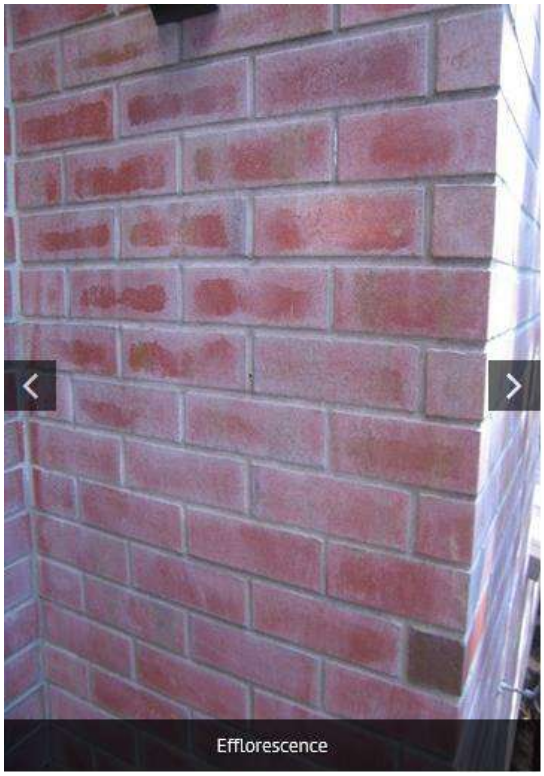
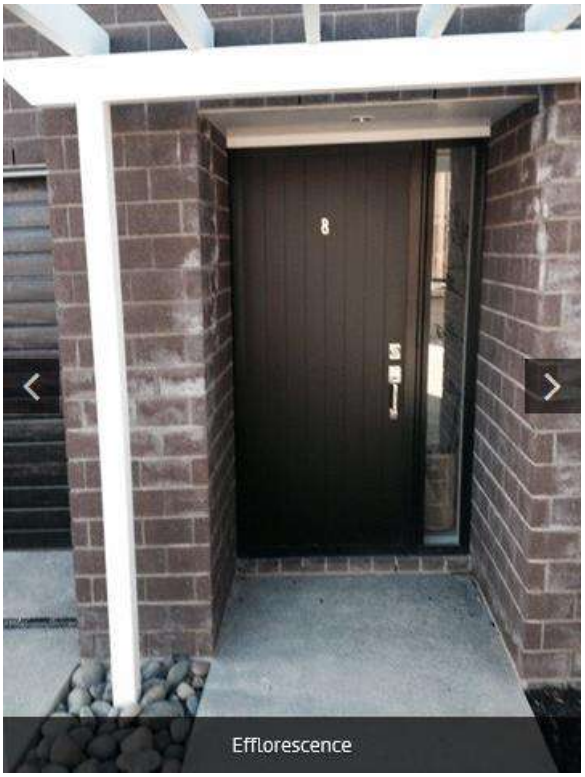
EFFLORESCENCE

Efflorescence





Efflorescence is a calcium deposit that can form on clay or concrete veneer. It appears as a white powdery and sometimes 'fluffy' deposit on the brick.

Efflorescence occurs where excessive amounts of water enters a veneer that has soluble salts present. When the water dries out, the salts are then deposited on the surface of the veneer. Soluble salts can enter the veneer from various sources:

- Mortar components, particularly cement.
- Soil or fill in contact with the wall.
- Sea spray in coastal areas.
- Masonry units (not a common source).

The Brick and Blocklayers Federation recommends that bricklayers protect new brick work with adequate coverings when rain interrupts construction.

Persistent efflorescence may act as a warning sign that water is entering the wall through faulty copings, flashings or pipes.

CLEANING EFFLORESCENCE

Most efflorescence will naturally disappear over time, however its removal can be accelerated by brushing with a stiff dry brush. The use of a dust pan or vacuum cleaner to collect the salts after

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brushing is recommended as this will prevent salts from re-entering the brickwork or any porous paving materials below.

After brushing and cleaning up, an absorbent cloth (wrung out until damp only) can be used to pick up any residue. Frequent rinsing of the cloth in fresh water is advisable. Rinsing brick work with water will only cause the salt to be re-absorbed in to the bricks and reappear when dry.

BRICK TOLERANCES AND AESTHETIC APPEARANCE

Brick Tolerances and Aesthetic Appearance

It is possible for a brick veneer to be building code compliant but not have the visual look that reflects the skills of an experienced bricklayer. This is referred to as 'workmanship quality'.

It is important to discuss with your bricklayer the aesthetic look you are hoping to achieve with your brick veneer and if possible, include them in your selection process.

The Brick and Blocklayers Federation recommends that parties to a brick veneer construction enter into a clear, written contract that sets out the expectations of parties including agreed workmanship quality standards, quality checking responsibilities and an agreement on how disputes will be managed– even if it is not a compulsory requirement under legislation.

VIEWING DISTANCE

Due to the nature of bricks no two bricks are the same and no brick is perfect when examined close-up. ASTMC90 has been adopted as the industry standard for viewing brickwork – it states that 'for exposed wall construction chips and imperfections shall not be evident when viewed from a distance of not less than 6.1m in diffused light'.

DRYING CRACKS

During the manufacturing process hairline cracks can appear in a small number of clay bricks. This occurs during the drying process when excess moisture is removed from the clay prior to it entering the kiln. Bricks with these cracks conform to AS/NZS4455 and do not compromise the structural integrity or weather tightness of the brick.

From an aesthetic standpoint, the relevant American Standard Test Method (ASTM) has been adopted. ASTM C216-04 specifies that bricks must contain less than 5% visible cracking when viewed from a distance of 6.1 meters.

CHIPPING

Bricks may be transported several times before arriving onsite and occasionally chipping can occur. Chips are more noticeable on bricks that have a surface colour different from the body of the brick. A workmanship quality standard is achieved if imperfections, including chips, are not visible when viewed from a distance of not less than 6.1m under diffused light as per ASTM C90.

New Zealand does not have a standard to assist a Bricklayer to evaluate the level of chipping acceptable in a brick prior to laying however ASTM C216-15 has been adopted by BBFNZ.

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- ASTM C216-15 for a general purpose face brick (FBS textured) basically has the following requirements:
- Chips from the edge should not be deeper than 8mm
- Corner chips should not be deeper than 13mm.
- When all the length of the chips are added up that the total is not exceed 10% of the perimeter of the brick face (as an example, the accumulative lengths of the chips for a 230mm X 75mm brick shall not exceed 61mm).

It is good practice for Bricklayers to set aside bricks that do not meet this standard and to assess whether to discard it or use it for cuts.

DIMENSIONAL CATEGORY

AS/NZS4455 Masonry units and segmental pavers' calls for bricks to be classified into dimensional categories based on their deviation from their work size, or the size specified in manufacture.

To test if bricks meet the standard, 20 bricks should be placed in a row and the total length should be measured. This can be done with height, width and length. Tolerances for these are:

Category	Height	Length	Width
DW1	±90mm	±50mm	±50mm
DW2	±60mm	±40mm	±40mm

RUBBING

During transportation brick may rub together on the pallet. This can sometimes cause light rubbing on the face of the bricks. Excessively rubbed bricks should be discarded or used for cuts.

COLOUR VARIATION

Clay and concrete bricks are both subject to some variation in colour between batches. This is part of the inherent beauty of brick.

Unusual discolouration patterns can be limited by blending the bricks. Should there be any concern regarding significant colour variation laying should cease and the manufacturer contacted.

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BRANZ Appraised
Appraisal No. 548 [2019]

TEKTON® BUILDING WRAP

Appraisal No. 548 (2019)

This Appraisal replaces BRANZ Appraisal No. 548 (2013)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Tekton® Building Wrap is a synthetic breather-type flexible wall underlay and air barrier for use under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured of a coated spun-bonded polypropylene.

Scope

2.1 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on timber framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent wall claddings directly fixed to framing; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
- situated in NZS 3604 Wind Zones up to, and including Very High.

2.2 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on steel framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer subject to specific design; and,
- situated in NZS 3604 Wind Zones up to, and including Very High.

2.3 Tekton® Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
- situated in NZS 3604 Wind Zones up to and including Extra High.

2.4 Tekton® Building Wrap has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Tekton® Building Wrap into their design in accordance with the declared properties and the instructions of Marshall Innovations Limited.

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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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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Tekton® Building Wrap, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Tekton® Building Wrap meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Tekton® Building Wrap will contribute to meeting this requirement. See Paragraphs 12.1 – 12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Tekton® Building Wrap meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 Tekton® Building Wrap is a 100 g/m^2 light grey sheet polypropylene membrane material approximately 0.6 mm thick.

4.2 The product is supplied in rolls 1.370 m x 37 m and 2.743 m x 37 m. The product is printed with the Tekton® logo repeated along the length of the roll. The rolls are wrapped with an instruction sticker.

Accessories

4.3 Accessories used with Tekton® Building Wrap which are supplied by the installer are:

- Fixings – staples, clouts, screws or proprietary wrap fixings, or other temporary fixings to attach the wall wrap to the framing.
- Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall wrap in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

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

Design Information

Timber and Steel Framing

7.1 Studs must be provided at maximum 600 mm centres. Dwangs must be fitted flush between the studs at maximum 1200 mm centres.

General

7.2 Tekton® Building Wrap is intended for use as an alternative to conventional building papers which are fixed over timber and steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.

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7.4 Tekton® Building Wrap must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.

7.5 Tekton® Building Wrap is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23, except that it must not be used with non-absorbent wall claddings such as vinyl or metal based sidings or weatherboards in direct fixed installations. Tekton® is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings. Refer to Table 1.

7.6 Tekton® Building Wrap is also suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, as called up in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 (c). Refer to Table 1.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC E2/AS1 Table 23 Wall Wrap Properties	**Property Performance Requirement**	**Actual Property Performance**
Absorbency	≥ 100 g/m^2	Classified as non-absorbent (see paragraph 7.5)
Vapour Resistance	≤ 7 MN s/g	Pass
Water Resistance	≥ 20 mm	Pass
pH of Extract	≥ 5.5 and ≤ 8	9.78 *(Note 1)*
Shrinkage	≤ 0.5%	Pass
Mechanical	Edge tear and tensile strength	**Edge tear:** Machine direction = 228 N Cross direction = 186 N **Tensile strength:** Machine direction = 4.4 kN/m Cross direction = 3.9 kN/m
Air Barrier	Air resistance: ≥ 0.1 MN s/m^3	Pass

Note 1: Further testing of Tekton® Building Wrap was completed to determine the effect of the high pH level on the wall underlay and materials it is likely to come into contact with during its serviceable life. The testing confirmed that the high pH had no adverse effects on the wall underlay performance, or the performance of other materials.

7.7 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Stucco Plaster

7.8 Tekton® Building Wrap is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The wall underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.

7.9 Tekton® Building Wrap may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 (b).

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Structure

8.1 Tekton® Building Wrap is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a flexible building underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid building underlays.

Durability

9.1 Tekton® Building Wrap meets code compliance with NZBC Clause B2.3.1 (a), not less than 50 years for building wraps used where the cladding durability requirement or expected serviceable life is not less than 50 years, and code compliance with NZBC Clause B2.3.1 (b), 15 years for building wraps used where the cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Tekton® Building Wrap is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

10.1 Tekton® Building Wrap has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Tekton® Building Wrap from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Tekton® Building Wrap must be used behind claddings that meet the requirements of the NZBC, e.g. such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.

12.2 Tekton® Building Wrap, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding systems compliance with NZBC Clause E2.

12.3 When used as an air barrier, particular care must be taken to ensure an air tight barrier is achieved, and weather sealing at all openings and penetrations through the cladding meets the requirements of the NZBC.

Installation Information

Installation Skill Level Requirements

13.1 Installation must always be carried out in accordance with the Tekton® Building Wrap Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

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Wrap Installation

14.1 Tekton® Building Wrap must be fixed to all framing members at maximum 300 mm centres with hot-dip galvanised, large-head clouts 20 mm long, zinc plated 6-8 mm staples, self-drilling screws, or proprietary wrap fixings. The membrane must be pulled taut over the framing before fixing.

14.2 Tekton® Building Wrap must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.

14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess wall underlay may be cut off flush with the internal face of the wall frame.

14.4 Tekton® Building Wrap can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.

14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.

14.6 Any damaged areas of Tekton® Building Wrap, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.7 The Technical Literature must be referred to during the inspection of Tekton® Building Wrap installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Tekton® Building Wrap by Scion: Folding strength of paper in accordance with AS/NZS 1301.423; edge tear resistance and tensile strength in accordance with AS/NZS 4200.1 and air resistance in accordance with BS 6538-3.

15.2 The following tests have been carried out on Tekton® Building Wrap by BRANZ: Absorbency in accordance with AS/NZS 4201.6, Vapour transmission in accordance with ASTM E 96B, Shrinkage in accordance with AS/NZS 4201.3, Water barrier in accordance with AS/NZS 4201.4 and pH of extract in accordance with AS/NZS 1301.421. A range of these tests were completed before and after Tekton® Building Wrap was exposed to ultra-violet light.

15.3 The Flammability Index of Tekton® Building Wrap has been evaluated in accordance with AS 1530.2.

Other Investigations

16.1 A durability opinion was given by BRANZ technical experts.

16.2 Site inspections were carried out by BRANZ to assess methods used for the installation of Tekton® Building Wrap, and to examine completed installations.

16.3 The marketer's Technical Literature, including installation instructions, have been examined by BRANZ and found to be satisfactory.

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Quality

17.1 The manufacture of Tekton® Building Wrap has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification by ICC-ES and CCMC covering quality aspects associated with the product.

17.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall wrap into their design in accordance with the instructions of Marshall Innovations Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, Permeable Building Underlays.
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 (Amendment 8, 30 November 2018).
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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BRANZ

In the opinion of BRANZ, Tekton® Building Wrap is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Marshall Innovations Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
14 June 2019

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BRANZ Appraised
Appraisal No. 548 [2019]

TEKTON® BUILDING WRAP

Appraisal No. 548 (2019)

This Appraisal replaces BRANZ Appraisal No. 548 (2013)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Tekton® Building Wrap is a synthetic breather-type flexible wall underlay and air barrier for use under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured of a coated spun-bonded polypropylene.

Scope

2.1 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on timber framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent wall claddings directly fixed to framing; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
- situated in NZS 3604 Wind Zones up to, and including Very High.

2.2 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on steel framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer subject to specific design; and,
- situated in NZS 3604 Wind Zones up to, and including Very High.

2.3 Tekton® Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
- situated in NZS 3604 Wind Zones up to and including Extra High.

2.4 Tekton® Building Wrap has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Tekton® Building Wrap into their design in accordance with the declared properties and the instructions of Marshall Innovations Limited.

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Tekton® Building Wrap, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Tekton® Building Wrap meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Tekton® Building Wrap will contribute to meeting this requirement. See Paragraphs 12.1 – 12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Tekton® Building Wrap meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 Tekton® Building Wrap is a 100 g/m^2 light grey sheet polypropylene membrane material approximately 0.6 mm thick.

4.2 The product is supplied in rolls 1.370 m x 37 m and 2.743 m x 37 m. The product is printed with the Tekton® logo repeated along the length of the roll. The rolls are wrapped with an instruction sticker.

Accessories

4.3 Accessories used with Tekton® Building Wrap which are supplied by the installer are:

- Fixings – staples, clouts, screws or proprietary wrap fixings, or other temporary fixings to attach the wall wrap to the framing.
- Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall wrap in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

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

Design Information

Timber and Steel Framing

7.1 Studs must be provided at maximum 600 mm centres. Dwangs must be fitted flush between the studs at maximum 1200 mm centres.

General

7.2 Tekton® Building Wrap is intended for use as an alternative to conventional building papers which are fixed over timber and steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.

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7.4 Tekton® Building Wrap must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.

7.5 Tekton® Building Wrap is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23, except that it must not be used with non-absorbent wall claddings such as vinyl or metal based sidings or weatherboards in direct fixed installations. Tekton® is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings. Refer to Table 1.

7.6 Tekton® Building Wrap is also suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, as called up in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 (c). Refer to Table 1.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC E2/AS1 Table 23 Wall Wrap Properties	**Property Performance Requirement**	**Actual Property Performance**
Absorbency	≥ 100 g/m^2	Classified as non-absorbent (see paragraph 7.5)
Vapour Resistance	≤ 7 MN s/g	Pass
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Air Barrier	Air resistance: ≥ 0.1 MN s/m^3	Pass

Note 1: Further testing of Tekton® Building Wrap was completed to determine the effect of the high pH level on the wall underlay and materials it is likely to come into contact with during its serviceable life. The testing confirmed that the high pH had no adverse effects on the wall underlay performance, or the performance of other materials.

7.7 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Stucco Plaster

7.8 Tekton® Building Wrap is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The wall underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.

7.9 Tekton® Building Wrap may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 (b).

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Structure

8.1 Tekton® Building Wrap is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a flexible building underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid building underlays.

Durability

9.1 Tekton® Building Wrap meets code compliance with NZBC Clause B2.3.1 (a), not less than 50 years for building wraps used where the cladding durability requirement or expected serviceable life is not less than 50 years, and code compliance with NZBC Clause B2.3.1 (b), 15 years for building wraps used where the cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Tekton® Building Wrap is expected to have a serviceable life equal to that of the cladding.

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10.1 Tekton® Building Wrap has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Tekton® Building Wrap from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Tekton® Building Wrap must be used behind claddings that meet the requirements of the NZBC, e.g. such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.

12.2 Tekton® Building Wrap, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding systems compliance with NZBC Clause E2.

12.3 When used as an air barrier, particular care must be taken to ensure an air tight barrier is achieved, and weather sealing at all openings and penetrations through the cladding meets the requirements of the NZBC.

Installation Information

Installation Skill Level Requirements

13.1 Installation must always be carried out in accordance with the Tekton® Building Wrap Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

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Wrap Installation

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14.2 Tekton® Building Wrap must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.

14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess wall underlay may be cut off flush with the internal face of the wall frame.

14.4 Tekton® Building Wrap can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.

14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.

14.6 Any damaged areas of Tekton® Building Wrap, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.7 The Technical Literature must be referred to during the inspection of Tekton® Building Wrap installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Tekton® Building Wrap by Scion: Folding strength of paper in accordance with AS/NZS 1301.423; edge tear resistance and tensile strength in accordance with AS/NZS 4200.1 and air resistance in accordance with BS 6538-3.

15.2 The following tests have been carried out on Tekton® Building Wrap by BRANZ: Absorbency in accordance with AS/NZS 4201.6, Vapour transmission in accordance with ASTM E 96B, Shrinkage in accordance with AS/NZS 4201.3, Water barrier in accordance with AS/NZS 4201.4 and pH of extract in accordance with AS/NZS 1301.421. A range of these tests were completed before and after Tekton® Building Wrap was exposed to ultra-violet light.

15.3 The Flammability Index of Tekton® Building Wrap has been evaluated in accordance with AS 1530.2.

Other Investigations

16.1 A durability opinion was given by BRANZ technical experts.

16.2 Site inspections were carried out by BRANZ to assess methods used for the installation of Tekton® Building Wrap, and to examine completed installations.

16.3 The marketer's Technical Literature, including installation instructions, have been examined by BRANZ and found to be satisfactory.

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BRANZ Appraised
Appraisal No. 548 [2019]

Quality

17.1 The manufacture of Tekton® Building Wrap has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification by ICC-ES and CCMC covering quality aspects associated with the product.

17.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall wrap into their design in accordance with the instructions of Marshall Innovations Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, Permeable Building Underlays.
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 (Amendment 8, 30 November 2018).
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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BRANZ

In the opinion of BRANZ, Tekton® Building Wrap is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Marshall Innovations Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
14 June 2019

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Thermakraft™

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Product Data Sheet

THERMATHENE BLACK

Damp Proof Membrane (DPM)

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

Thermathene Black comes in two roll sizes:

Product Code	Width	Length	Coverage
PF250025	4000mm	25m	100m^2 coverage
PF250050	4000mm	50m	200m^2 coverage

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Thermakraft

Thermathene Black

Damp Proof Membrane (DPM)

Scope of Use

Thermathene Black intended for use as a damp-proof membrane separating concrete slab from ground soil. The product acts as a vapour barrier to stop ground moisture penetrating the concrete. Thermathene Black must be sealed with Thermakraft White General Purpose tape at the laps joints to form a complete vapour barrier.

General

- Unaffected by LOSP treated timber. However, LOSP treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.
- 4m x 25m [100m2] and 4m x 50m [200m^2] unfolded size.
- 250 Micron in thickness.

Limitations

- Maximum weather or UV exposure is 28 days.
- Cannot be used as a roof or wall underlay.

Compliance

Thermathene Black is an acceptable solution as per the requirements of the NZBC. Thermathene Black meets the requirements of NZBC 3604:2011 Clause 7.5.4.2, NZBC Acceptable Solutions E2/AS1, Table 23 and NZS 4229:2013 Clause 7.4 & 7.6.

When Thermathene Black is used and installed as a damp-proof membrane as per Thermakraft's literature, the product will meet or contribute to meeting the following provisions of the NZBC: Clause B2 Durability: Performance B2.3.1 (a), 50 years, Clause E2 External Moisture: Performance E2.3.3 & Clause F2 Hazardous Materials: Performance F2.3.1.

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.**

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Thermakraft Limited / 0800 806 595

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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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Thermakraft™

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Installation Guide

THERMATHENE BLACK

Damp Proof Membrane (DPM)

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

Product usage

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

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Thermakraft

Installation Guide

Application Method

- Thermathene Black should be installed in accordance with the requirements of NZS3604:2011 and must be laid on a properly prepared base as required by NZS3604:2011 Section 7.5.3 to 7.5.6.2.
- Thermathene Black must be laid in a continuous manner with all laps minimum 150mm, and penetrations to be taped with Thermakraft White General Purpose Tape.
- Thermathene Black should be laid in a neat fashion with a smooth surface, with as many of the ripples as possible eliminated.
- Thermathene Black must be inspected for any damage (tears or pentrations) prior to concrete placement. Any damage must be repaired with Thermakraft White General Purpose Tape, for any larger damage a patch of Thermathene Black maintaining a 150mm lap.
- Thermathene Black must not be left exposed for more than 28 days.
- Thermathene must be installed by a licensed building practitioner.
- Thermathene Black may also be used to cover ground areas under suspended timber floors to prevent the rise of dampness. Ensure that the site is clear of rubbish, sharp edges such as rocks or bricks. Slit and patch around jack studs or pipe work. All penetrations and joints must be taped.

Handling and Storage

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

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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

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Product Technical Statement

Issued: January 2021 vers: 210106-2

bayonet® WORK SHARPER

Bituminous Roofing Underlay and Valley Guard

BITUMINOUS

Pauloid Roofing Underlay and Valley Guard are bitumen impregnated kraft based, self supporting paper products. The width of the rolls varies, dependent on the application.

FEATURES

- ✓ Consists of a breather type underlay made from bitumen impregnated paper.
- ✓ For use under all roof claddings without restrictions
- ✓ Suitable for timber and steel framed structures
- ✓ Fully self supporting - can be attached directly to framing and used with netting.
- ✓ Spans up to 1200mm centres between purlins without support on roof pitches 10 degrees and above
- ✓ Suitable for use in all Building WindZones of NZS 3604 up to, and including 'Extra High'.
- ✓ Printed laying lines for ease of install.
- ✓ Complies with NZS 2295:2006
- ✓ Meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23
- ✓ Complies with the requirements of AS/NZS 4200.1:1994 Pliable Building Membranes and Underlays
- ✓ Kiwi made

APPLICATIONS

- ✓ Roofing

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MANUFACTURED IN NZ by bayonet

KIWI MADE

0800 330 320
worksharper@bayonet.co.nz
www.bayonet.co.nz

bayonet ISO 9001 CERTIFIED COMPANY

Complies with:
NZS 2295:2006
AS/NZS 4200.1.2017
NZBC E2/AS1/AS2/AS3/AS4

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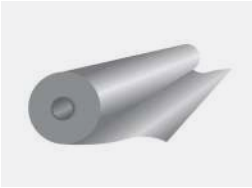
BITUMINOUS

Sizes



Pauloid Roofing Underlay and Valley Guard
Type: R2 - Kraft - Self - Supporting - NZS 2295:2006
Type: Heavy Duty, Class 3 - Vapour Permeable, Water barrier, Nonconductive - NZS 4000.1:2017
300-1250mm Wide
Extra High - Building Wind Zones - NZS 3604

Pauloid Roofing Underlay and Valley Guard - compliance with **NZS:2295:2006, AS/NZS NZS 4000.1:2017, 4002.1:2017, NZBC E2/AS1/AS2/AS3/AS4**

Product Code	Suggested Application	Description	Width x Length (mm x m)	Total Area (m^2)	Roll mass (kg)	Roll mass/square meter (g/m^2)	Rolls per Pallet (Qty)	Pallet nominal mass (kg)
SS125050	Construction, Roofing	Bituminous Roofing Underlay	1250 x 40	50	21.16	423	33	700
VG30012	Construction, Roofing	Bituminous Valley Guard	300 x 40	12	5.66	472	33	188

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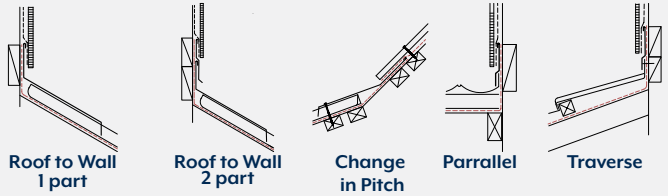
SYNTHETIC

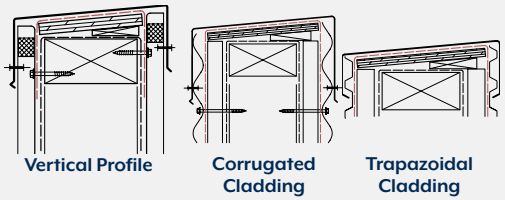
Use Cases as per NZBC E2/AS1

Aprons:

Installation Procedure on Page 4

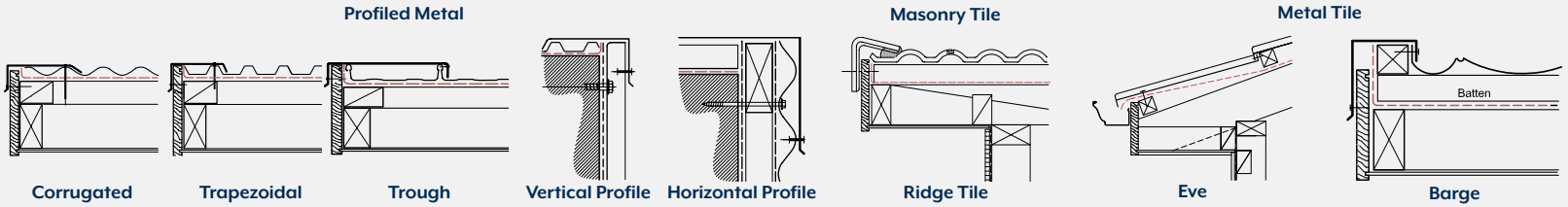


Parapet and enclosed balustrades:



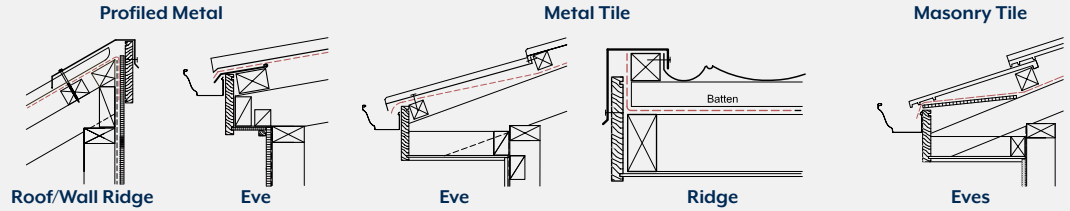
Barges:

Installation Procedure on Page 4

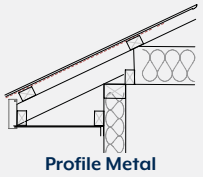


Eaves:

Installation Procedure on Page 4

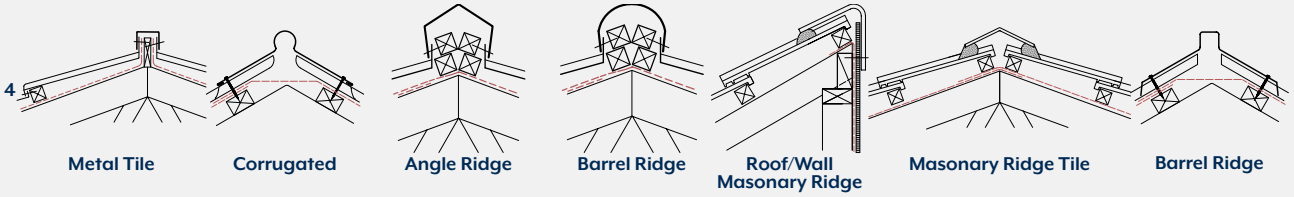


Cold Roof:

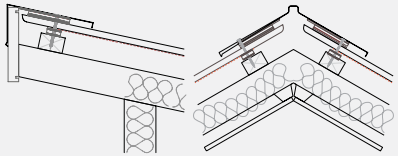


Ridges:

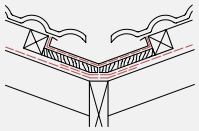
Installation Procedure on Page 4



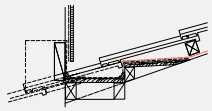
Vented & Cavity Battens



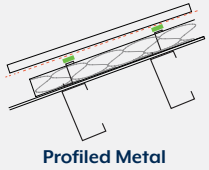
Masonary Tile Valley:



Abutments:



Thermal Breaks:



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SYNTHETIC

Installation Procedure

Before You start:

Installation of Bayonet Bituminous roofing underlay and Valley Gaurd can be used in warm, cold, and cold non-ventilated normal to pitched roofing systems. In roof construction it is important to recognise that underlays are one of the defence mechanisms in managing internal moisture and should not be used as a compensation for unreliable weatherproofing design or installation. For this reason the requirements of NZBC E2/AS1, New Zealand Metal Roofing Manufacturers Inc. code of practice,NZS 2295:2006,AS4200:Part 2, NASH Building Envelope Solutions: 2019 for Light Steel Framed Buildings and the following list of criteria must be met to comply with the requirements of this technical document:

Safety

Prior to accessing the roof, the Best Practice Guidelines for Working on Roofs provided by Ministry of Business, Innovation and Employment (MBIE) must be applied to meet the obligations stated under the Health and Safety in Employment Act 1992 (HSE Act) and the HSE Regulations 1995.

Care should be taken in handling materials at height. In particular ensure that manual handling reauirements are not exceeded. That there is sufficient edge protection, netting, appropriate scaffolding and lifting equipment necessary to ensure the safe application of the roofing underlays. Before work commences a method statement and risk assessment should be prepared and risk mitigation actions implemented.

Timing of installation:

The Bayonet Bituminous roofing underlay and Valley Gaurd can not be left uncladded for which ever is the greater of 7 days or 50 hours of sunshine exposure. Any further sunshine radiation exposure to the product will negatively affect its tensile strength properties.

The commencement of the installation of the roofing underlay can only start once the timber frame moisture content is less than 20% and the relative humidity of the interior of the building is below 75%. A relative humidity of below 75% for the interior of the building will be required before the installation of roof underlay can commence for steel frame and concrete buildings. Residual construction moisture will collect on the underlays soon after installation, if installed at greater than 75% relative humidity levels.

Where timbers on roofs have been treated with wood preservative due to high moisture content of timbers, it is essential that manufacturer's guidance be sought in relation to chemical attack from preservative on roofing underlay especially treated with solvent based preservatives

The underlay can be used to provide temporary weather protection, as the main function of a roof tile underlay is to provide a secondary barrier to the roof covering, preventing the ingress of wind-driven rain, snow, dust into the roof space and reduce the wind uplift forces acting on the roof covering. However the underlay is not a total waterproof barrier and if it is to be used as a temporary waterproof covering some rain penetration may occur.

In certain conditions, particularly if there is persistent heavy rainfall combined with subsequent severe freeze/thaw conditions, an underlay should not be exposed for more than a one week. To avoid unnecessary damage to the underlay, care must be taken where high winds persist.

Moisture-sensitive internal materials and/or finishes should not be installed until the external roof covering has been completed.

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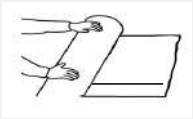
SYNTHETIC

Installation Procedure

Installation process

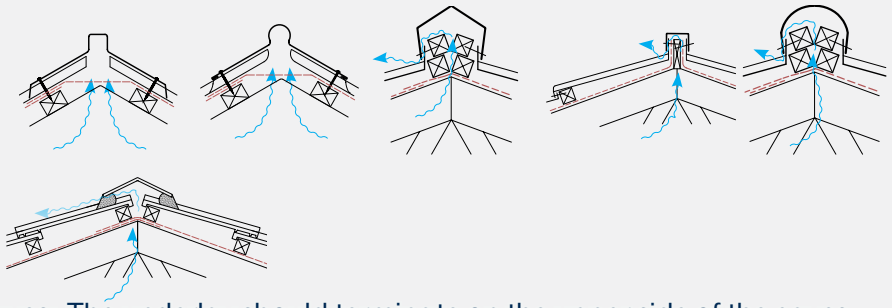
1. **Safety:-** Applied your risk assessment and mitigation actions as per the Best Practice Guidelines for Working on Roofs by (MBIE).
2. **Pre-Installation conditions:-** The roofing system meets the conditions as set out in the "Timing of installation" section on the previous page.
3. **Product Handling:-** Reasonable precautions must be taken in handling the rolls to prevent damage, such as tears or perforations, occurring before and during installation, and prior to the application of the roof covering. The rolls must not be exposed to a naked flame or other ignition source. Damage to the roof underlay greater than 75mm in form of rips or tears requires the underlay to be replaced. Rips up to 75mm can be repaired using Ultra-Bond Sill Tape.
4. **Unrolling:-** Unroll the underlay exactly as per the sketch, such that the inner surface of the roll [side with guideline] is facing up.



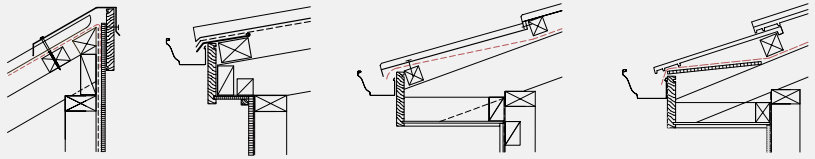
Roof types:- Laying of underlay can either be horizontal or vertical but the NZBCE2/AS1 prescribes the following according to roof pitch.

Roof pitches below 10°	Roof pitches of 10° or above
Run horizontally or vertically	
when fully supported by a corrosion resistant roof support.	Self supporting
Good ventilation design and effective weathertight details need to be applied in conjunction with underlay details for effective moistures control especially with low pitch roofs.	

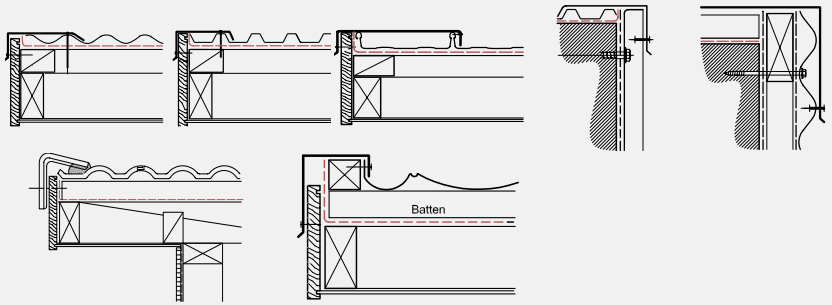
5. **Lapping:** All sides of the underlay must over lap by 150mm. Overlapping of underlay must be kept to a minimum and there are specific requirements for the ends of the underlay that terminate at the ridge, eaves, abutments and roof protrusions (see items 7-23).
6. **Supports:** Bayonet Bituminous Rooffing Underlay is strong enough to support its own weight up to a 1200 mm span.
7. **Ridges:-** all underlay is terminated at the ridge, and if not it should be slit or slotted to allow passive ventilation of the ceiling cavity.



8. **Eaves:-**The underlay should terminate on the upper side of the eaves flashing or overhang fascia by no more than 20 mm to prevent wicking.



9. **Barge:-**The underlay should terminate to the highest point, either the top of the barge board or meet the metal barge flashing except for horizontal profiled metal where the underly is used to separate the metal from timber.



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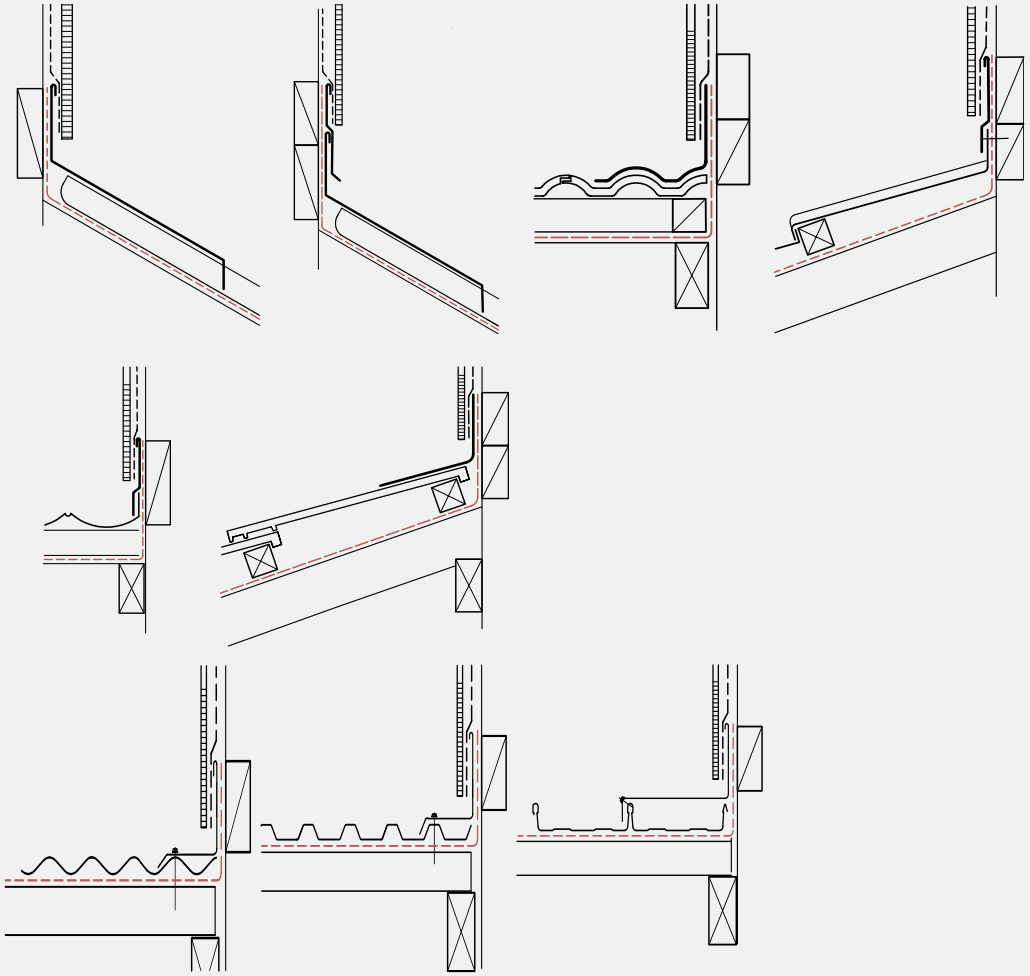
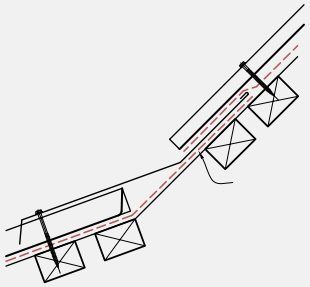
SYNTHETIC

Installation Procedure

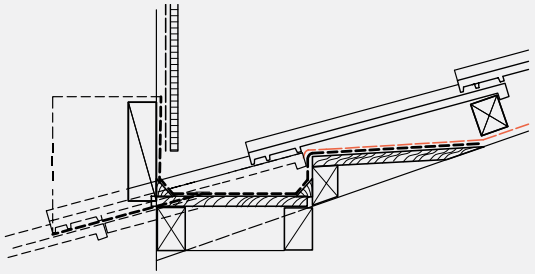
10. **Aprons:**-The underlay lap should terminate at a minimum of 150mm from the roof edge to the wall and separate any metal aprons flashing from the wall/ timber.



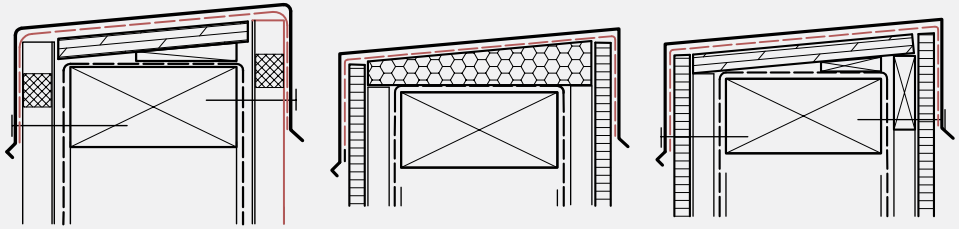
11. **Aprons flashing and change in roof pitch:**-The underlay lap should terminate at the end of the apron flashing so as to any metal apron flashing from the supporting roof structure.



12. **Abutment:**-The underlay is to cover the gutter lining under the roof area and overlap into the gutter by a maximum of 20 mm to prevent wicking.



13. **Parapet and enclosed balustrades:**-The underlay is to provide separation of the metal and timber.



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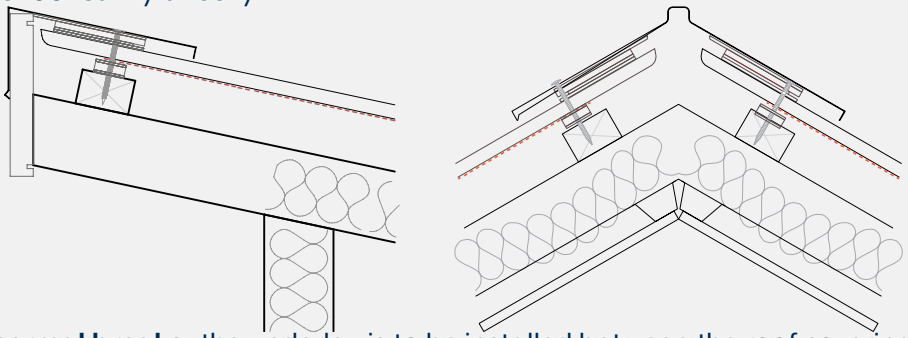
SYNTHETIC

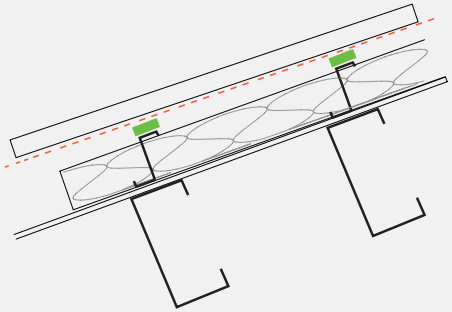
Installation Procedure

14. **Penetrations:**-All roof penetrations that pass through the roof underlay will be installed by star-cutting the underlay carefully to prevent tears, closely fitted over the pipe, ensuring that all the tabs project upwards along the pipe, and then the tabs taped around the circumference of the pipe using a flexible flashing tape compiling with Parts 3.2 and 4 of ICBO Acceptance Criteria AC148, shall be compatible or roof underlay, and be used only in fully concealed applications.

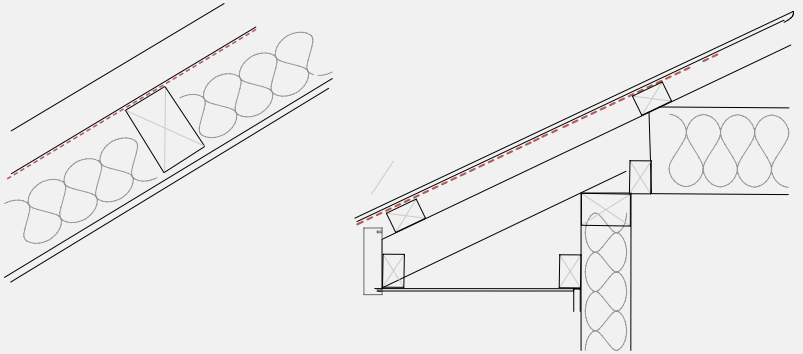
15. **Vented Cavity Battens:**-the underlay should be positioned on the upper side of the batten, directly under the roof covering allowing the battens to vent the roof cavity directly.



16. **Thermal breaks:**-the underlay is to be installed between the roof covering and the insulating spacer to avoid thermal bridging.



17. **Cold roofs and insulation:**- in cold roof construction, the insulation is at ceiling level and there is an air gap between the insulation and the roof underlay of at least 25mm.



18. **Separation from sources of heat:**- underlays being combustible materials must be separated from chimneys, flues, fire places and heating appliances as indicated in Part 7 of NZBC Acceptable Solutions C/AS1-C/AS6 and NZBC Verification Method C/VM1.

19. **Accidental ignition:**- underlays have the risk of fire spread when used unsupported, should the material be accidentally ignited during maintenance works, etc. (e.g. by a roofer or plumbers torch). As with all types of sarking and bituminous material, care must be taken during building and maintenance to avoid the material becoming ignited.

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SYNTHETIC

Installation Procedure

20. **Fixings of roof underlay:-** If the underlay is laid during roof or batten installation then the fixings used will be normally permanent through the roof, battens or purlins and comply with the specific design requirements of the building including the NZBC. If the temporary fixing is required then 6-8mm stainless steel staples or self drilling screws that are compatible with the roof coverings can be used as long as they are compatible with the roof covering. The maximum distance between fixing centres to all framing members is 300mm.

21. **Ultraviolet Radiation:-** Once the underlay is installed and covered with the roof covering, it must not be exposed to the weather or direct ultra-violet light for long periods. It is recommended that any transparent cladding or windows have UV filters in place to prevent the degradation of the underlay over time as the UV reflective properties of white paint, concrete and asphalt range from 4-22% and will reduce the serviceable life of the underlay to that of the roof cladding.

22. **Loading Underlay:-** Bayonet Bituminous Rooffing Underlay is not designed to withstand the weight of an installer, tiles, roofing material being loaded out. Purlins must therefore be installed as work progresses from eaves to ridge for achieving support for feet and avoiding damage to the underlay surface. No materials or implements should be resting on the underlay. Where pressure on the underlay over a rafter is unavoidable, it should be noted that the underlay does not offer substantial grip, particularly at overlaps or when wet.

23. **Repairing Installed Underlay:-** Where the underlay becomes damaged for whatever reason, repairs can be carried out by overlaying the damaged area with a layer of additional material ensuring a 150mm overlap all round, ensuring that the up-slope side is overlapped by the next highest horizontal run of underlay, and secured under a batten. If the underlay is vertically installed, a full new sheet width will be installed from and fixed to the purlin below the damaged area to two purlins above the damaged area, fitted to under the old sheet and fixed to the purlin.

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Durability & Material Properties

The product is a breathable bitumen impregnated Kraft paper. The top face has a 150mm overlap guide mark along the length of the roll.

In accordance with NZS 2295:2006 Pliable, Permeable building Underlays for Kraft - Self-Supporting Type: R2
NZS 4000.1:2017 Type: Heavy Duty, Class 3

Property	Description	Testing Method	Unit	NZS 2295:2006	NZS 4200.1:2017	Bayonet Bituminous
Mass per square meter	Mass of material based on a square meter rate	-	g/m^2 [mass of underly in grams per square meter]	-	-	≥423 g/m^2 and ≤472g/m^2
Dry Delamination	Determines the ability of a pliable building membrane material to resist delamination in hot, dry conditions	AS/NZS 4201:Part 1	Pass/Fail	Pass	Pass	Pass
Wet Delamination	Determines the ability of a pliable building membrane material to resist delamination in hot, humid conditions	AS/NZS 4201:Part 2	Pass/Fail	Pass	Pass	Pass
Moisture Shrinkage	Determines the extent to which pliable building membrane material shrinks in the machine & cross direction following repeated wetting and drying. Synthetic roof underlays do not need to be assessed for moisture shrinkage and may have an unlimited run length [NZS 2295:2006]	AS/NZS 4201:Part 3	% of shrinkage	≤0.5% MD ≤0.5% CD	≤0.5% MD ≤0.5% CD	≤0.5% MD ≤0.5% CD
Resistance to water penetration	Is the measure of a material's ability to resist water penetration. It is ideal that the underlay have a high value in order to prevent water from passing through into the building's interior.	AS/NZS 4201:Part 4	mm [height of head of water]	≥100 mm	Pass	xxxxmm
Emittance	Determines the infra-red emittance by the optical method, of a face of a pliable building membrane. Emissivity is a measure of the efficiency in which a surface emits thermal energy	AS/NZS 4201:Part 5	A value between 0 and 1	N/A	IR Reflective ≤0.05 IR Semi-reflective ≥0.05 to ≤0.15 IR Non-reflective >0.15	0.90 IR Non-reflective for both surfaces
Absorbency	It is the measure of a material's ability to absorb surface water. It is ideal that the underlay have a high value in order to manage condensation in the roof cavity.	AS/NZS 4201:Part 6	g/m^2 [mass of water in grams per square meter]	≥ 150 g/m^2	High	Pass
pH extract	Determine the expressing the acidity or alkalinity of a material when the material is in contact with cold water. This ensures the material is neutral and does not damage the roof covering or structure.	AS/NZA 1301.421s	pH [A measure of the acidity or alkalinity of a material]	≥5 and ≤8 [0=very acidic] [14=very alkaline]	-	Pass
Surface Corrosion of Low Emittance Surface	Only applies for pliable building materials with a emissivity value of less that 0.90	AS/NZS 4859.1	A value between 0 and 1 for pre and post test	N/A	N/A	N/A
Folding Endurance	Determine the folding strength of paper, measured as either folding endurance or the mean of the number of double folds, using a Kohler-Molin folding strength tester. Folding endurance is defined as the logarithm (to the base of ten) of the number of double folds that are required to make a test piece break under standardized conditions. $F = \log_{10} d$. d = number of double folds.	AS1301.423	Number of double folds without failure	N/A	≥100 in MD ≥50 in CD	Pass
Electrical Conductivity	Determining if the electrical conductivity by measuring the insulation resistance of the material	AS3100	>10MΩ = non-conductive ≤10MΩ = conductive	N/A	Electrically non-conductive	>10MΩ
Flammability	The ability of the material to support combustion especially or have a high capacity for combustion. The lower the flammability index factor the less likely it is for the material to contribute to combustion.	NZS/AS 1530:Part 2	FI [Flammability Index factor of combustion speed, heat and spread]	≤5	≤5	Capacity for combustion
Tensile Strength in the Machine direction	The ability of the underlay material to resists maximum level of puling, tension, or stress force in the direction parallel to the machine of the pliable building underlay roll	ASTM D882	KN/m [Kilo newton per meter]	3KN/m	N/A AS1301.448s used for kraft paper only	16.5KN/m
Tensile Strength in the Cross direction	The ability of the underlay material to resists maximum level of puling, tension, or stress force in the direction perpendicular to the machine direction.	ASTM D882	KN/m [Kilo newton per meter]	2.5KN/m	N/A AS1301.448s used for kraft paper only	7.84KN/m
Tear Resistance Machine Direction	The ability of the underlay material to resists tearing at the fixing points in the direction parallel to the machine of the pliable building underlay roll.	TAPPI T470	N [Newtons]	≥150N	≥80N	148N
Tear Resistance Cross Direction	The ability of the underlay material to resists tearing at the fixing points in the direction perpendicular to the machine direction.	TAPPI T470	N [Newtons]	≥130N	≥80N	125N
Water Vapour Resistance	It is the measure of the material's reluctance to let water vapour pass through. The underlay should allow the water vapour to pass through easily in order to manage condensation in the roof cavity and the value must be low to achieve this. As a reference point: Wood or pine = 45 - 1850 MN s/g , Aluminum foil = 4000 MN s/g	ASTM E96 Procedure B	MN s/g [Mega- Newton seconds per gram]	≤ 0.7 MN s/g	Class 3 Vapour Permeable ≤ 0.7 MN s/g	XXXXX MN s/g
Heat Shrinkage	Determines covers the measurement of changes in linear dimensions of nonrigid thermoplastic sheeting or film that result from exposure of the material to specified conditions of elevated temperature and time	ASTM D1204-7	% of shrinkage	N/A	State values	-
UV exposure resistance	The underlay retains at least 85% of its initial mechanical strength after UV exposure test	ASTM G155 48 hours	Correlation between accelerated and neutral UV weathering	5 days	N/A uses ASTM G154	7 days
Air Control Barrier	Control of air when the material has a certain air resistance value.	ISO 5636.5	MN s/m^3	≥0.1 MN s/m^3	≥0.1 MN s/m^3 Air Barrier ≤0.1 MN s/m^3 Non-air barrier	Air Barrier

Durability

- The underlay complies with the NZBC B2.3.1. a) & b) and will match or exceed the specified design life of the roof covering being not less than 50 years for roofing systems that provide structural stability to the building, and less than 15 years specified design life of roof coverings where items are moderately difficult to access or replace or failures would be noticeable during normal maintenance.
- The Bayonet Bituminous roofing underlay can not be left uncladded for which ever is the greater of 7 days or 50 hours of sunshine exposure. If the installation procedures are adhered to and the roof covering performs to its criteria and remains weather resistant then the underlay will maintain its serviceable life equal to that of the roof covering.

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Packaging and Storage

33 x Rolls/Pallet	Product Code	Width x Length (mm x m)	Roll Mass (kg)	Pallet Nominal Mass (kg)
	SS125040	1250 x 32	21.16	700
	VG30012	300 x 40	5.66	188

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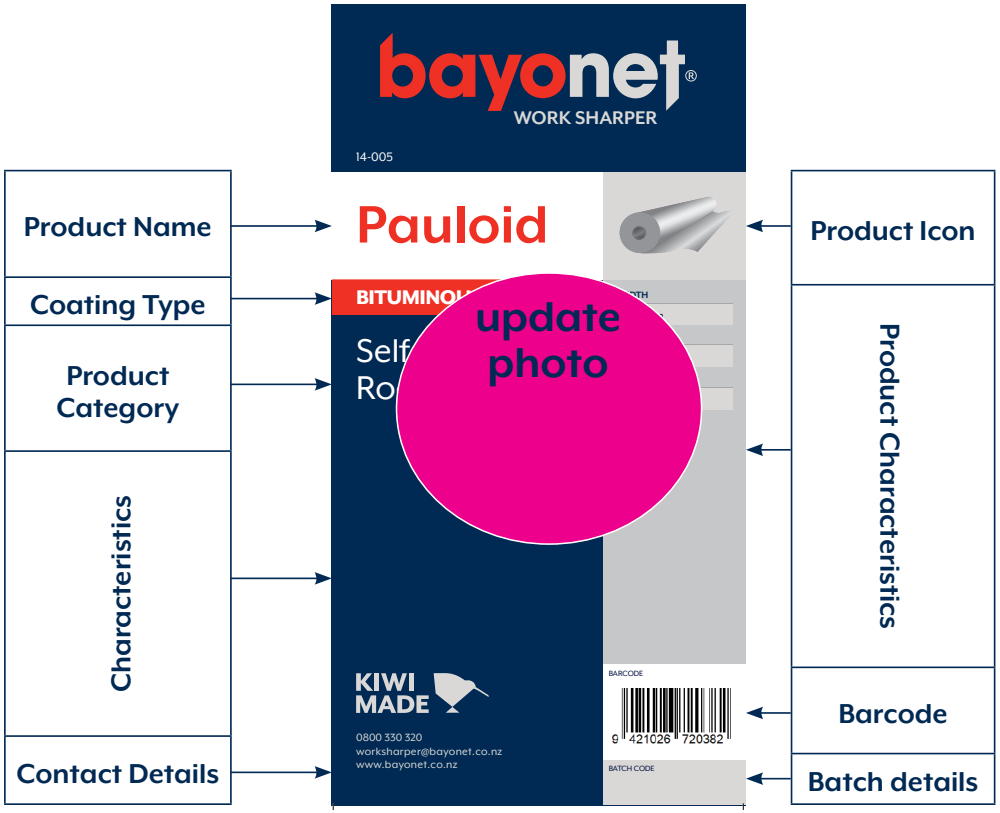
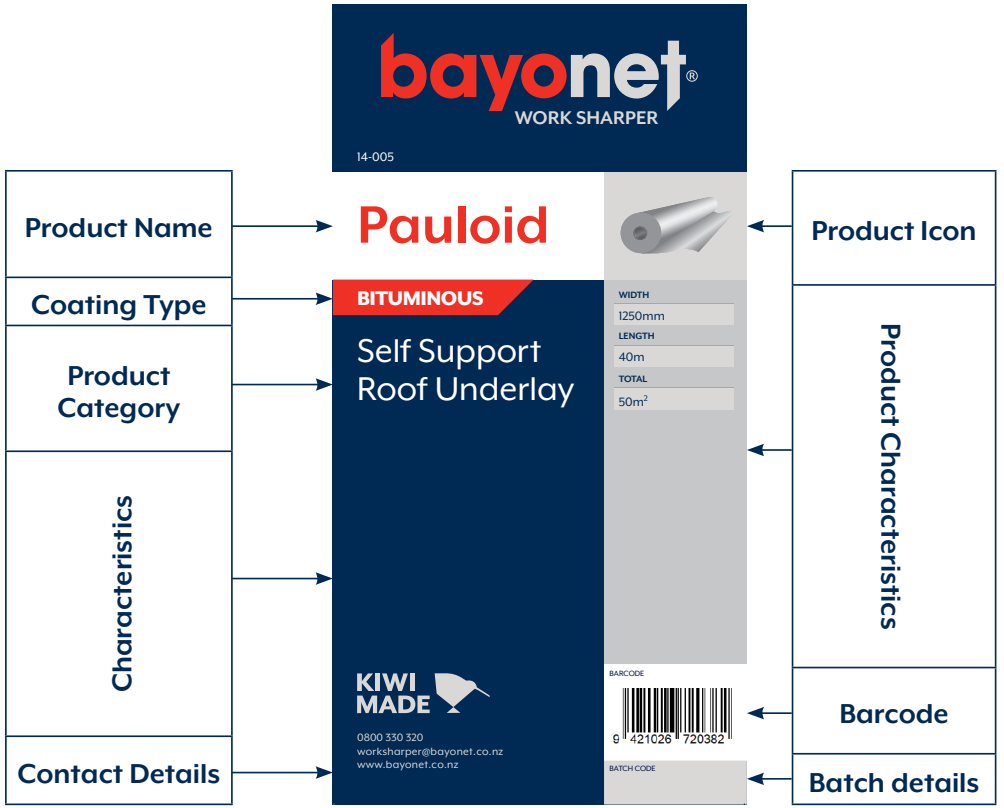
Labeling And Marking





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Storage Requirements

Packaging:

- Underlays are supplied in rolls and individually wrapped in polythene. A product label bearing the product name, batch number, is included with each roll.

Do not store the products in the following conditions:

- Exposed to direct sunlight
- Dusty environments
- Moist environments with little air flow
- In contact with solvents and with materials containing volatile organic components such as coal tar, and timbers newly treated with solvent based preservative (LOSP).
- Exposed to a naked flames or other ignition sources.

Preferred Storage Conditions

- Rolls should be stored on end on a flat level, smooth, clean and dry surfaces.
- Under cover, not exposed to UV light or direct sunlight
- Care must be taken not to crush the rolls.

Preferred Transport Conditions

- All packaged products should be securely strapped, separated from each other and any movement of the packages during transport reduced to a minimum.
- If movement of the packages is not prevented localised abrasion can occur during the transport process and further reducing the longevity of the product.

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Work Safely And Duty Of Care

The product is pre-packaged as per the packaging requirements section but still has some inherent risks that user/reseller/installer and any affected person is required to be informed. The list below indicates the known risks at the time of publishing, their consequence of harm and likelihood to occur with the controls that should be used to reduce the potential harm.

Risk and Potential Harm	Product Related Description	Raw Risk	Proposed Controls	Controlled Risk Evaluation
Manual handling of packaged rolls could cause: • Serious back injuries, acute low back pain • Other work-related musculoskeletal disorders • Harm to neck, shoulders, knees, arms and hands	The rolls weigh a minimum of 5.66kg.	Rare Likelihood (1) Low Consequence(1) The risk is evaluated as Low(1)	**Refer to Worksafe's Code of Practice for Manual Handling** - The packaged product is relatively low mass and is unlikely to cause harm. - If good lifting techniques are used and the code of practice applied the risk of harm is unlikely	Rare Likelihood (1) Low Consequence(1) The risk is evaluated as Low(1)
Installing the product while working from heights pose the following risks and potential harm: • Falling from heights • Long term disability and or death	The product is a roofing product and requires working from heights which is inherently a high risk high incident work activity.	Certain Likelihood (5) Major Consequence(5) The risk is evaluated as High(25)	**Prior to accessing the roof the Best Practice Guidelines for Working on Roofs provided by Ministry of Business, Innovation and Employment (MBIE) must be applied to meet their obligations under the Health and Safety in Employment Act 1992 (HSE Act) and the HSE Regulations 1995.** Care should be taken in handling materials at height. In particular ensure that manual handling regulations are not exceeded. Sufficient edge protection, netting, appropriate scaffolding and lifting equipment are necessary to ensure the safe application of roofing underlays. Before work commences a method statement and risk assessment should be prepared risk mitigation actions implemented.	Moderate Likelihood (3) Major Consequence(5) The risk is evaluated as High(15)

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Conformity - Legislation

Bayonet Bituminous Roof Underlay and Valley Gaurd is constructed to the AS/NZS 2295:2006 Pliable, permeable building underlays standard but falls under the New Zealand regulated building products and construction methods that must comply with the legislated New Zealand building code.

Compliance With Building Code Clauses:

E2- External Moisture
- -Metal Cappings - 6.4 e) and Figure 10.
- -Underlay support - 8.1.5.1 - "R2 self support underlays"
- -Gutters general-8.1.6 c)- " For internal, valley, and hidden gutters"
- -Gutters general-8.1.6 l)- when gutter spreaders are used on tile roofs
- -Masonry Tile Installation-8.2.3 tiled pitched roof underlay requirements
- -Pressed Metal Tiles Underlay-8.3.6
- -Profiled Metal Roof Cladding Underlay-8.4.7
- -Profiled Metal Wall Cladding-9.6
- -Vertical profile – direct fixed- Installation 9.6.8.1
- -Properties of roof underlays-Table 23
- -Flexible flashing tape-4.3.11
- -Parapets-General- 6.2. c)
- -Metal Cappings 6.4 e)
- -Figures: 7, 10,23,25,26,27,28,30,34,35,36,37,42,45,46,47,48,50,51,52,101,102

B2 - Durability
- -Performance-B2.3.1. a)i),ii),iii) for roofing systems have a specified life of not less than 50 years.
- -Performance-B2.3.1. b)i),ii) for roofing systems that have a specified intended life of 15 years or less

F2 - Hazardous Building Materials
- -Performance-F2.3.1 Bayonet Bituminous Roof Underlay and Valley Gaurd contains no hazardous substances in quantities that pose any increased risk for human health and environment.

B1 - Structure
- -Performance B1.3.1 self supporting underlay has a low probability of failure during construction and its specified life.

E3 - Internal Moisture
- -Thermal Resistance - R-values - 1.1.1 d)
- -Thermal Resistance - Materials and Installation - 1.1.3.

C1 - Objectives of Clauses C2-C6 a)

C3 - Fire Affecting Areas Beyond the Fire Source
- -Performance - Suspended flexible fabrics - C3.4 c)

C/AS2-Control of internal fire and smoke spread
- - Suspended flexible fabrics - 4.17.8 b)

E1 - Surface Water
- -Objective E1.2

E1/AS1 - Downpipes- Materials - 4.1.2

G12 - Water Supplies
- -Water supply systems - G12.3.7 b)

G12/AS2 - Weathertightness - 5.2.1

F5 - Construction and Demolition Hazards

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Conformity - Standards and Guidelines

Standards & Guidelines Complied With:

Standard	Description
NZS3604:2011	Timber-Framed Buildings
AS/NZS1170: Part 2:2011	Structural design actions - Wind Actions
AS/NZS 1301: Part 421s:1998	Determination of the pH value of aqueous extracts of paper, board and pulp - cold extraction method
AS/NZ 4200: Part 1:2017	Pliable building membranes and underlays - Materials
AS/NZS 4201: Part 1:2017 Part 3:1994 Part 4:1994 Part6:1994	Pliable building membranes and underlays - Methods of test Shrinkage Resistance to water penetration Surface water absorbency
ASTM E96/E96M:2016	Standard test methods for water vapour transmission of materials
ASTM g154:2012a	Standard practice for operating fluorescent ultraviolet (UV) lamp apparatus for exposure of nonmetallic materials
ASTM G155:2013	Standard practice for operating xenon arc light apparatus for exposure of non-metallic materials
AS 4200 Part 2:2017	Pliable building membranes and underlays, Installation
TAPPI T470:1986	Edge Tearing resistance of paper (Edge-tear strip method)
NZMRM CoP Vers 3	NZ Metal Roof And Wall Cladding Code Of Practice v3.0
NZBC & Building Act 2004	Verification Methods and Acceptable Solutions prepared by the Ministry of Business, Innovation and Employment in accordance with section 22 of the Building Act 2004 for use in establishing compliance with the New Zealand Building Code.
Best practice guidelines for working on roofs, ISBN 978-0-478-40192-9	Published by the Ministry of Business, Innovation and Employment and has been prepared in association with the Roofing Association of New Zealand (RANZ) providing practical guidance to employers, contractors, employees, and all others engaged in work associated with working on roofs.
B100 - Install Roof Underlay	BRANZ Build magazine Issue 100 page 19
B114 - Retrofitting insulation correctly	BRANZ Build magazine Issue 114 page 17-18
Build-180-Feature-Ventilation-A-School-Lesson	BRANZ Build magazine Issue 180 page 69-70
NASH Building Envelope Solutions: 2019 Light Steel Framed Buildings ISBN 978-0-473-49093-5	NATIONAL ASSOCIATION OF STEEL-FRAMED HOUSING INC. (NASH) referencing document as an Acceptable Solution to the New Zealand Building Code (NZBC) clause E2 External moisture for the exterior weathertight envelope for steel-frame buildings constructed in accordance with NASH Standard Part 2 which provides for low-rise buildings including houses and low-rise commercial buildings.

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Product Technical Statement

Issued: January 2021 vers: 210106-2

KEY INFORMATION

as per Building (Product Certification) Regulati0ons 2008
Amendment Regulations 2019 (LI 2019/218) Regulation 14, Schedule 2, clause 1-7.

bayonet® WORK SHARPER

1. Certificate holder details:
I&F Holdings Ltd t/a Bayonet
PO Box 308 Seventh Avenue, Tauranga 3140
201 Taurikura Drive Tauriko, Tauranga 317, New Zealand
worksharper@bayonet.co.nz
Tel: 08002296638
Web: www.bayonet.co.nz

2. Product certification body details:
BRANZ
1222 Moonshine Rd,RD1, Porirua 5381, New Zealand
Private Bag 50908, Porirua 5240, New Zealand
Tel: 04 237 1170
Web: www.branz.co.nz

3. Summary of description of building method or product
Name: Bayonet Bituminous Roofing Underlay and Valley Guard
Product code: SSXXXXxx or VGXXXXxx X=Length in mm x=Roll sqaure area in m²
Physical attributes: The product is a bituminous Kraft paper roof underlay. The black top face has a 150mm overlap guide mark along the length of the roll. The bottom face is black coloured.
Matters that should be taken into account: The Bayonet bituminous Kraft paper roof underlay can not be left uncladded for which ever is the greater of 7 days or 50 hours of sunshine exposure.

4. Summary of intended use of building method or product: Bayonet bituminous Kraft paper roof underlay is to be used as self supporting roof underlay on buildings within the limitations of NZBC Acceptable Solution E2/AS 1.1/AS2 1.0/AS3 1.0/AS4 and situated in NZS3604 Wind Zones up to and including Extra High.

5. Building Code Provisions:

E2- External Moisture -Metal Cappings - 6.4 e) and Figure 10. -Underlay support - 8.1.5.1 - "R2 self support underlays" -Gutters general-8.1.6 c)- " For internal, valley, and hidden gutters" -Gutters general-8.1.6 l)- when gutter spreaders are used on tile roofs -Masonry Tile Installation-8.2.3 tiled pitched roof underlay re-quirements -Pressed Metal Tiles Underlay-8.3.6 -Profiled Metal Roof Cladding Underlay-8.4.7 -Profiled Metal Wall Cladding-9.6 -Vertical profile – direct fixed- Installation 9.6.8.1 -Properties of roof underlays-Table 23 -Flexible flashing tape-4.3.11 -Parapets-General- 6.2. c) -Metal Cappings 6.4 e) -Figures: 7, 10,23,25,26,27,28,30,34,35,36,37,42,45,46,47,48,50,51,52,101,102	[specific provisions to be complied with]
B2 - Durability -Performance-B2.3.1. a)i),ii),iii) -Performance-B2.3.1. b)i),ii)	[Expected serviceable life of the underlay is to equal that of the roof cladding.]
F2 - Hazardous Building Materials -Performance-F2.3.1	[Bayonet Bituminous Roof Underlay and Valley Gaurd contains non-hazardous substances in quantities that pose any increased risk for human health and environment]
B1 - Structure -Performance B1.3.1	[The self supporting underlay has a low probability of failure during construction and its specified life.]
E3 - Internal Moisture -Thermal Resistance - R-values - 1.1.1 d) -Thermal Resistance - Materials and Installation - 1.1.3.	[Part of the roofing system thermal calculation]
C1 - Objectives of Clauses C2-C6 a) C3 - Fire Affecting Areas Beyond the Fire Source -Performance - Suspended flexible fabrics - C3.4 c) C/AS2-Control of internal fire and smoke spread - Suspended flexible fabrics - 4.17.8 b)	[Contains a Fire retardant enabling the product to maintain a flammability index of less than 5]
E1 - Surface Water -Objective E1.2 -E1/AS1 - Downpipes- Materials - 4.1.2 G12 - Water Supplies -Water supply systems - G12.3.7 b) G12/AS2 - Weathertightness - 5.2.1	[Any penetrations that pass through the roof underlay form part of the water management building system relevant clauses as well as its intended use.]
F5 - Construction and Demolition Hazards [Installation provisions of the roof underlay will comply with safety aspects of F5 code]	

6. Conditions and limitations of use

6.1. The Bayonet bituminous Kraft paper roof underlay can not be left uncladded for which ever is the greater of 7 days or 50 hours of sunshine exposure. Any further sunshine radiation exposure to the product will negatively affect its tensile strength properties.
6.2. The commencement of the installation of the roofing underlay can only start once the timber frame moisture content is less than 20% and the relative humidity of the interior of the building is below 75%.
6.3. If timbers on roofs have been treated with solvent based wood preservatives, it is essential that guidance from the preservative manufacturer be sought in relation to chemical attack from preservative on roofing underlay prior to installing.
6.4. If there is persistent heavy rainfall combined with subsequent severe freeze/thaw conditions, the underlay should not be exposed for more than a one week. To avoid unnecessary damage to the underlay and potential high risk of harm to the installers, work must not start and cease where high winds persist.
6.5. The rolls must not be exposed to a naked flame or other ignition source.
6.6. Roof underlay damage greater than 75mm rips or tears requires the underlay to be replaced. Rips up to 75mm can be repaired using Ultra-Bond Sill Tape.
6.7. All sides of the underlay must over lap by 150mm. Overlapping of underlay must be kept to a minimum and there are specific requirements for the ends of the underlay that terminate at the ridge, eaves, abutments and roof protrusions (see Installation Procedure items 7-23 starting from page 5).

7. Health and safety information
Installing roof underlay is a high risk activity and prior to accessing the roof the Best Practice Guidelines for Working on Roofs provided by Ministry of Business, Innovation and Employment (MBIE) must be applied to meet the obligations under the Health and Safety in Employment Act 1992 (HSE Act) and the HSE Regulations 1995. Care should be taken in handling materials at height. In particular ensure that manual handling regulations are not exceeded. Sufficient edge protection, netting, appropriate scaffolding and lifting equipment are necessary to ensure the safe application of roofing underlays. Before work commences a method statement and risk assessment should be prepared risk mitigation actions implemented.

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Note:

Due to the fast changing landscape of fencing product development we reserve the right to change specifications without notification. Although every effort has been made to ensure accuracy of this document, it is the users responsibility to ensure the product is fit for purpose.

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GERARD
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New Zealand specification manual

Roofing Designed to Endure

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Gerard Roofs specification manual

New Zealand's steel roofing system

1.1 Products 5
1.1.1. Gerard Roof profiles 5
Gerard Stratos 6
Gerard Senator 6
Gerard Rockport 7
Gerard Alpine 7
Gerard Aspen 8
Gerard Heritage 8
Gerard Milano 9
Gerard Classic 9
1.1.2. Trims 10
1.2 Finishes 11
1.2.1 Textured finishes 11
1.2.2 Smooth finishes 11
1.2.3 Custom finishes to order 11
1.3 Colours & finishes 12
1.3.1 Textured finish colours 12
1.3.2 Types of finish by roof profile 12
1.3.3 Smooth finish colours 13
1.4 Product warranty 14
1.5 Environmental responsibility 15
1.6 CAD details available 15
1.7 Handling and storage 15
1.8 Product identification 15

2.0 Design considerations

2.1 Scope 18
2.2 Building code 18
2.3 Serviceable life 18
2.4 Other information sources 19
2.5 Alternatives 19
2.6 Materials 19
2.6.1 Panels and accessory materials 19
2.6.2 Installation materials 19
2.7 General information 20
2.7.1. Dissimilar metals/materials 20
Limitations on use 20
2.8.1. Corrosive environments 20

3.0 Substrate & installation overview

3.1 Preparation of structure 22
3.1.1 Rafters and valley boards 22
3.2 Battens 22
3.2.1 Batten setout 22
3.2.2 Batten/rafter fastening 23
3.3 Roofing underlay 23
3.4 Valleys 23
3.5 Solar brackets 23
3.6 Panel installation 23
3.6 Panel installation continued 24

4.0 Standard roof details

4.1 Batten spacing -Eave 26
4.2 Ridge installation 26
4.3 Valleys 28
4.4 Hips 30
4.4.1 Installation of roof trim on hip junction with wooden battens 30
4.5 Barge/Gable ends 31
4.5.1 Installation of roof trim over a wooden fascia with batten 31
4.5.2 Installation of roof trim over a metal fascia with and without batten 31
Wall flashings 32
4.6.1 Side flashings 32
4.6.2 Step - Pitch flashings 32
4.6.3 Soft edge apron flashings 33
4.7 Wall Stop Ends 33
4.8 Change in pitch 34
4.9 Penetrations 35
4.9.1 Pipes 35
4.9.2 Chimneys 35
4.9.3 Roof windows 35
4.9.4 Solar panels 35
4.10 Extra high wind zone installation 36

5.0 Components & fixing patterns

5.1 Gerard Roofs components 38
5.2 Gerard Stratos installation 40
5.3 Gerard Senator installation 41
5.4 Gerard Rockport installation 42
5.5 Gerard Alpine installation 43
5.6 Gerard Aspen installation 44
5.7 Gerard Heritage installation 45
5.8 Gerard Milano installation 46
5.9 Gerard Classic installation 47

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New Zealand’s ingenious pressed steel roofing system

A Gerard roof is made up of individual lightweight pressed steel panels secured using a unique fixing system that effectively locks them together to form a single structural unit. The result is a roof that’s stylish, copes with severe weather and lasts a very long time.

Invented in New Zealand …

In 1957 New Zealand innovator Lou Fisher saw an opportunity to create a new kind of roof.

Disappointed with the limitations of solid tile and the utilitarian look of long-run corrugated iron roofs, he invented the steel tile roof and established a trusted brand that would grow to become Gerard Roofs.

… proven all over the world

The company continues to lead through ongoing product development and relentless attention to quality standards. Over the years Gerard Roofs' products have been fine-tuned to endure in all living situations and are now used in over 120 countries.

The Gerard roof you put over your head has not only been proven throughout New Zealand, but in some of the most extreme climates and environments on the planet

1.1 Products

1.1.1. Gerard Roof profiles

The roof has profound effect on the look of most homes

An attractive roof is a significant architectural feature. The roof usually accounts for around a third of the overall visual appearance of a home and will have a noticeable influence on its style and street appeal.

Gerard Roofs’ profiles complement a range of styles

For many people, choosing a roof is primarily about looks. Homes are a reflection of individuality and their roofs a prominent feature. Unlike most other roofing types Gerard offers a system of choices that enables you to determine the right ‘look’ rather than having to accept a pre-defined one.

Applicable to traditional or contemporary architecture

Whether you’re imagining traditional style or something following the latest trends, Gerard Roofs have profiles to meet the brief. Milano, for example, is reminiscent of the enduring ridged roofs of the Mediterranean; by contrast, a profile like Rockport offers a slimmer, squarer more contemporary pattern.

Gerard Rockport

Gerard Classic

Gerard Stratos

Gerard Milano

Gerard Senator

Gerard Aspen

Gerard Alpine

Gerard Heritage

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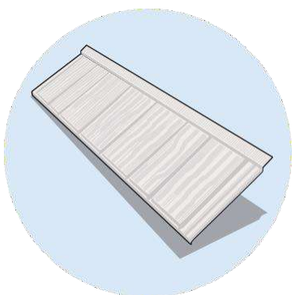
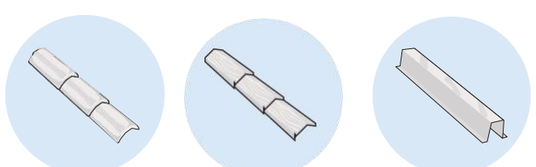
Gerard Stratos

Combining a flat plane with continuous but irregular grooves gives Gerard Stratos a recurring but slightly organic pattern that works with many styles of home.



Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	370 mm
Upstand	27 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	2.1 kg
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	4.7 kg

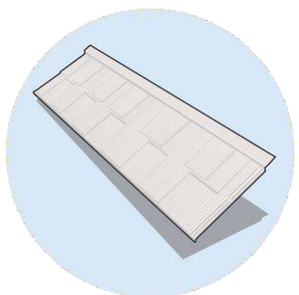
Gerard Stratos is compatible with all three Gerard trims – **Barrel, Angle** and **Box**.



Dimensions and weights given are nominal.

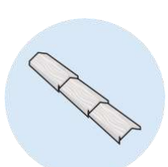
Gerard Senator

A profile with a modern look and subtle raised detailing. Senator is known for the simplicity and uniformity it brings to contemporary and traditional homes.



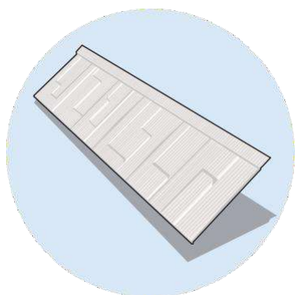
Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	16 mm
Roof cover/panel	0.46 m2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	NA

Gerard Senator is compatible with **Angle** trim.



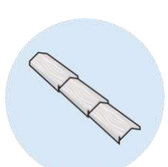
Gerard Rockport

Among Gerard's flattest profiles, Rockport lends your roof a sleek, linear look and is often used on clean, simple architecture with a modern bias.



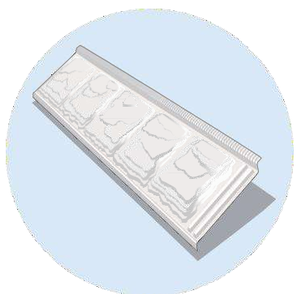
Pitch – min./max.	15-90°
Overall length	1330 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	20 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	NA

Gerard Rockport is compatible with **Angle** trim.



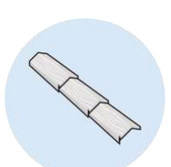
Gerard Alpine

Inspired by the look of Welsh slate the Gerard Alpine profile lends a smooth, sleek linear look while surface detailing adds a slightly rustic overtone.



Pitch – min./max.	15-90°
Overall length	1335 mm
Length of cover	1260 mm
Width of cover	368 mm
Upstand	17 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.4 kg
Weight/m^2 Smooth	NA

Gerard Alpine is compatible with **Angle** trim.



Dimensions and weights given are nominal.

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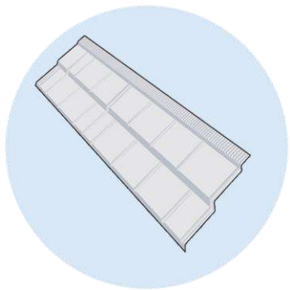
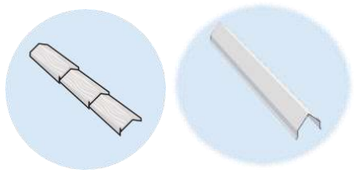
Gerard Aspen

Inspired by the smooth stone slate roofs typical of alpine regions, Aspen gives a sleek, understated look of modern sophistication.



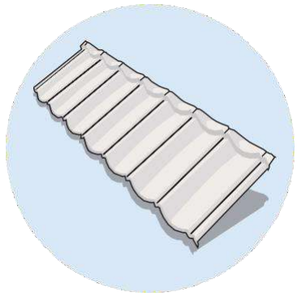
Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1165 mm
Width of cover	368 mm
Upstand	18 mm
Roof cover/panel	0.43 m^2
Panels/m^2	2.3
Weight/panel Textured	2.9 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.6kg
Weight/m^2 Smooth	NA

Gerard Aspen is compatible with **Angle** trim and long Angle trim.



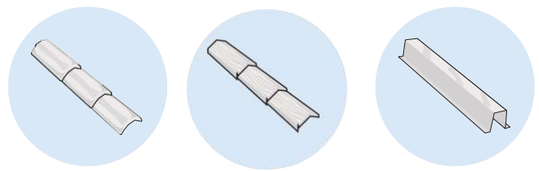
Gerard Heritage

The scalloped shapes of this profile bring a look that's similar to heavyweight tiles. The advantages of pressed steel mean this profile is often chosen as a substitute.



Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	2.1 kg
Weight/m^2 Textured	6.4 kg
Weight/m^2 Smooth	4.7 kg

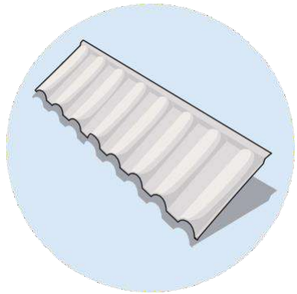
Gerard Heritage is compatible with all three Gerard trims – **Barrel, Angle** and **Box.**



Dimensions and weights given are nominal.

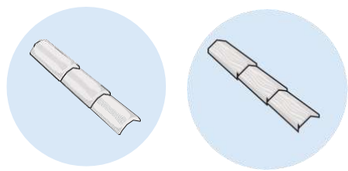
Gerard Milano

With balanced arches and flats found in traditional design, Gerard Milano is a timeless profile that creates clean, elegant and classical looking roofs.



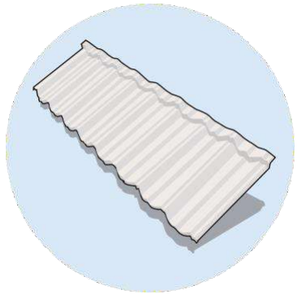
Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1215 mm
Width of cover	368 mm
Upstand	24 mm
Roof cover/panel	0.45 m^2
Panels/m^2	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.4 kg
Weight/m^2 Smooth	NA

Gerard Milano is compatible with **Barrel** and **Angle** trims.



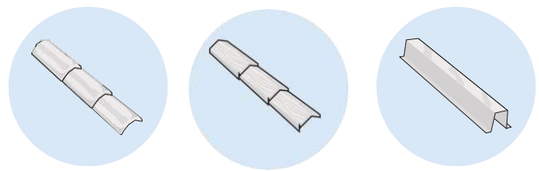
Gerard Classic

Gerard Classic is a geometric profile with shapes and angles that accentuate light and shadow to emphasise its corrugations and create a look of strength and definition.



Pitch – min /max.	12-90°
Overall length	1320 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	2.1 kg
Weight/m^2 Textured	6.4 kg
Weight/m^2 Smooth	4.7 kg

Gerard Classic is compatible with all three Gerard trims – **Barrel, Angle** and **Box.**



Dimensions and weights given are nominal.

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1.1.2. Trims

Gerard Roof trims

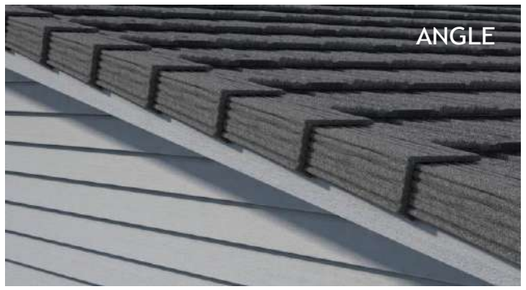
Trim is an essential roofing element, for performance as well as appearance; roof trims create a weatherproof seal at roof junctions and are an important part of the integrity of the roofing system.

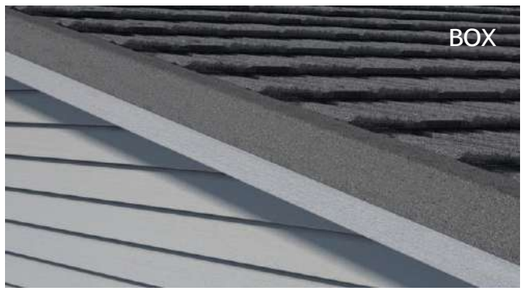
There are three types of roof trim – Angle, Barrel and Box. Each roof profile is compatible with one or more of these as shown in the chart on the right.

Gerard's roof trim component system is designed to be fully integrated. The finish of Gerard trims can be chosen to exactly match the finish of a Gerard roof or chosen in a contrasting colour to create a specific effect.

	Angle trim	Barrel trim	Box trim
Stratos	✓	✓	✓
Senator	✓		
Rockport	✓		
Alpine	✓		
Aspen	✓		
Heritage	✓	✓	✓
Milano	✓	✓	
Classic	✓	✓	✓

Gerard Roof Profiles With Corresponding Trims





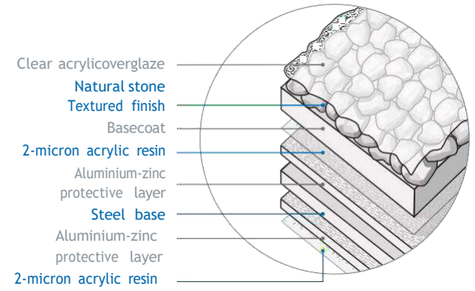
1.2 Finishes

Choice of surface finishes

Some Gerard roof profiles allow you to choose either a textured or Smooth finish on the surface of your roof.
Both have their merits and both come in a range of contemporary colours. The decision is usually influenced most by the architectural style of the home and the intended colour scheme.

1.2.1 Textured finishes

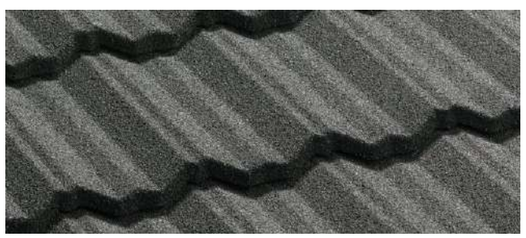
Naturally coloured mineral fragments, or ceramic coated stone fragments, fused to aluminium-zinc steel in layers of acrylic resin and over-glaze.



Textured finish advantages:

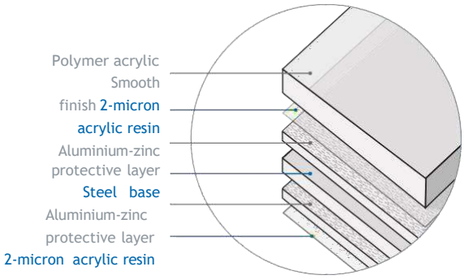
- Additional protection from the elements
- Natural stone colours are almost entirely fade-free
- Gerard textured finishes have longer warranty

A textured stone finish is inclined to look a little more substantial yet visually softer than a Smooth finish.



1.2.2 Smooth finishes

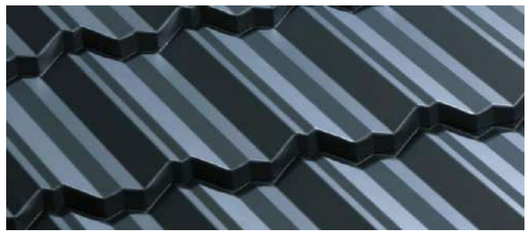
45-micron thick topcoat of ultra-tough polymer acrylic applied after the shape has been pressed into the aluminium-zinc steel (preventing surface micro-cracks).



Smooth finish advantages:

- Less expensive than a textured finish
- Smooth surface with clearer detail
- Just like ordinary coloured steel but much more durable

Smooth finishes tend to produce a smoother, crisper look accentuating patterns and details more.



1.2.3 Custom finishes to order

Custom finishes can be created for special projects by request.

A Gerard Smooth finish can be made to match any colour sample. We also have the ability to develop a custom textured finish – for example, we could work with stone that's native to your location.

To find out more contact Gerard Roofs on 0800 100 244.

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1.3 Colours & finishes

1.3.1 Textured finish colours

Midnight
Black / Ebony

Charcoal
Black / Ebony

Eclipse
Black / Ebony

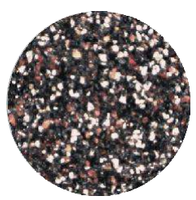
Onyx
Greyfriars / Greyfriars

Ashwood
Sandstone Grey / Sandstone Grey

Rainforest
Karaka / Karaka

Cedar
Lignite or Scoria / Lignite

Teak
Lignite / Lignite



Pepper
Ironsand / Ironsand

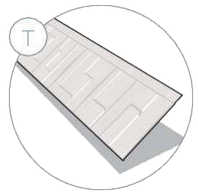
Terracotta
Scoria / Scoria

The name below each colour swatch title is the Colorcote® / Colorsteel® equivalent.
These are useful for matching accessories like fascia or aluminium joinery
as the names are often referred to as a colour standard.

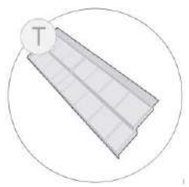
1.3.2 Types of finish by roof profile

Textured finishes and colours are available for all Gerard roof profiles.

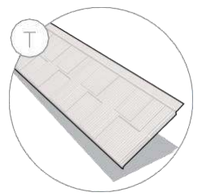
Gerard Alpine



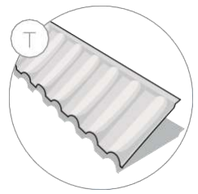
Gerard Rockport



Gerard Aspen



Gerard Senator



Gerard Milano

Smooth finishes and colours are available for the three Gerard profiles shown below.

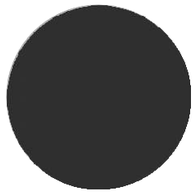
Gerard Classic

Gerard Stratos

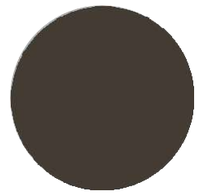
Gerard Heritage

Gerard Roofs has many more colours available to suite any build or design. Visit our website at, www.gerardroofs.co.nz To see the full range

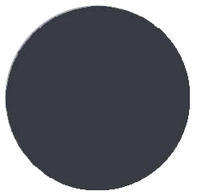
1.3.3 Smooth finish colours



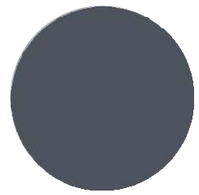
Obsidian
Black / Ebony



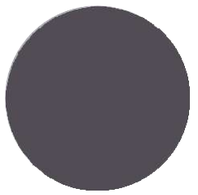
Graphite
Ironsand / Ironsand



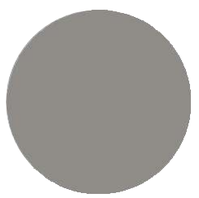
Castle Grey
Windsor Grey / Windsor Grey



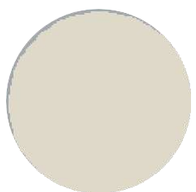
Ocean Blue
New Denim Blue / New Denim Blue



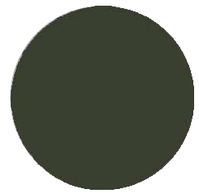
Smoke Grey
Greyfriars / Greyfriars



Pearl Grey
Sandstone Grey / Sandstone Grey



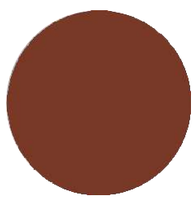
Chalk
Cloud / Pacific Cloud



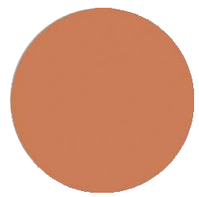
Deep Olive
Karaka / Karaka

Cypress
Flaxpod

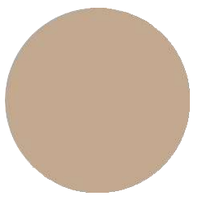
Basalt
TidalDrift Matte



Russet
Scoria / Scoria



Marseille Clay
Terracotta / Terracotta



Morocco
Beige / *No equivalent*

The name below each colour swatch title is the Colorcote® / Colorsteel®equivalent.
These are useful for matching accessories like fascia or aluminium joinery
as the names are often referred to as a colour standard.

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1.4 Product warranty

Gerard's warranty addresses homeowners' two main concerns:

1. That the roof remains weatherproof
2. That the coating remains sound

Complicated rules simplified

Warranties are complex but we've narrowed the variables affecting Gerard Roofs' warranty cover down to two questions:

Is the building sited in a corrosive environment?

Does the roof have a Smooth or a textured finish?

On the right is a chart showing the terms of the warranty according to the circumstances of the individual building.

In each situation the warranty is pro-rata with cover diminishing over time.

There are two warranty environment zones: Standard and Corrosive. Warranty cover is longer in the standard environment zone.

A Corrosive Environment is defined as anywhere within 750m of breaking surf.

Gerard Roofs' warranty applies to all Gerard manufactured products, even if installed in extreme corrosive conditions.

Installation is assured

Be reassured that Gerard roofs are only installed by Gerard Certified Roofers.

Each GCR is responsible under law to make good any problems in the unlikely event they arise.

Visit www.gerardroofs.co.nz to download a sample of the full warranty document.

	Initial period Full cost of repair or replacement	Subsequent period Pro-rata share
Weatherproof warranty	First 25 years	Years 26 - 50, as per Schedule A
Surface Coating warranty: Textured Coated Tile	First 10 years	Years 11 - 20, as per Schedule B
Surface Coating warranty: Smooth Finish Tile	First 5 years	Years 6 - 15, as per Schedule C

1.5 Environmental responsibility

A Gerard pressed steel roof is an environmentally responsible choice.

Pressed steel roofing generates minimal manufacturing, construction site and demolition waste.

A pressed steel roof is lighter than its concrete or clay equivalent, which means transportation is more energy-efficient. It requires less framing support, which also saves resources. Steel is endlessly recyclable too.

Gerard Roofs is conscious of its environmental footprint and was New Zealand's first roofing manufacturer to be awarded ISO 14001 environmental accreditation.

TELARC REGISTERED
Environment ISO 14001

1.6 CAD details available

CAD details for commonly encountered roof details in a number of common formats can be found at www.gerardroofs.co.nz/designtech

At the time of publication these details cover:

- Eaves
- Gables
- Ridges
- Roof-to-wall (transverse)
- Hips
- Roof-to-wall (parallel)
- Valleys

Gerard Roofs' CAD library is an expanding online resource that will be added to periodically as new details become available.
Check www.gerardroofs.co.nz to see the latest available versions.

Specific details for unusual or challenging areas can be requested by contacting Gerard Roofs on 0800 100 244.

Products and specifications

1.7 Handling and storage

Gerard panels and accessories must be transported and handled with care to avoid damaging the pre-finished surfaces.

Long term storage of panels and accessories must be under dry, ventilated cover. For short term storage on site, panels and accessories must be stored flat off the ground, no more than two pallets high.

Handling and storage of all materials supplied by Gerard Roofs, whether on or off site, is under the control of the Gerard Certified Roofer.

Other materials must be handled and stored in accordance with the relevant manufacturer's instructions.

1.8 Product identification

Gerard Roofs print a run number, date and time of production on the reverse side of each panel. Pallets have pallet cards that show the run number, date of production and colour code markings; this allows identification of batch colours.

The steel supplier also prints a code which allows identification of the parent coil.

Reverse side of the panel.

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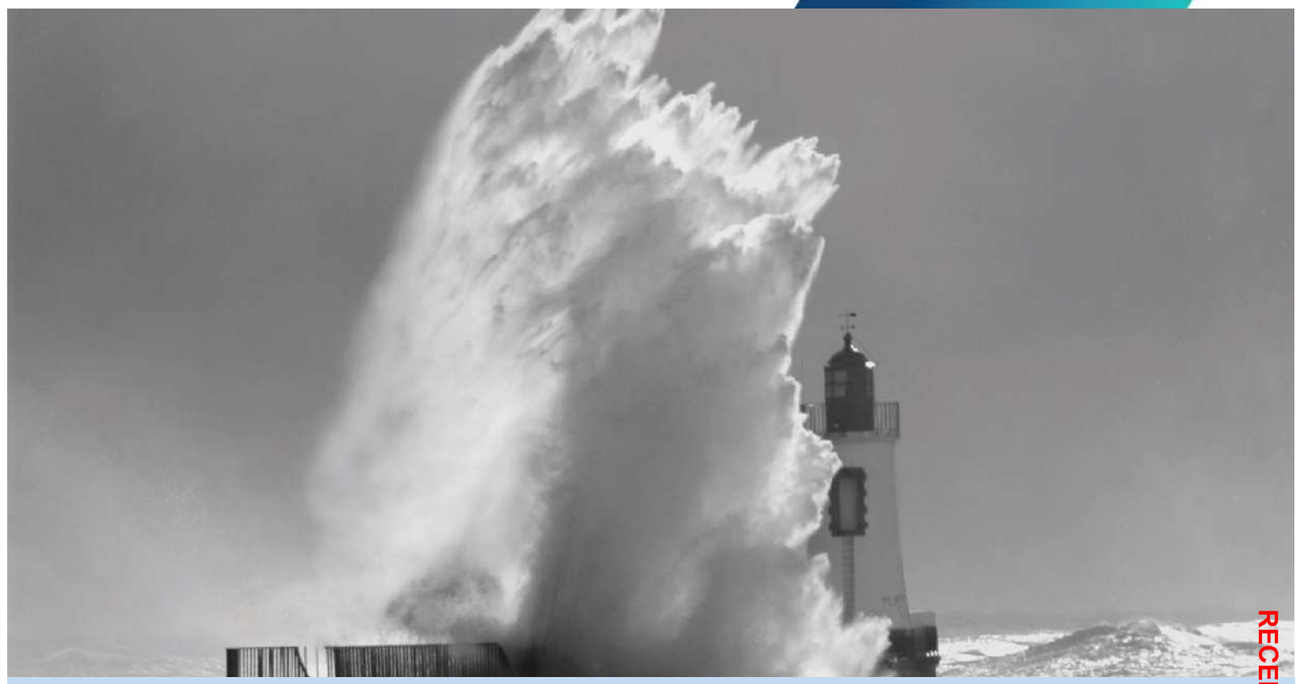

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2.0 Design considerations

This section contains general information you need to keep in mind when designing buildings with Gerard Roofs. The numbered sections (2.1; 2.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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2.1 Scope

This specification covers the supply and fixing of:

- Materials
- General information
- Limitations of use
- Service of life
- Workmanship - pre-roofing requirements
- Timber battens.
- Roofing underlay
- Valleys
- Gerard Roofs - pressed metaltiles/panels
- Trim, standard, barrel and angle
- Wall flashings
- Fixings/fasteners
- Incompatible materials
- Extra high wind zone variations
- Solar panels

2.2 Building code

The following standard specifications should be adhered to in both materials and workmanship.

NZS 2295	Roofing underlays
NZS 4217	Standard for pressed metal tile roofs
NZS 3604:2011	Code of practice for light timber framed buildings, not requiring specific design
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles - galvanising of nails
E2/AS1	New Zealand Building Code clause E2 External moisture
AS1397:2011	AS 1397-2011 continuous hot-dip metallic coated steel sheet and strip - coatings of zinc and zinc alloyed with aluminium and magnesium.
AS/NZS 1530	pt. 3:1999. Fire standard

NZ Building Code sections B1,B2,E2, G12

2.3 Serviceable life

Durability (B2)

Without recoating, the Gerard Roofs products will meet the provisions of NZBC B2.3(C) for 15 years, when used and maintained.

Structure (B1)

When installed according to the manufacturers recommendations the Gerard Roofs products will allow provisions of NZBC B1.3.1, B1.3.2 and B1.3.4 to be met for the relevant provisions of B1.3.3.

External moisture (E2)

When correctly used and installed, the Gerard products meet the requirements of the NZ Building Code E2/AS1

Live loads

During installation and subsequent construction process or maintenance, walking load must be positioned to the front of the panel where the panel is supported by a batten.

Wind zones

On new roofs when fixed to battens sized and installed according to NZS 3604:2011 Gerard Roofs systems are suitable for use in all NZS 3604:2011 building wind zones up to and including extra high.

Spread of fire (C3)

The coating of the roof is <1mm thickness and applied directly to a non-combustible substrate. There was no spread of flames when tested to AS/NZ 1530.pt3.

Water supplies (G12)

Rainwater collected from the Gerard Roofs systems will meet the provisions of NZBC G12.3.1, providing the surface coating is maintained as directed.

It is recommended that a potable water collection system is not installed until 3 good rainfalls have washed the new roof surface free of building debris and surface coating surfactants.

Snow

The Gerard Roofs products are suitable for use where buildings are designed for a 1kPa snow loading.

2.4 Other information sources

NZ MRM Code of Practice.

2.5 Alternatives

No alternatives or substitutions permitted.

2.6 Materials

2.6.1 Panels and accessory materials

The roofing panels and accessories are made by Gerard Roofs.

The base material is aluminium-zinc coated steel - 0.39 mm, AZ150 of AS1397:2011.

Panels are finished in either a granulated textured or Smooth paint finish.

Submissions

An actual product sample should be sighted to confirm colour choice before material orders are placed/accepted.

2.0 Design considerations

2.6.2 Installation materials

1. Roofing underlay shall be either a bitumen impregnated Kraft or synthetic underlay. Kraft underlays are covered by NZS2295 while synthetic roofing underlays are approved by Acceptable Solution documentation from the suppliers.
2. Battens of rough sawn radiata pine type timber meeting suitable dimensions (table 02, page 22) with H1.2 protection.
3. Ridge, hip, gable and wall flashings shall be supplied as standard products from Gerard Roofs.
4. Valleys may be used as supplied pre-finished in 2.4 metre lengths by Gerard Roofs or made to order out of pre-painted 0.55 mm G300 AZ150 aluminium-zinc coated steel in a matching colour from a sheet metal fabricator. If made to order, valleys should have similar dimensions to those supplied by Gerard Roofs.
5. Valleys must be painted to the same colour as the roof panel if not pre-finished.
6. Hip end caps to be installed where necessary to stop ingress of moisture or bird-life.
7. All nails in panels should be 50 mm galvanised and coated to meet AS/NZS 4680 specification (Zn 390 g/m^2). Galvanised nails are used for ridge hip caps 30 mm, all other trim or flashings 50 mm.

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2.7 General information

Profile	Minimum pitch
Stratos	15°
Senator	15°
Rockport	15°
Alpine	15°
Oberon	20°
Heritage	12°
Milano	12°
Classic	12°

Minimum Roof Pitches For Gerard Roof Profiles

For full specifications - refer to individual panel profile data (pages 6-9) dimensions, coverage, weights etc.

2.7.1. Dissimilar metals/materials

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect often occurs with water flowing over different metals.

This form of corrosion is commonly found:

- Where water is discharged from copper or brass systems over a galvanised or aluminium-zinc coated steel roof.
- Where unpainted lead flashings are applied directly to aluminium-zinc coated steel products.
- Where fasteners are incompatible with the roofing material.
- Any electrical contact between dissimilar metals should be avoided, e.g. wet leaves making contact between copper gutters and aluminium-zinc coated steel roof panels.

Note: Special consideration should be given when replacing existing roofs as some roof claddings use unsuitable materials for flashing such as lead.

2.8 Limitations on use

2.8.1. Corrosive environments

The Gerard system must not be used in high alkaline environments (such as intensive animal shelters or other buildings with high ammonia concentrations); contact with fresh concrete or plaster must be avoided. The roofing must not be used in contact with permanently damp materials, nor on or near industrial buildings in which corrosive processes occur, nor over swimming pools.

Directing water-flow to minimise potential corrosion

This chart lists commonly used metals in a 'Galvanic Series'. If any two of these metals are in damp contact or a run-off situation, the metal further to the left will sacrifice itself to protect the metal further to the right. Therefore the simple rule to remember is that you can run water from left to right, but not from right to left. For example zinc to copper is alright, but copper to zinc is not. Specific advice should be sought from Gerard Roofs regarding use of dissimilar metals.

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3.0 Substrate & installation overview

Information for the design and specification of the sub-structure of a Gerard roof; rafters, battens, underlays and fixings are covered in detail. The numbered points (3.1; 3.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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3.1 Preparation of structure

3.1.1 Rafters and valley boards

Rafters and valley boards are to be correctly installed by the builder before roofing can start.

Refer to Gerard Roofs Technical Note - Builder Check List, on the Gerard Roofs website.

Where an exact number of complete panel courses is not possible, the top row of panels should be trimmed to fit and then bent up beneath the ridge flashing.

3.2 Battens

Select batten size to suit rafter or truss spacing. Battens are to be treated to H1.2 and graded on site.

Truss spacing (mm)	Batten size (mm)	Situation
900	40 x 50	Standard
1200	50 x 50	Occasional
1500	50 x 65 on edge	Unusual
1800	50 x 75 on edge	Unusual

Table 02 Batten/Spacing

3.2.1 Batten setout

Stratos, Heritage, Classic, Milano, Rockport and Alpine profiles

A row of battens fixed directly behind the fascia with the second batten 330mm up the truss. Subsequent battens are spaced at 370mm (or as specified for profile and coating finish). The final, top row of panels is 365mm or less, depending on whether the top row needs cutting due to rafter length.

Senator

A row of battens fixed directly behind the fascia with the second batten 330mm up the truss. Subsequent battens are spaced at 368mm. A centre support batten (40x50 mm) positioned 185 mm behind the front face of the panel batten is installed and held in place with a single batten nail. Panels are not fastened to this support batten. The final top row of panels should be 365mm or less, depending on whether the top row needs cutting due to rafter length.

NB. The second batten up from the facia is left out to allow the roofing underlay to maintain an angle above horizontal.

Aspen

A row of battens fixed directly behind the facia with the second batten 330 mm up the truss. Panel Battens are spaced at 368 mm (textured), with a support batten set at 185 mm from the front face of each panel batten to support roof traffic. The final top row of panels should be 365 mm or less, depending on whether the top row needs cutting due to rafter length. Panels are fastened to intermediate support battens only at the side lap.

NB. The second batten up from the facia is left out to allow the roofing underlay to maintain an angle above horizontal.

Eaves panels at gutter fascia

Panels should extend into the gutter by 40mm. This may vary slightly depending on the rafter length and roof pitch.

Roof profile	Batten spacing	
	Textured	*Smooth*
Stratos	370mm	371mm
Senator*	368mm	
Rockport	368mm	
Alpine	368mm	
Aspen^	368mm	
Heritage	369mm	370mm
Milano	368mm	
Classic	369mm	370mm

Table 03 Batten Set-Out

**Centre batten 185 mm, second batten from eave not installed*
^Centre batten 185 mm, second batten from eave not installed

3.2.2 Batten/rafter fastening

Gerard Roofs require that all 40 x 50 mm battens fastened to rafters at 900 mm centres are to be fastened with 2 x 90 mm gun nails in all wind zones up to and including the very high wind zone.

In extra high wind zones a screw fastener must be used for all batten rafter junctions.

This meets or exceeds the requirements of NZS3604:2011

Wind zone	900 rafter 50x40 mm	1200 rafter 50x50 mm
Low 32m/s	S	S
Medium 37m/s	S	S
High 44m/s	S	T
Very high 50m/s	S	T
Extra high 55m/s	T	T
SED +55m/s*	Contact GR	Contact GR

Table 04 Fasteners for Panel Battens -Wind Zones - NZS3604.

S = 2 x 90 mm x 3.15 mm nails (0.8kN)
T = 80 mm x 10g screw (2.4kN)

**In SED Specific design situations refer to Gerard Roofs Technical Notes on installation in SED wind areas.*

3.3 Roofing underlay

Must comply with standard NZS 2295 - Pliable and Permeable Building Underlays. Roofing underlay is installed under the battens but over the bottom batten.

Roofing underlay should be installed horizontally with a minimum overlap of 75 mm.

All vertical laps to be taken past rafters and lap by a minimum of 150 mm.

The Roofing underlay is self-supporting up to 1200 mm and does not need mesh.

3.0 Substrate & installation overview

3.4 Valleys

Valley trays should be made from 0.55 mm AZ150 coated steel. Typically the steel will be pre-painted. Install valleys in a weatherproof workmanlike manner. Do not fix through valleys. Where more than one valley length is used in one run, have an overlap of at least 150mm. Tag valleys at the top edge of the valley join to eliminate valley creep.

3.5 Solar brackets

Gerard Roofs have proprietary solar brackets which can be installed at the time of roofing or later. These brackets do not require holes to be cut into the surface of the panels offering complete weather security.

Refer to Gerard Roofs for more information.

3.6 Panel installation

Care must be taken when handling, cutting, bending and installing to avoid damage to the surface. In particular, the paint finish must be kept clean.

Use rubber soled work shoes during installation and protective/synthetic padding on bending equipment.

Where work is still to be carried out on upper storey dormer windows or walls, panels can be left off to avoid damage or fallout from paint or plaster coatings. Alternatively, a plank embedded into 3 sand bags along its length can be used on top of the panel, with the sand bags placed over the support batten near the nose of the panel.

Where work is progressing above installed panels, dust sheets must be used held down with sand bags.

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3.6 Panel installation continued

Heritage, Classic and Milano

Heritage, Classic and Milano can be installed to a minimum of 12° and may be laid left to right or right to left. All laps to be the same way on each plane.

Stratos

Stratos can be installed to a minimum of 15° and may be laid left to right or right to left. The laps must be laid facing away from prevailing winds or line of vision. All laps should be the same way on each plane. Courses must be staggered in a random pattern to avoid patterning as you progress up a hip, or gable.

Senator, Alpine and Rockport

Senator, Alpine and Rockport can be installed to a minimum of 15°. These profiles may only be laid in a single direction, as follows:

- Senator and Alpine – left to right only
- Rockport – right to left only

Courses of all three should be laid in a random pattern, with staggered start points.

Senator should be installed with an intermediate batten at 185mm to support roof traffic.

Aspen

Aspen can be installed at a minimum of 15° and must be laid right to left. Reference can be made to the individual profile fixing pattern pages at the back of this specification manual. Courses must be staggered in a random pattern for Aspen, to avoid patterning as you progress up a hip or gable.

Eaves

At eaves, the front rows of panels are fixed to the battens alongside the fascia by driving nails through the top face into the eave batten. These nails are positioned at points of low water run off. Eaves nails for Smooth finish have a synthetic washer installed under the nail head, eaves nails on textured finishes are sealed with the touch up kit basecoat and chip.

Nailing panels

Successive rows of panels are fixed by driving 50mm nails through the centre of the panel nose into the face of the battens. These nails are spaced as shown/ described in the individual profile fixing pattern pages at the back of this specification manual.

Only Gerard Roofs approved nails should be used in the installation of panels and accessories.

Valleys

Panels are cut at the same angle as the valley, at appropriate points, and bent down into the valley; they must not touch the valley tray. At the ridge, panels are cut and bent up under ridge accessories.

Ridge, Hip, Gable and Wall flashings

Only factory produced flashings and trim as supplied by Gerard Roofs may be installed. Panels are turned up by a minimum of 40 mm and covered by Gerard Roofs accessories to the prescribed coverage. Special flashings can be formed and coated to order.

Wall roof lower junctions

Gerard roofs have proprietary PVC stop end flashings that direct roof/wall run off water into the rain water gutter system.

Membrane areas

If flat membrane areas such as Butynol overlap onto product surfaces, these can be painted with the touch up kit or base coated and granite textured.

Weather sealing

Proprietary or custom made rubber or metal flashings require neutral-cure silicone or MS sealants acceptable to Gerard Roofs to be used for weather-sealing services penetrating the roof. Sealant shall be applied between the flashing and panel surface and mechanical fasteners (rivets, Tek screws) installed to permanently fix the flashing in place.

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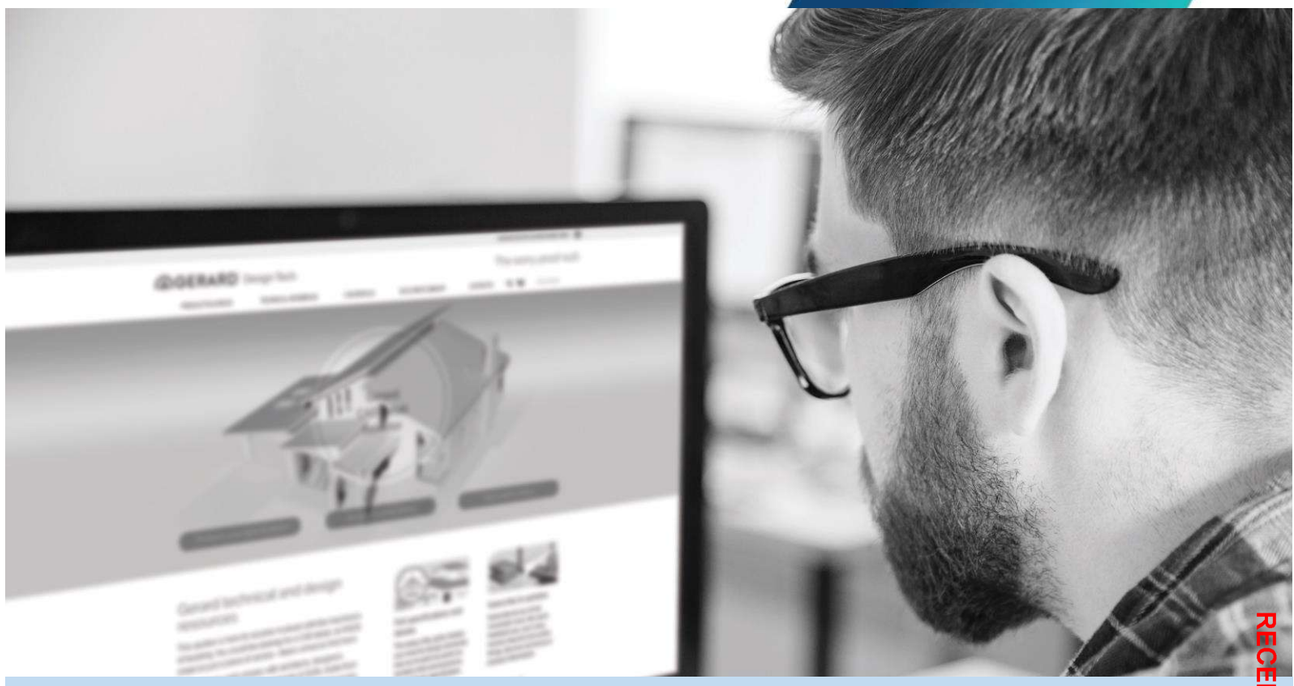

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4.0 Standard roof details

This section contains the common junction details and information you need to design and specify buildings with Gerard Roofs. The numbered sections (4.1; 4.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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4.1 Batten spacing – Eave

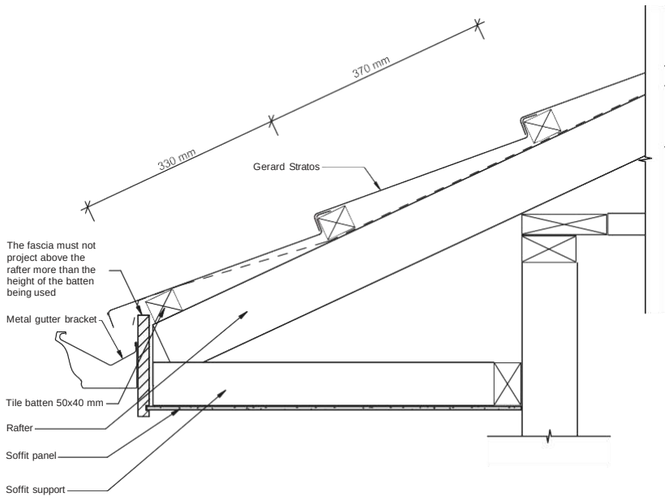

Fig 001 - Gerard Eave

4.2 Ridge installation

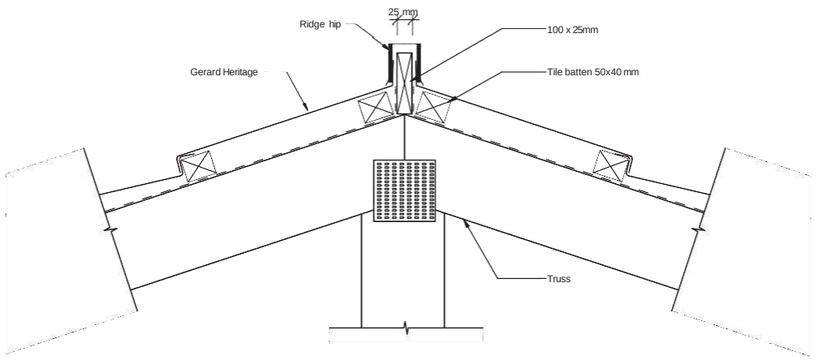

Fig 002 - Gerard Box TrimRidge Board/Batten- Truss

4.0 Standard roof details

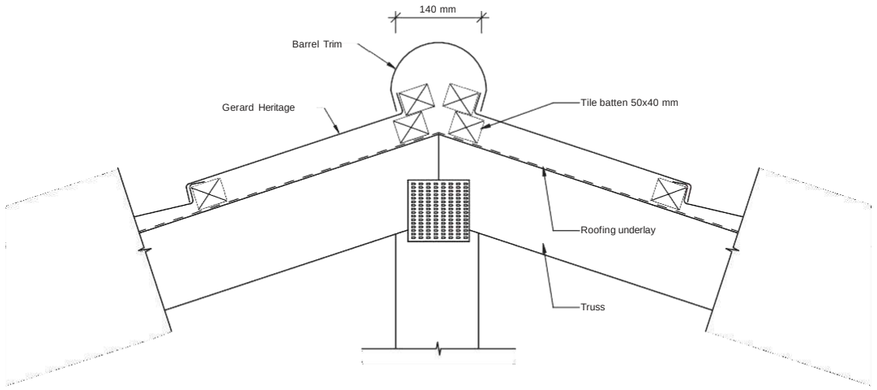

Fig 003 - Gerard BarrelTrim Ridge Board/Batten-Truss

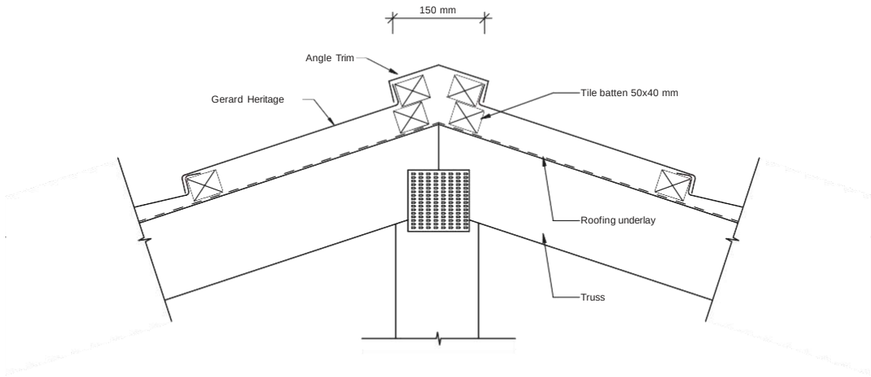

Fig 004 - Gerard Angle Trim Ridge Board/Batten- Truss

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4.3 Valleys

Gerard Roofs provide valley trays in two widths, a 160mm Combination Valley and a 250mm E2 Wide Valley for use where required by specification.

Valleys must be supported by valley boards; these should be installed with nogging where necessary.

The nogging should have at least 25 mm clearance beyond where the valley sits so battens have sufficient support and nailing width.

Panels above valleys should be turned down to within 5 mm of the valley tray but must not touch the tray.

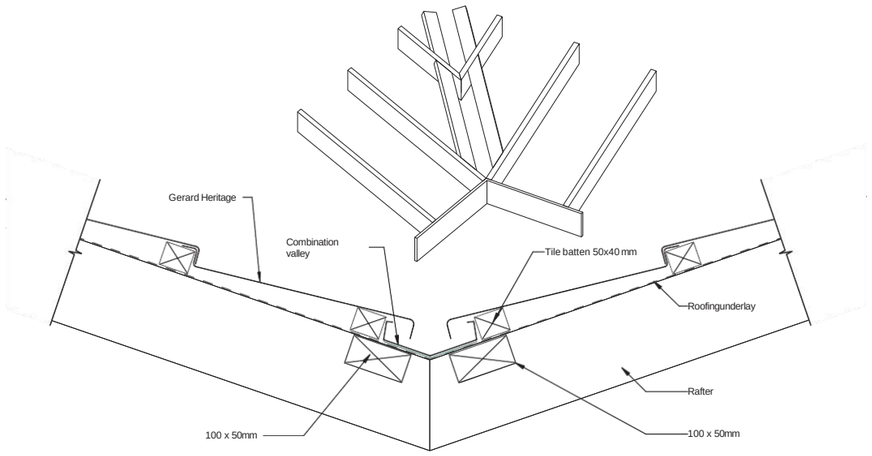

Fig 005 - Gerard Combination Valley

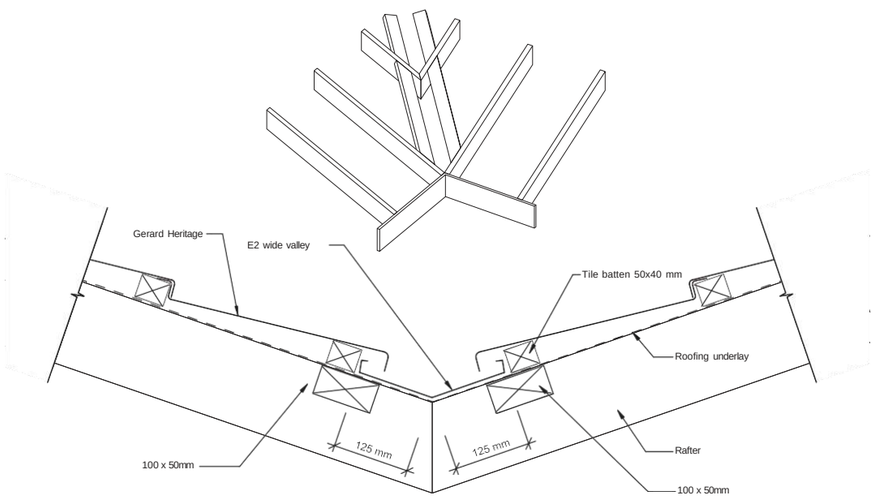

Fig 006 - Gerard E2 Wide Valley

4.0 Standard roof details

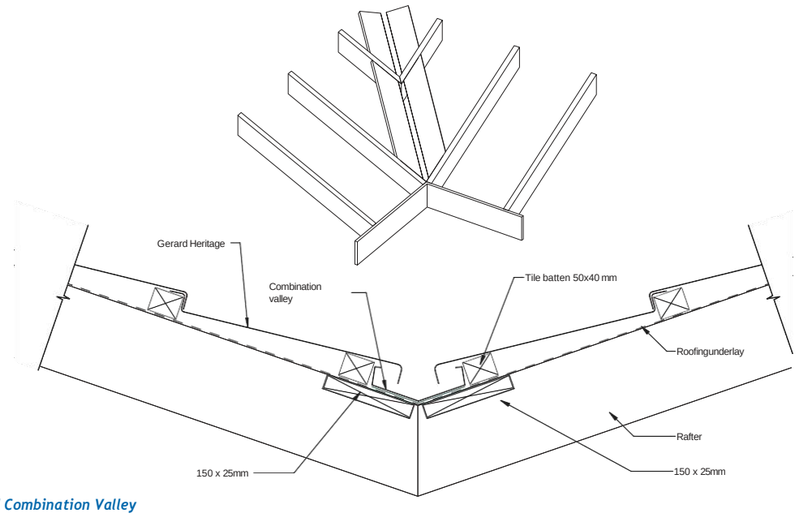

Fig 007 - Gerard Combination Valley

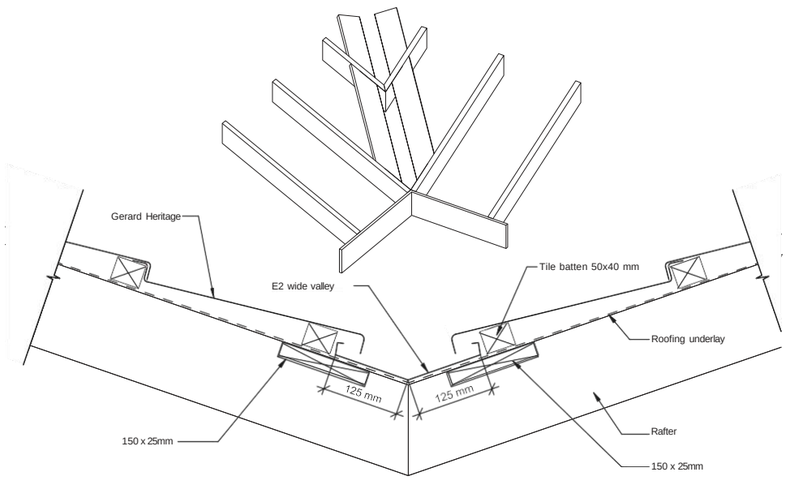

Fig 008 - Gerard Valley - E2 Wide Valley

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4.4 Hips

4.4.1 Installation of roof trim on hip junction with wooden battens

Roof panels that butt up to hip battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 35 mm.

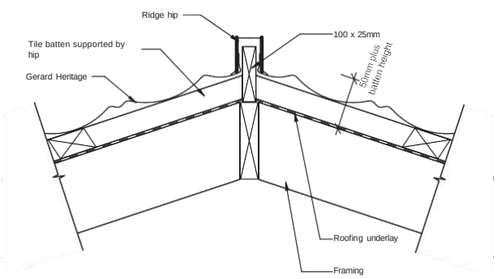

Fig 009 - Gerard Heritage Hip - Box Trim

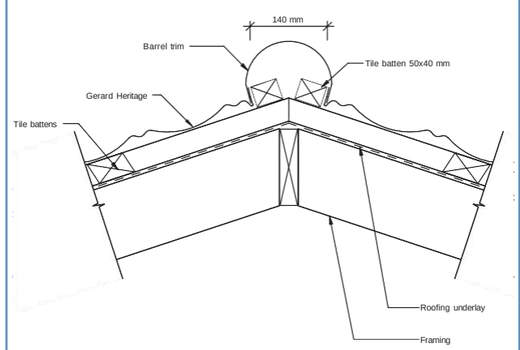

Fig 010 - Gerard Heritage Hip - Barrel Trim

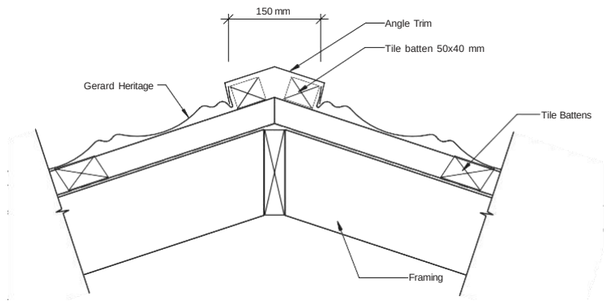

Fig 011 - Gerard Heritage Hip - Angle Trim

4.5 Barge/Gable ends

4.5.1 Installation of roof trim over a wooden fascia with batten

Roof panels that butt up to edge battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 25 mm.

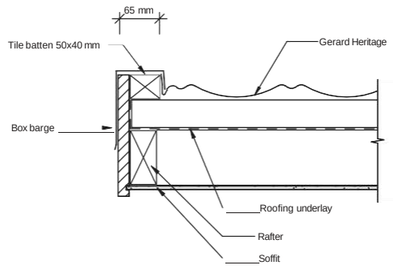

Fig 012 - Gerard Heritage Gable End - Box Barge

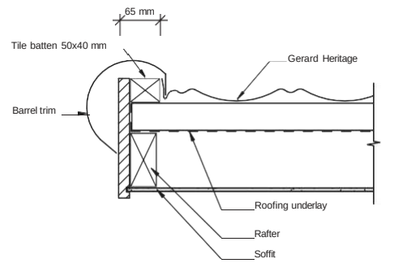

Fig 013 - Gerard Heritage Gable End - Barrel Trim

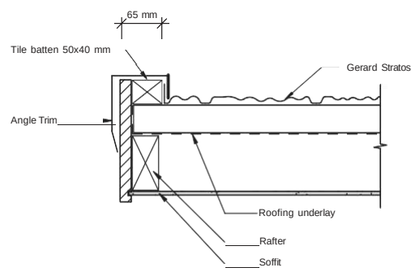

Fig 014 - Gerard Stratos Gable End - Angle Trim

4.5.2 Installation of roof trim over a metal fascia with and without batten

Roof panels that butt up to edge battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 25 mm.

Roof trims should be riveted to the metal facia.

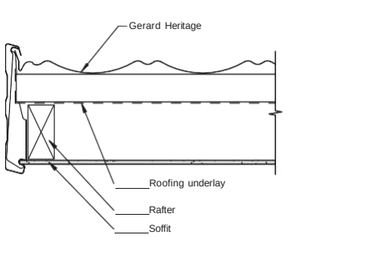

Fig 015 - Gerard Heritage Fascia - Box Trim

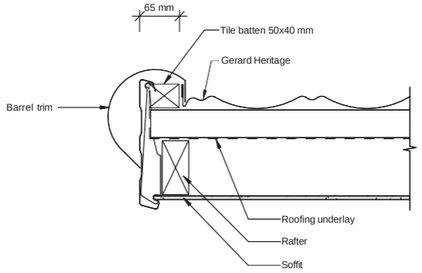

Fig 016 - Gerard Heritage Fascia - Barrel Trim

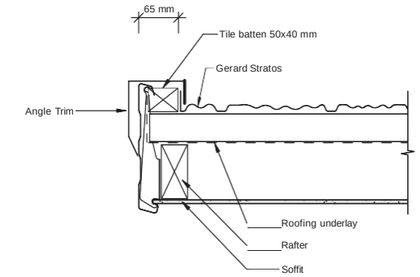

Fig 017 - Gerard Stratos Fascia - Angle Trim

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4.6 Wall flashings

There are several types of wall flashings that may be used with various thicknesses of wall claddings.

Gerard Roofs manufacture most of these without hooks or hems which then requires 100 mm coverage of the section hidden behind the wall cladding.

4.6.1 Side flashings

Side flashings are general purpose flashings suitable for use with most wall claddings.

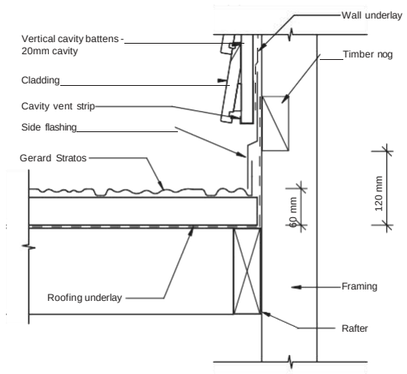


Fig 018 - Gerard Stratos Wall Parallel - Side Flashing

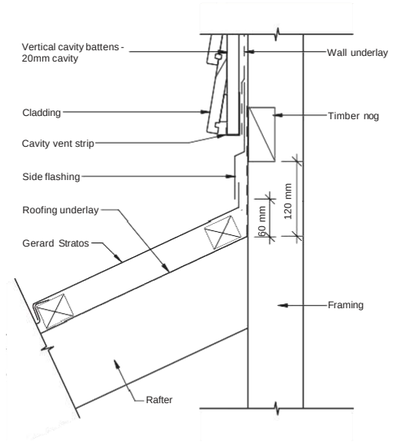


Fig 019 - Gerard Wall Transverse - Side Flashing

4.6.2 Step - Pitch flashings

Pitch flashings are a special system for thicker wall claddings like brick veneer. The transverse wall flashing is folded to closely match the roof pitch allowing the corner junctions to mitre neatly.

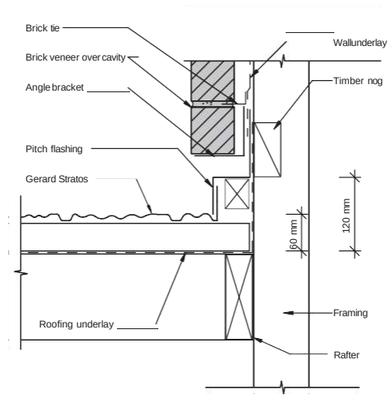


Fig 020 - Gerard Stratos Wall Parallel - Pitch Flashing

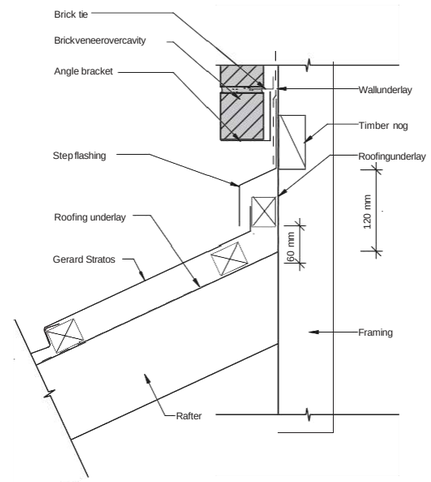


Fig 021 - Gerard Wall Transverse - Step Flashing

4.6.3 Soft edge apron flashings

Soft edge apron flashings are general purpose flashings suitable for most wall claddings. The soft edged aluminium is moulded down to meet the surface of the panel.

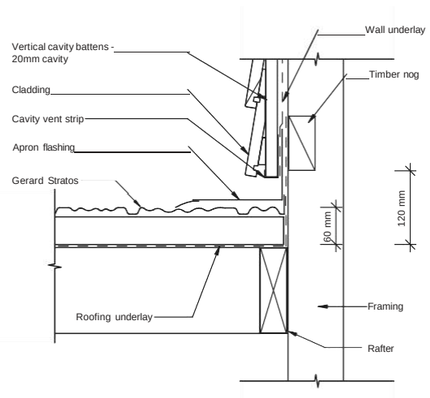


Fig 022 - Gerard Stratos Wall Parallel - Apron Flashing

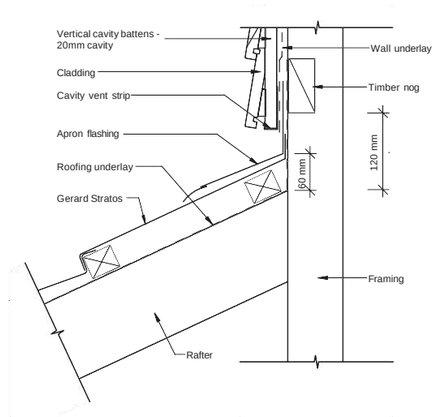
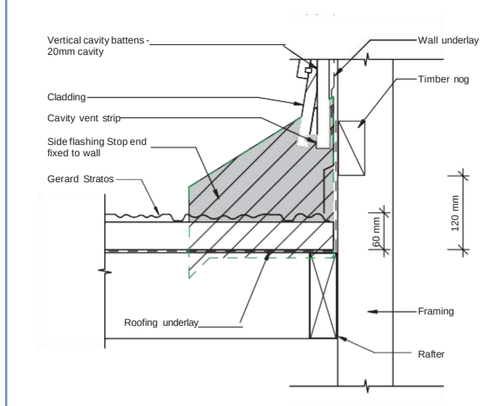


Fig 023 - Gerard Transverse - Apron Flashing

4.7 Wall Stop Ends

Gerard Roofs proprietary PVC Stop Ends direct water away from the roof and wall and into the rain water collection gutters. There are left and right versions.



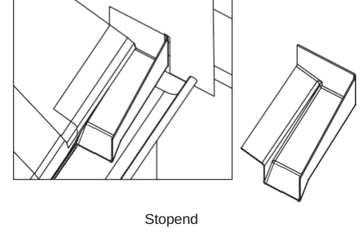


Fig 024 - Gerard Wall Parallel - Stop End Wall

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4.8 Change in pitch

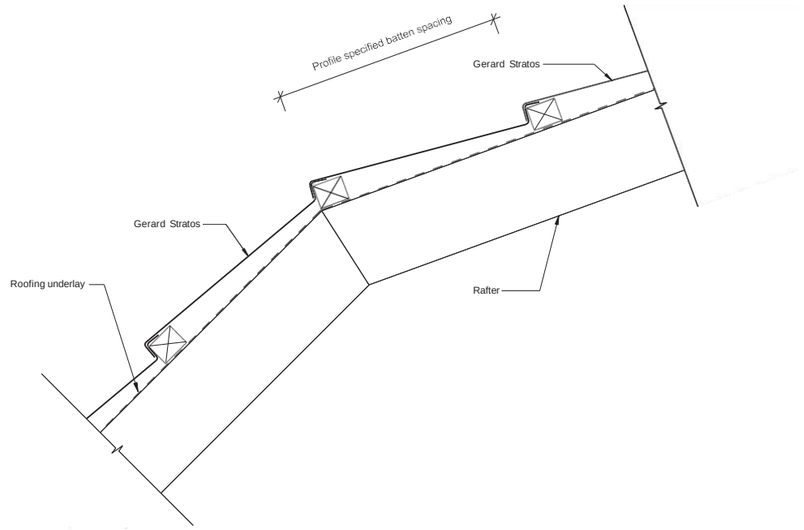

Fig 025 - Gerard Change in Pitch - Low Pitch to High Pitch
Abatten is located at the pointwherethe roof line changes pitch. If an exact number of courses of fullpanels is notpractical a panel may be bent to suit.

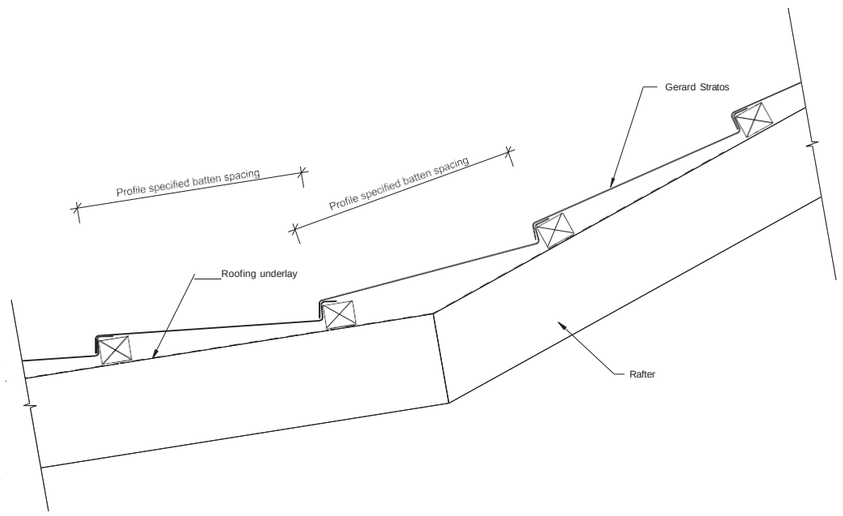

Fig 026 - Gerard Change in Pitch
A batten is located at the pointwhere the roofline changes pitch. If an exact number of courses of full panels is not practical a panel may be bent to suit.

4.0 Standard roof details

4.9 Penetrations

4.9.1 Pipes

Pipe penetrations should be flashed using an EPDM flexible sleeve/boot or similar, such as Aquaseal. The edge of the EPDM flexible sleeve/boot should be fixed at 45° tohorizontal.

4.9.2 Chimneys

Chimneys require specific flashings depending on the type and width of the chimney.

Cylindrical chimneys may be flashed with a large EPDM rubber sleeve similar to pipe flashings.

Rectangular chimneys require a back flashing. For chimneys up to 600 mm wide this may be made of flat sheet supplied by Gerard Roofs, AZ150 pre-painted steel, aluminium, or a supported butyl membrane.

Chimneys exceeding 600mm in width

For chimneys and other penetrations wider than 600mm an internal gutter should be used to create a fall to the edges of the penetration.

This requires a cricket flashing or slope to direct water to the edges using a supported butyl membrane.

Where the chimney is situated at the eave an internal gutter should be installed around the side to allow water to exit into the eave's rainwater system.

Angled internal gutters should be formed using butyl rubber or other inert material such as aluminium. These should be installed by suitably qualified Licensed Building Practitioners (LBPs).

4.9.3 Roof windows

Refer to specific roof window supplier's installation instructions. Typically this will involve cutting and bending panels up to the perimeter of the roof window in a manner that supports installation of the proprietary flashings supplied by the roof window manufacturer.

4.9.4 Solar panels

Refer to specific solar panel supplier's installation instructions. Note that these should allow for fastening directly to the rafters and not to the roof panel battens. Penetrations of the support must be appropriately flashed to ensure weather security, e.g. an EPDM flexible sleeve/boot.

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4.10 Extra high wind zone installation

Refer to *Table 04 Fasteners for Panel Battens - Wind Zones - NZS3604.* (Page 23)

Gerard Roofs fixing patterns do not change for extra high wind zones.

Gerard Roofs can provide a wall flashing that retains the panel turn up and offers greater wind-blown rain protection. This is an extended side flashing that has a soft edge to contour the panel surface and a hem at the top section that is mandatory for roofs in extra high wind zones.

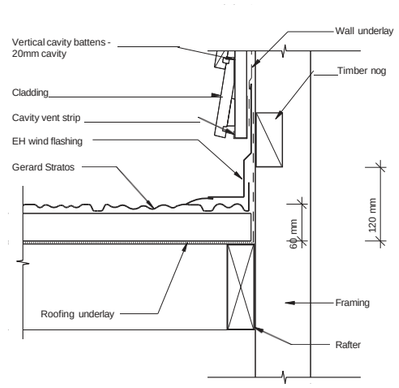

Fig 027 - Gerard Stratos Parallel - EH Wind Wall Flashing

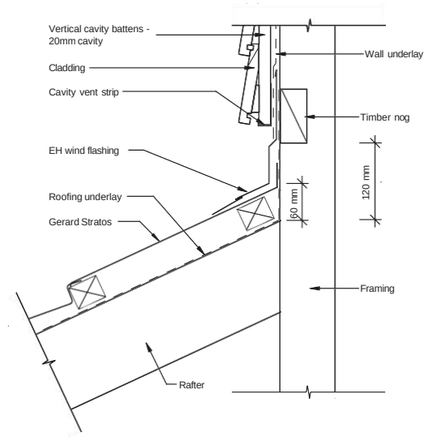

Fig 028 - Gerard Wall Transverse - EH Wind Wall Flashing

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5.0 Components & fixing patterns

This section contains useful installation information for very detailed specification. You'll find a complete list of Gerard Roofs componentry and specific layout and fixing instructions for each of the eight Gerard Roof profiles. The information contained in this section is also contained in individual product profile sheets available for download at www.gerardroofs.co.nz/designtech

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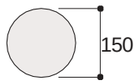
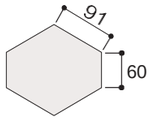
5.1 Gerard Roofs components

To accompany their eight roof profile panels – Stratos, Senator, Rockport, Alpine, Aspen, Milano, Heritage and Classic – Gerard Roofs produces a full range of accessories.

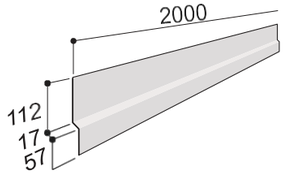
All components are produced in the same way, from the same steel and, where appropriate, coated to match the roof profile panels themselves using the same materials and techniques to ensure complete synergy for performance and aesthetics.



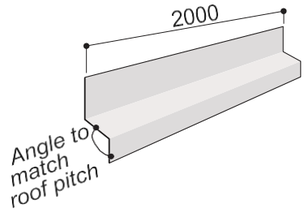
Barrel Trim End



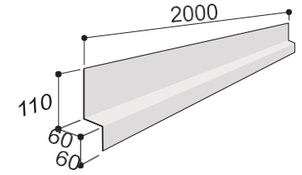
Angle Trim End



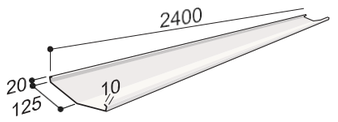
Side Flashing



Step Flashing



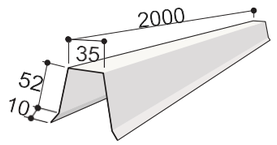
Pitch Flashing



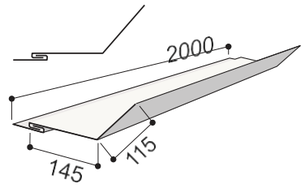
E2 Wide Valley

Left Stop End

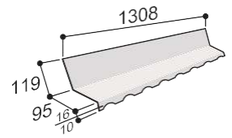
Right Stop End



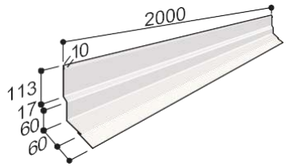
Box Trim



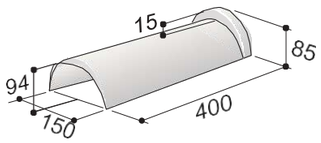
Apron Flashing



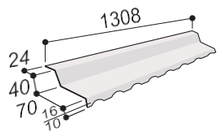
Milano Wall Flashing



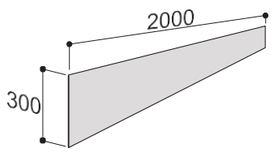
EH Wind Wall Flashing



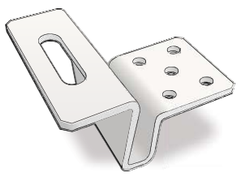
Barrel Trim



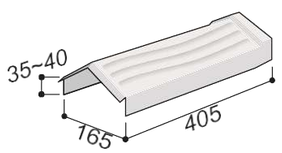
Milano Ridge Flashing



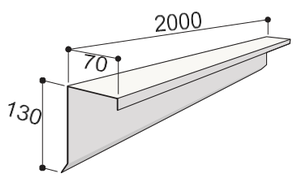
Flat Sheet 300 (Also 400 and 490)



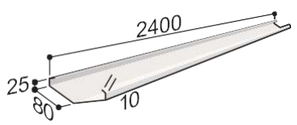
Solar Brackets



Angle Trim



Box Barge



Combination Valley

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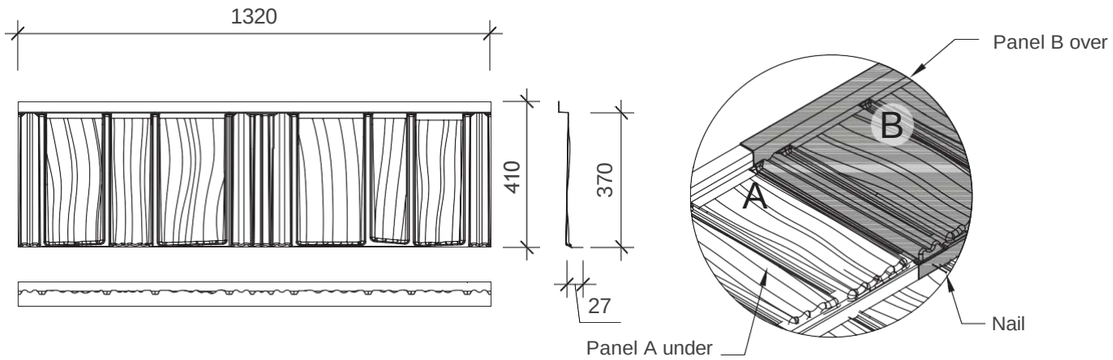
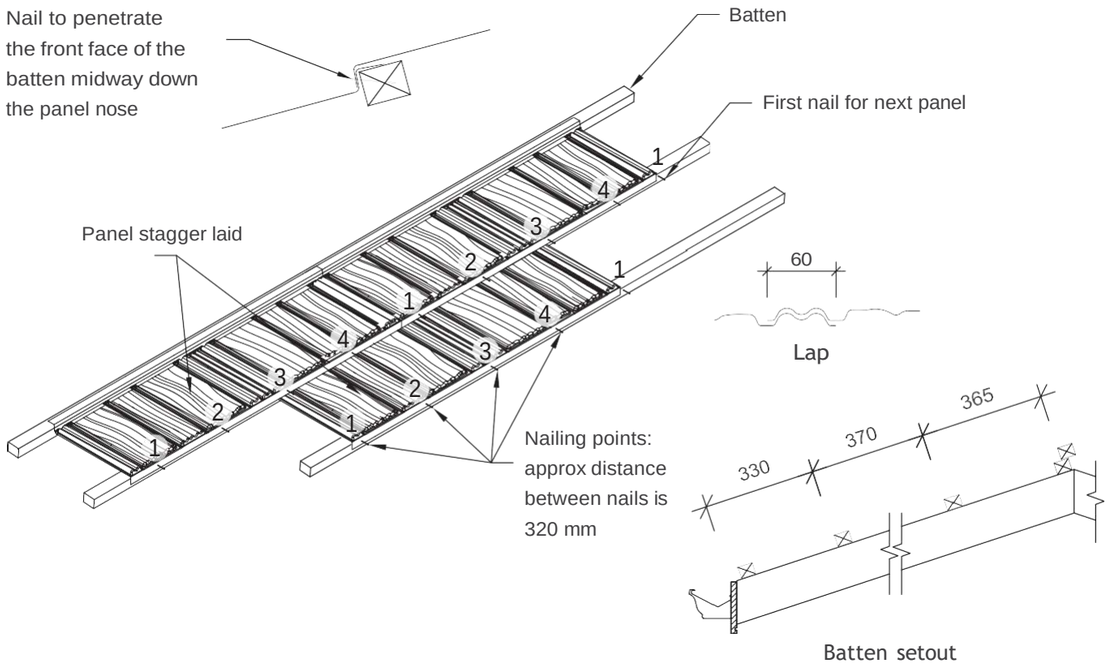
5.2 Gerard Stratos installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

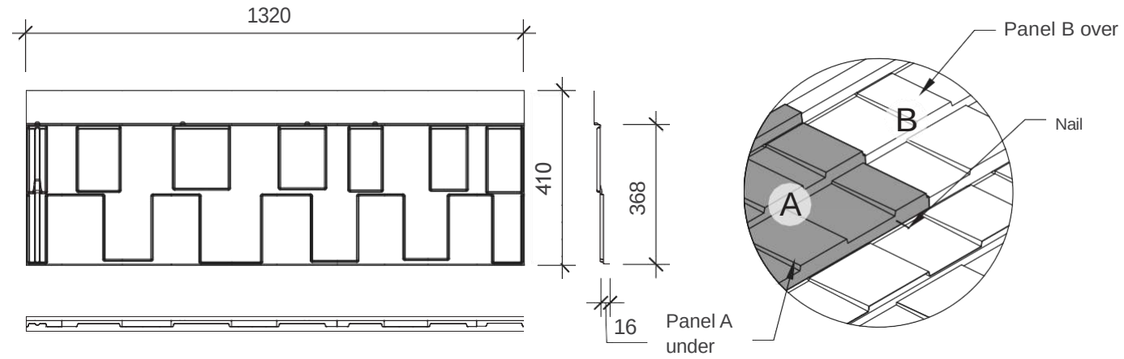
Fastening Panels in Cyclone Areas

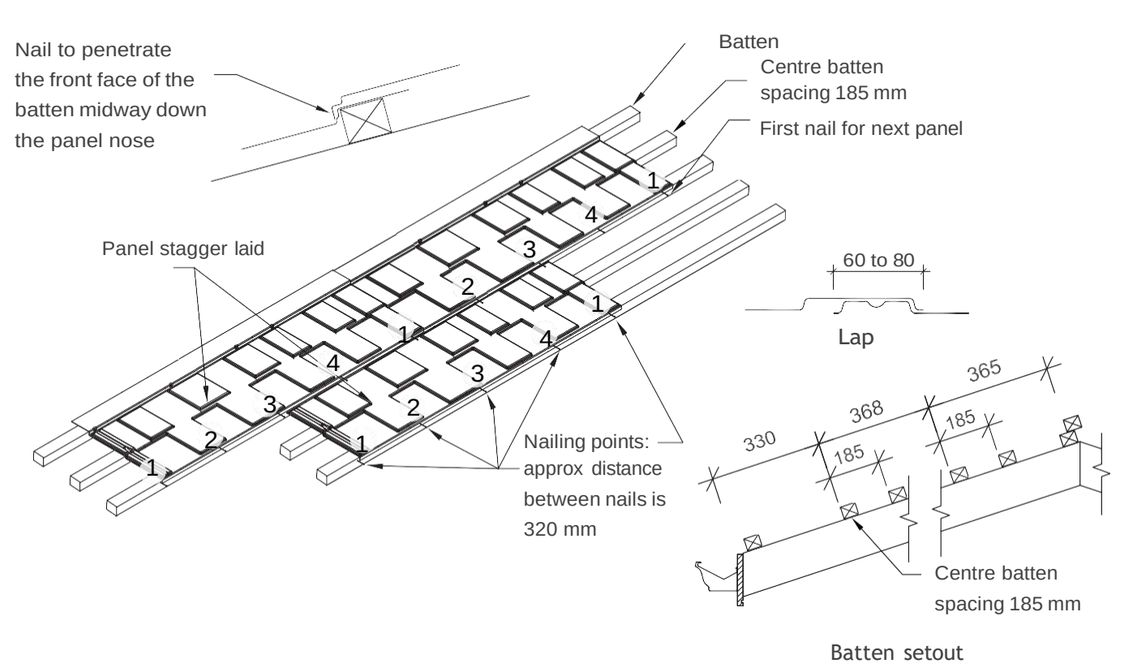
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given are nominal.

5.3 Gerard Senator installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given arenominal.

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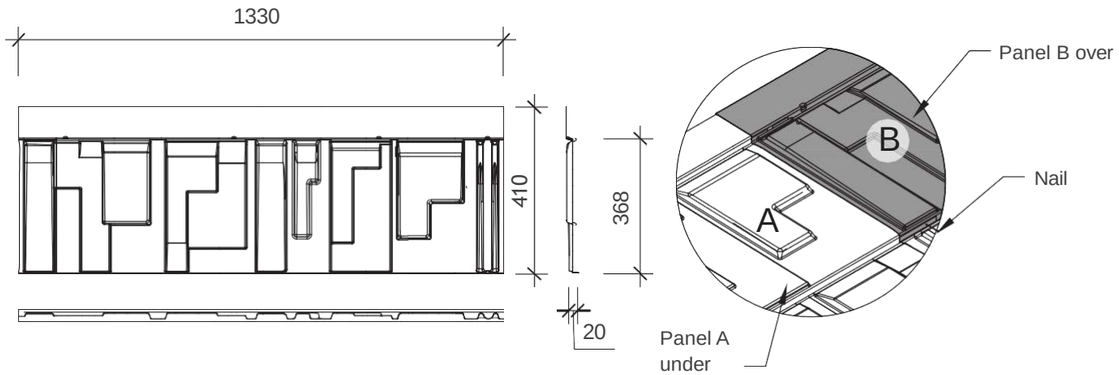
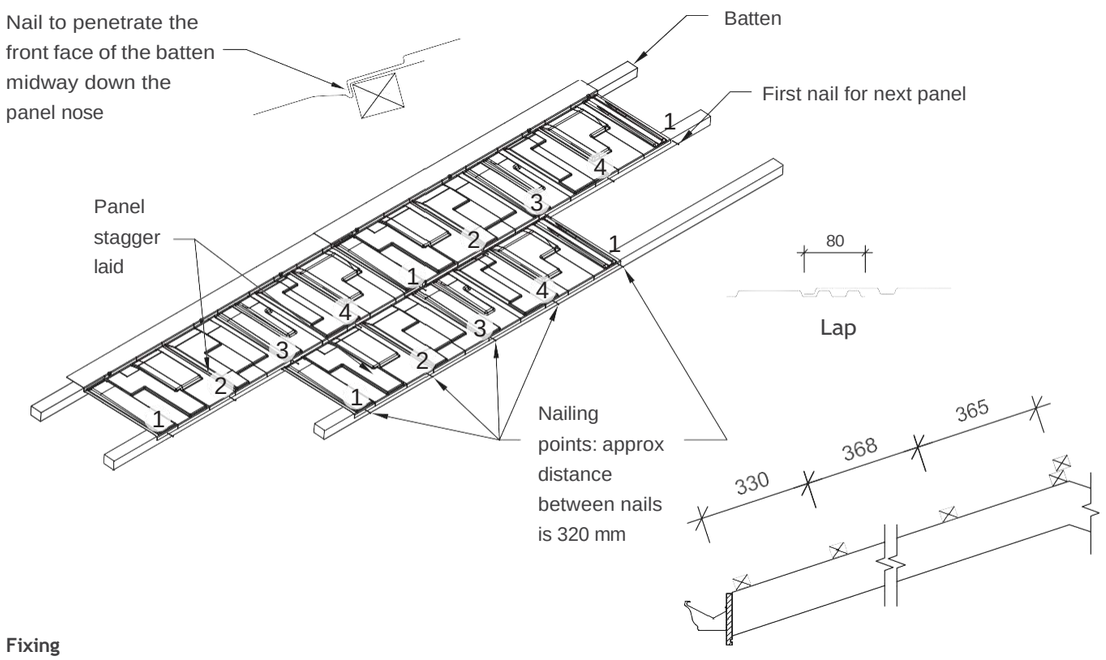
5.4 Gerard Rockport installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

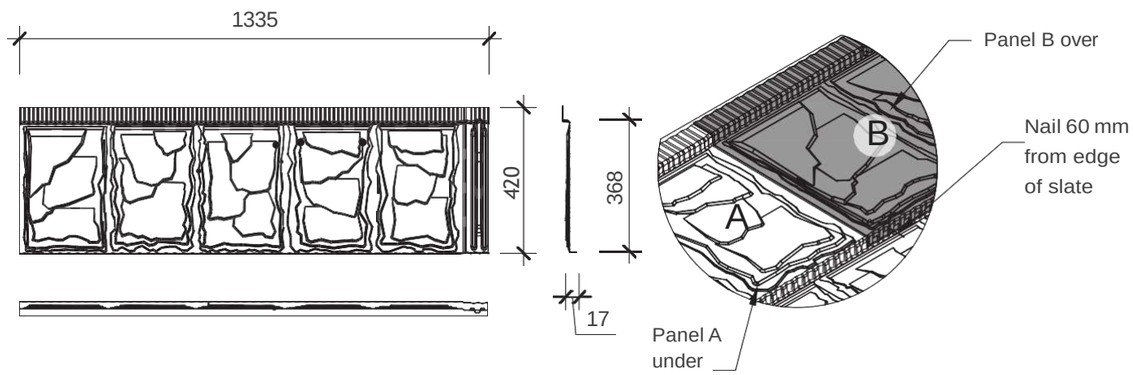
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

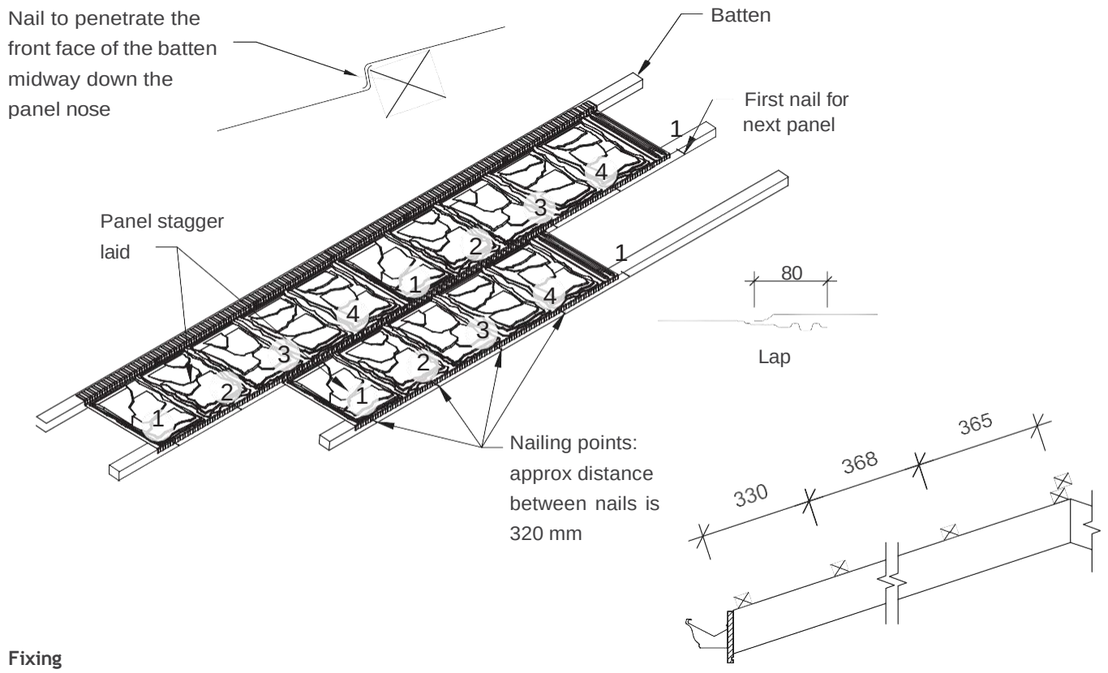
Dimensions and weights given are nominal.

5.0 Components & fixing patterns

5.5 Gerard Alpine installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given arenominal.

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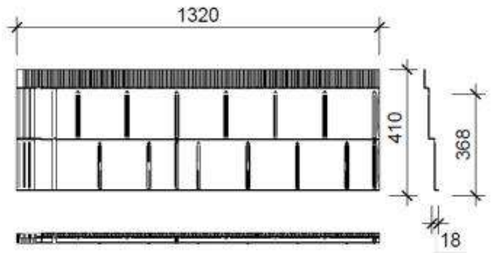
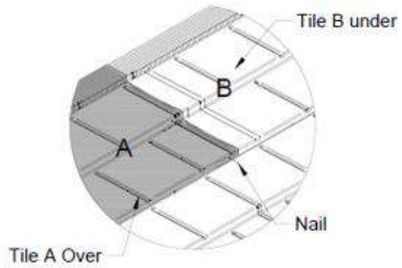
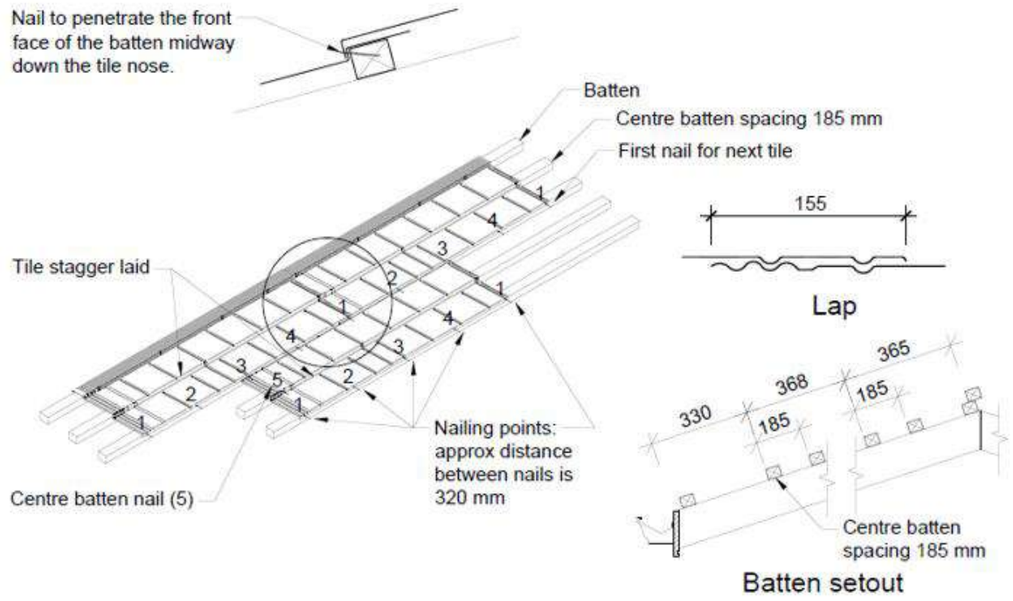
5.6 Gerard Aspen installation

Panel installation instructions & nailing positions



Tile dimensions





Batten setout

Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

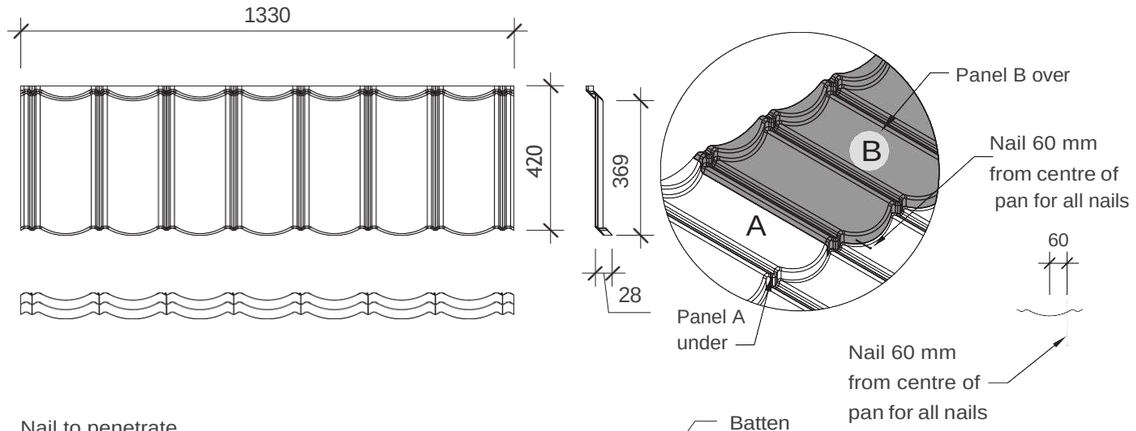
Fastening Panels in Cyclone Areas

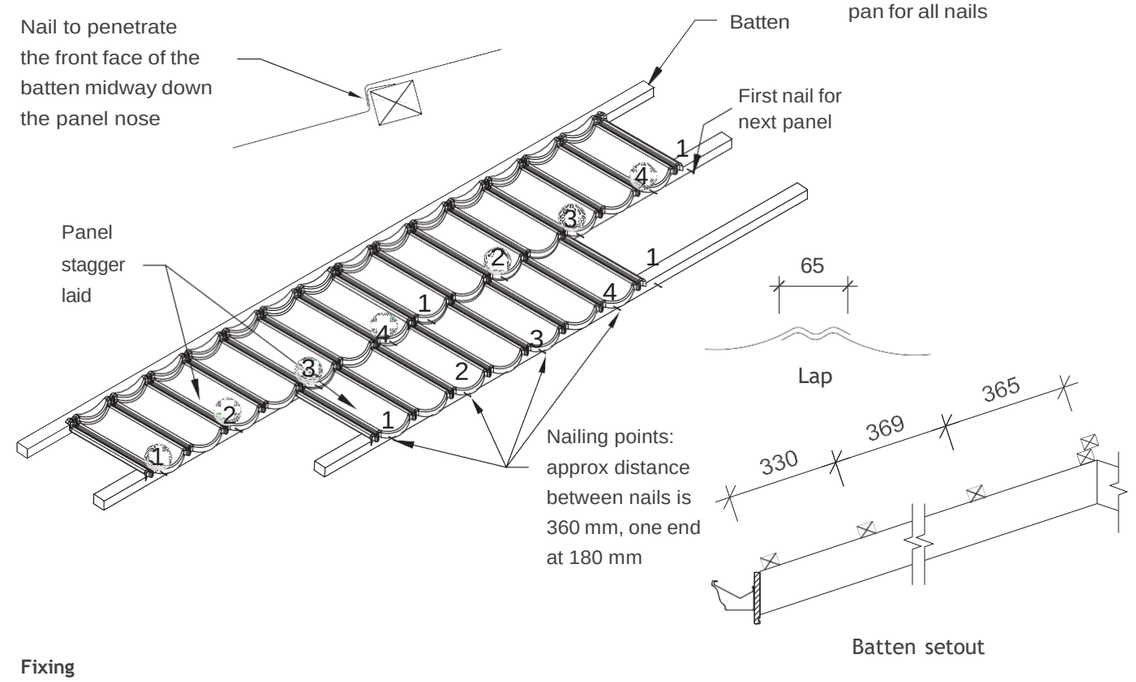
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx. 160 mm spacing (each module).

Dimensions and weights given are nominal.

5.7 Gerard Heritage installation

Panel installation instructions & nailing positions





Batten setout

Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx. 160 mm spacing (each module).

Dimensions and weights given arenominal.

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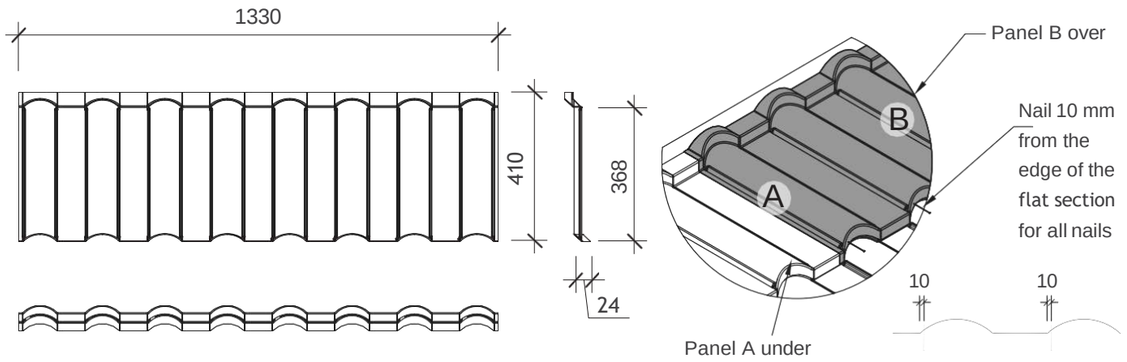
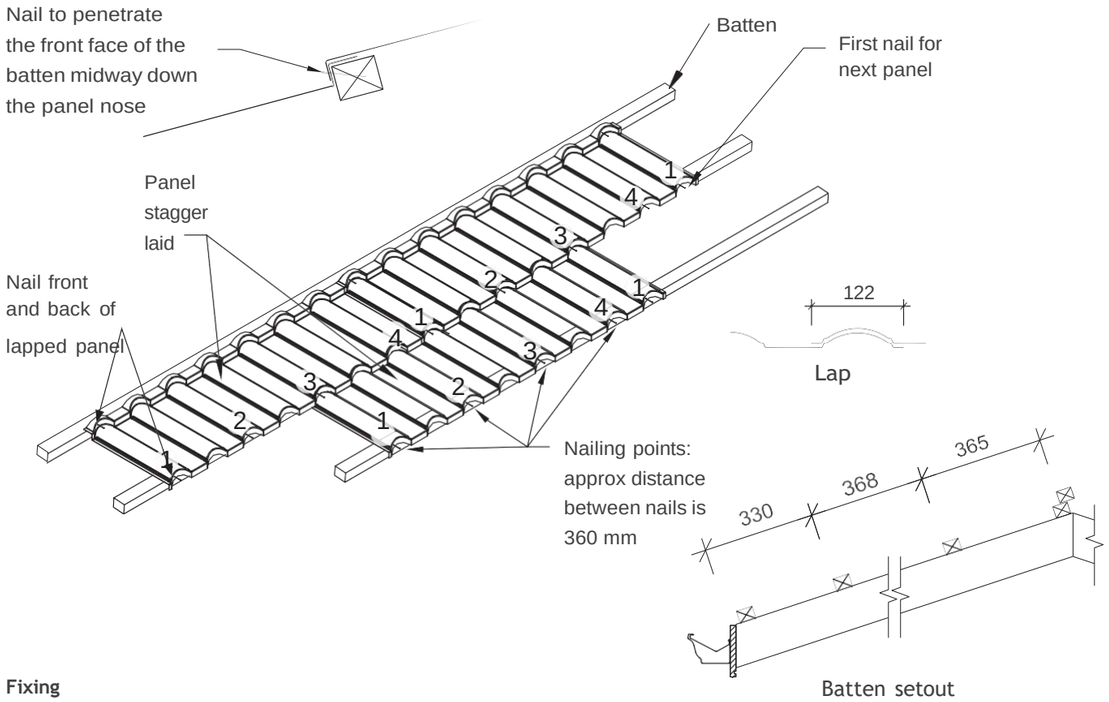
5.8 Gerard Milano installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.
- Nail front and back of lappedpanel.

Fastening Panels in Cyclone Areas

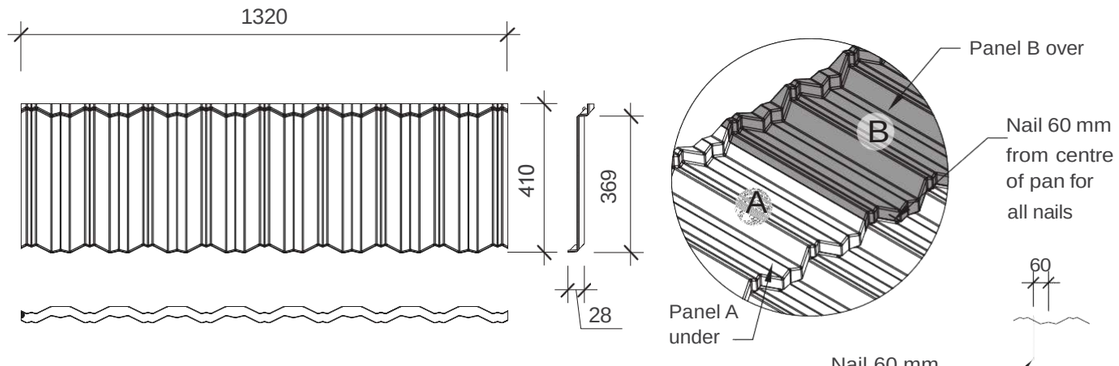
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

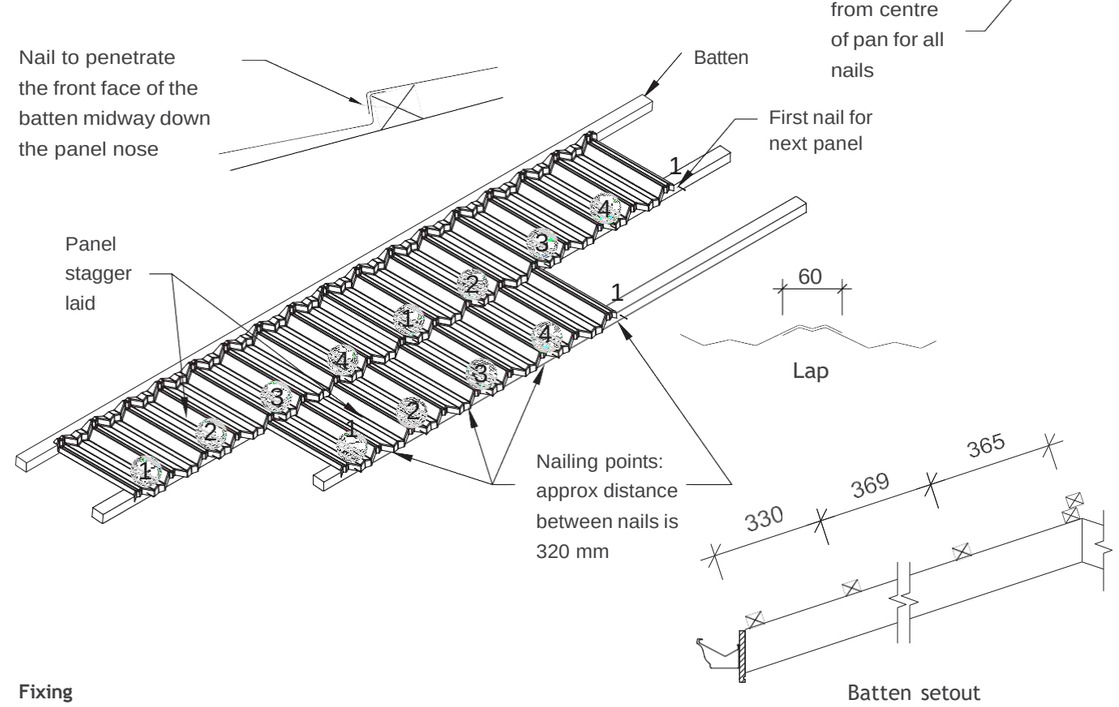
Dimensions and weights given are nominal.

5.0 Components & fixing patterns

5.9 Gerard Classic installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given arenominal.

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Important information about this material

The Gerard Roofing System

RoofTG Pacific Ltd accepts no liability if the Gerard roofing system is not used in accordance with instructions contained in this publication.

Use only the current specification

This publication may be superseded by a newer publication. RoofTG Pacific Ltd accepts no liability for reliance upon publications that have been superseded. Before using this manual check whether this is the current version; simply call the Gerard Roofs Helpline on 0800 100 244 or visit www.gerardroofs.co.nz

Substitution

RoofTG Pacific Ltd accepts no liability if the systems are not installed in accordance with instructions contained in this and other Gerard Roofs technical literature. Substitution of specified or recommended components with alternative brands can compromise performance dramatically. The Gerard roofing system is not generic and must be installed as specified including the use of Gerard branded components.

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Rinnai INFINITY gas continuous flow water heating

Specification guide: A-Series, EF26, HD49, and N-Series

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Rinnai

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Important

Rinnai is constantly improving its products, and as such, information and specifications are subject to change without notice. For the most up-to-date information, go to www.rinnai.co.nz.

Help is here

For more information about buying, using, and servicing of Rinnai appliances call 0800 RINNAI (0800 746 624).

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Contents

Leaders in gas continuous flow 4
Rinnai INFINITY range 5
What is continuous flow 6
Model selection for residential applications 7
Location of a Rinnai INFINITY 8

Product specification pages

Rinnai INFINITY A-Series 10
Rinnai INFINITY EF26 12
Rinnai INFINITY HD49 and HD250 range 14
Rinnai INFINITY N-Series 16
Rinnai INFINITY accessory matrix 18
Rinnai INFINITY internal flueing 20

Rinnai INFINITY accessory product pages

Digital controllers 26
Metal recess box 28
Pipe covers 29
Rinnai INFINITY flue diverters 30
N-Series N56kWi flue diverter kit 32
Security bracket 33
Commercial error switch 34
EZ HD connect cable 34
N-Series cascade cable, and pump cable 35
HD manifolding (MECS) 34

Appendices

Appendix 1: Water flow and gas usage 38
Appendix 2: Rinnai INFINITY inbuilt frost protection 46
Appendix 3: Gas boosted solar 47
Appendix 4: Rinnai INFINITY Limited Warranty 48
Appendix 5: LPG gas bottle consumption and clearances 52
Appendix 6: The future of gas in New Zealand 53

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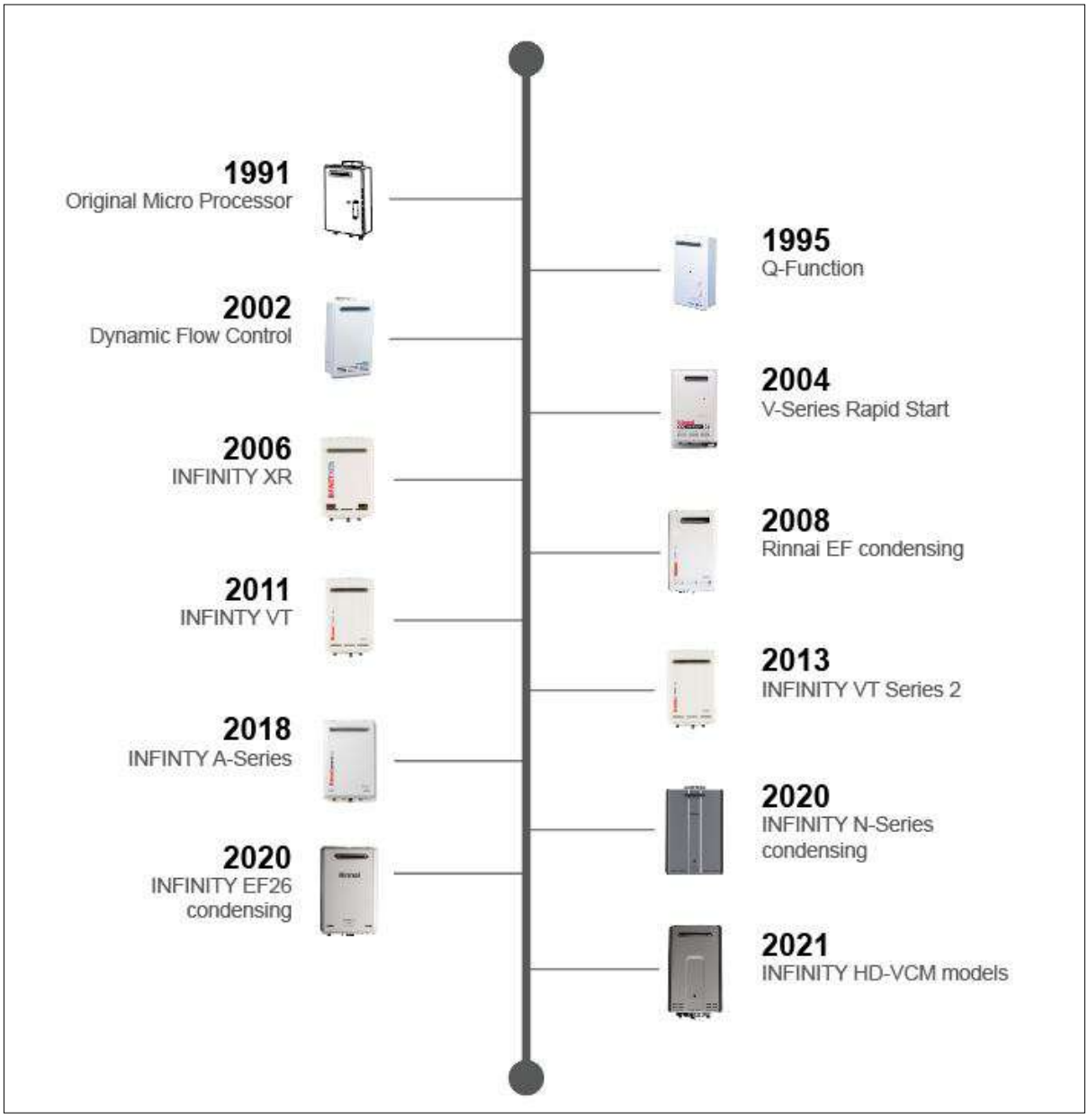
Leaders in gas continuous flow

When you turn on a tap you want water at the right temperature fast, which is why over the years we've devoted considerable time and resource to leading edge research and development.

We were the first to introduce continuous flow technology and have been tirelessly working on improving this ever since.

Rinnai INFINITY continuous flow technology timeline



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Rinnai INFINITY range

The Rinnai INFINITY range is made up of four categories to cater for a variety of hot water demands and installation requirements.

Category	Suitability	
Rinnai INFINITY **A-Series** Improved accessibility for easier and faster service	Residential applications only	
Rinnai INFINITY **HD** Heavy duty on demand for demanding jobs	Residential and commercial applications	
Rinnai INFINITY **N-Series** Condensing technology to deliver higher efficiencies.	Residential and commercial applications	
Rinnai INFINITY **EF26** Condensing technology, replacing the EF24.	Residential applications only	

Model	Mounting position	Input	Output	Thermal efficiency on high	Status monitor
A16	External	16.3-124 MJ/h	27.8 kW	80.5%	No
A20	External	19.9-156 MJ/h	34.9 kW	80.5%	No
A24	External	16.3-184 MJ/h	42.0 kW	81%	No
A26	External	16.3-199 MJ/h	44.5 kW	80.5%	No
A28i	Internal	11.0-210 MJ/h	48.8 kW	83.5%	Yes
EF26	External	16.3-175 MJ/h	44.5kW	91.5%	No
N49kWi	Internal	11.0-210 MJ/h	48.8 kW	83.5%	Yes
N49kWe	External	11.0-210 MJ/h	48.8 kW	83.5%	Yes
HD250	External	20.0-249 MJ/h	57.8 kW	83%	No
N56kWi	Internal	16.0-209 MJ/h	55.5 kW	97%	Yes
N56kWe	External	16.0-209 MJ/h	55.5 kW	97%	Yes

Service and maintenance

For reliable operation Rinnai INFINITY continuous flow water heaters in residential applications should be serviced every two years. For commercial applications Rinnai has a maintenance and servicing schedule, please contact us for more information.

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What is continuous flow?

A continuous flow hot water system only heats water when it passes through the unit. It will deliver heated water at a predetermined flow rate, depending on the model, as long as the unit is connected to power and gas.

General principle of operation
Each Rinnai INFINITY has a number of components that control the water temperature and water flow. These are:

- PCB (onboard computer)
- water flow control valve
- water flow sensor
- modulating gas valve
- outlet water temperature sensor

When a tap is turned on the unit senses the need to start. The combustion fan starts, ignition begins (electronic requiring electricity), and the gas valve opens. Once the flame is established the appliance will heat the water through the heat exchanger (as required) until the tap is turned off.

What is condensing continuous flow?
The Rinnai N-Series and EF26 utilise condensing technology to deliver higher efficient water heaters, requiring less gas to operate. These water heaters, via a secondary heat exchanger, unlock energy that would otherwise be wasted.

They do this by preheating the incoming water through the transfer of heat from the exhaust gas, which in a standard unit would otherwise be wasted.

Water then flows to the primary heat exchanger and is heated. as the water is already preheated it uses less gas to reach the required temperature.

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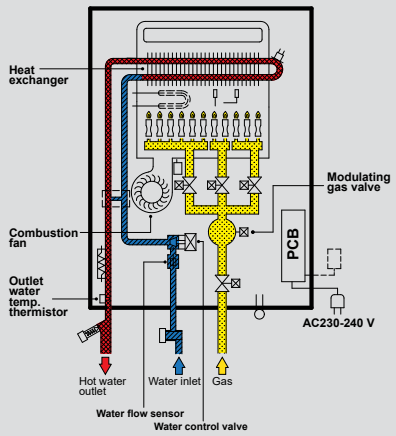
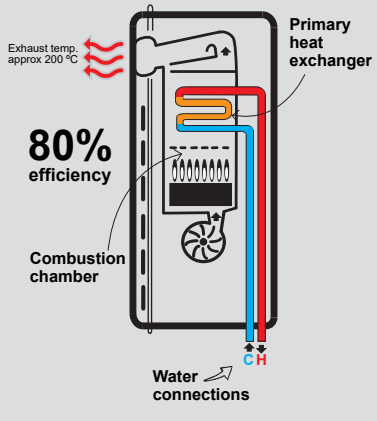
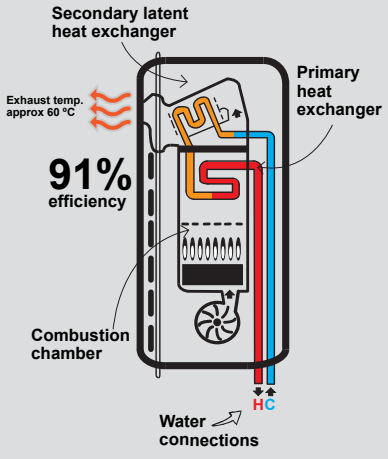
Standard continuous flow - general principle of operation



Standard water heater



EF26 Condensing water heater



Please note
The N-Series models utilise the latest condensing technology. The way they operate differs from the EF26 shown above. The latest N-Series models have the highest thermal efficiency of the INFINITY range at 97%.

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Model selection for residential applications

When specifying residential applications there are some questions you need to ask when selecting a model or models. Keep in mind future requirements of the building. Water heating solutions should be designed to the number of hot water outlets and not the number of people.

How many bathrooms?
An A16 or A20 unit may be suitable for a one bathroom home, a two or three bathroom home will need a larger Rinnai INFINITY, or even multiple units.

Where are the bathrooms and other hot water outlets in the building?
Where are the bathrooms and other hot water outlets in relation to where the water heater is to be installed. In most cases it is better to site the Rinnai INFINITY closer to the kitchen where there is an immediate demand for hot water. If bathrooms are situated at opposite ends of the house two units may be required.

Simultaneous demand?
How likely will hot water outlets, such as showers, be used at the same time?

Scenario one: Two bathroom home with a couple who rarely use the second shower—an A20 may be suitable.

Scenario two: Two bathroom home with a family of five who fight for two showers in the morning—a larger Rinnai INFINITY would be needed.

What type of tapware is installed?
There is a large range of tapware in the market, some with very high flow rates. The main consideration is the type of shower rose installed and how many litres it puts out—typical flow rates for showers is around 8-12 L/min. This needs to be factored when determining the model. To measure the flow rate of a shower, hold a bucket under the shower rose for one minute and measure the water volume.

Location in New Zealand?
Ambient water temperatures will vary throughout the country, especially in winter. This is important when determining incoming water temperature and the temperature required at the hot water outlet, as this will affect how much hot water the unit can deliver. For more information refer to Appendix 1 on p.38 and the below model selection graph.

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Model selector example

Determine the hot water outlets that will run simultaneously and list the flow rates against them.

Hot water outlet	Typical flow rate	Worked example
Bathroom 1	9 L/min	9 L
Bathroom 2	9 L/min	9 L
Kitchen	6 L/min	6 L
Laundry	6 L/min*	
Other	Allow 6 L/min	
TOTAL		24 L

* Some washing machines, particularly front loaders, have a cold-only connection as they have an internal heater. Hot water in this instance would not need to be factored into this calculation.

In the column for the geographical region move down until a number bigger than your total appears.

Warm (L/min)	Mild (L/min)	Cool (L/min)	A-Series	HD	EF26 & N-Series
16	13	11	16	HD49 (28)	EF26 (26)
20	17	14	20	HD49 (28)	EF26 (26)
24	20	17	24	HD49 (28)	EF26 (26)
26	22	19	26	HD49 (28)	N56 (32)
30	26	22	26	HD250 (32)	N56 (32)
32	27	23	28i	HD250 (32)	N56 (32)

Read across the model, e.g. for 24 litres per minute in the mild zone an A26 is selected. If you find the flow rate is greater than the figures listed in the table please contact Rinnai for advice. Multiple units or an alternative hot water heating solution may be required.

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Location of a Rinnai INFINITY

To provide safe and effective water heating it is important to adhere to all the relevant gas installation standards. If in doubt it pays to consult a licensed gasfitter to double check where the unit can be located.

General installation considerations

The Rinnai INFINITY should be placed as close as possible to the most frequently used hot water outlet(s) to minimise the delay for hot water. In most cases it's better to site the unit closer to the kitchen where there is an immediate demand for hot water.

For installations where the distance between the water heater and outlets is considerable, a flow and return system with a buffer tank can be used to minimise the waiting time for hot water. Alternatively multiple units can be strategically placed to serve different outlets.

Operating noise

Some people are susceptible to low level noise. Rinnai INFINITY units operate at around 50-54 dB(A). This needs to be considered if locating the appliance near a bedroom.

Easy access

All continuous flow water haters must be installed so that access can be gained for servicing and repair without hazard or undue difficulty.

If mounting the unit at height the owner must arrange permanent and safe access, or provide another means of safe access such as scissor or boom lifts.

External models

External models are designed for outdoor installations only. They must be located above ground where products of combustion can be naturally dispersed. They should not be in enclosed areas as the unit can suffocate on its own flue gases, which will cause the unit to malfunction. Refer to the general flue clearances diagram below.

Internal models

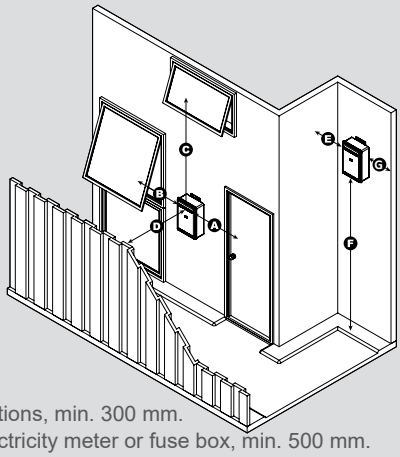
Internal models are designed for indoor installations only. They are a flued appliance. They may be installed in an enclosure if the requirements of AS/NZS 5601.1 are met. An enclosure is defined as a compartment, enclosed area, or partitioned off space primarily used for the installation of the appliance.

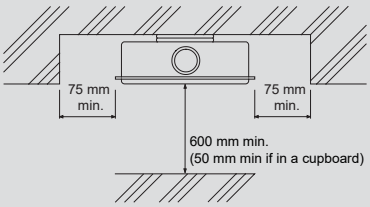
Example of an internal unit installed in a cupboard - Rinnai Auckland showroom

For internal units we recommend a 600 mm clearance in front of the unit for servicing access. This can be reduced to 50 mm if installed in a cupboard, refer clearances below.

GENERAL FLUE CLEARANCES: External models | Internal models

Dim.	A-Series, EF26	N56kWe, HD49kWe[1], HD250
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm[2]
G	Min. 300 mm	Min. 300 mm





Below eaves, balconies, and other projections, min. 300 mm.
From a gas meter 1000 mm. From an electricity meter or fuse box, min. 500 mm.

[1] If the HD49kWe is downrated to a 26 L unit (MJ rating decreases) then the clearances shift to the A-Series / EF26 column
[2] Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.

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Rinnai **INFINITY**

product specification pages

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Instant vs continuous flow hot water

If an outlet is more than 15 m away from the INFINITY there could be a time delay for hot water of approximately 10-15 seconds. To minimise hot water delivery times, pipe sizing, INFINITY model selection and location are important. Consult a licensed gasfitter for more information.

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Rinnai INFINITY A-Series

Description

Designed and made in Japan, the Rinnai INFINITY A-Series are gas continuous flow hot water heaters with inbuilt frost protection. They have electronic ignition and require electricity to operate. They are factory preset to deliver water at 55 °C. The internal unit (A28i) is a room sealed appliance.

Scope of use

Suitable for RESIDENTIAL applications only. The external units are designed to be externally mounted on an outside wall. The internal A28i unit is designed for internal installations only and can be installed in an enclosure if the requirements of AS/NZS 5601.1 are satisfied. They are designed to be located as close as practicable to the most frequently used hot water outlets to reduce the delay for hot water delivery.

Not suitable as a spa or swimming pool heater, or for hydronic applications. The **external** units 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.

	A16 external	A20 external	A24 external	A26 external	A28i[1] internal
REU number	A1620WG-ZK	A2024WG-ZK	A2426WG-ZK	A2626WG-ZK	VCM2837FF-ZK
Code Natural Gas	INFA16N	INFA20N	INFA24N	INFA26N	INFA28FFN
Code LPG	INFA16L	INFA20L	INFA24L	INFA26L	INFA28FFL
Thermal efficiency on high	80.5%	80.5%	81%	80.5%	83.5%
Hot water capacity[2]	1.5-20 L/min	1.5-24 L/min	1.5-26 L/min	1.5-26 L/min	1.4-37 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	28 L/min 1680 L/h
Input	16.3-124 MJ/h	19.9-156 MJ/h	16.3-184 MJ/h	16.3-199 MJ/h	11-210 MJ/h
Output	27.8 kW	34.9 kW	42 kW	44.5 kW	48.8 kW
Weight	13 kg	14 kg	15 kg	15 kg	21 kg
Nominal operating pressure	120-1000 kPa	160-1000 kPa	200-1000 kPa	200-1000 kPa	200-1000 kPa
Connection - hot	R ½ (15 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Connection - cold	R ½ (15 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Connection - gas	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Ingress protection rating	IPX4	IPX4	IPX4	IPX4	IPX2
Noise level (1 m) away	54 dB(A)	55 dB(A)	54 dB(A)	55 dB(A)	54 dB(A)
Power consumption					
• **normal**	47 W	58 W	56 W	66 W	66 W
• **standby**	2 W	2 W	2 W	2 W	2 W
• **frost protection**	68 W	68 W	68 W	68 W	104 W

[1] The A28i model, while part of the A-Series range, looks different to the external units—refer image on p.5. This model is suitable as a gas boost for solar installations as the temperature can be set to 75 °C—refer system layout diagram on p.47.

[2] The higher figures for the A16, A20, A24, and A28i are only applicable in areas where the incoming water temperatures are high, for example 20 °C. Rather than all the water going through the heat exchanger, some of the water will go through the bypass tube allowing a greater capacity of water to be delivered.

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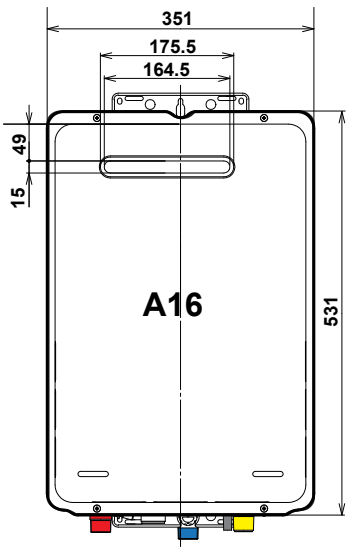

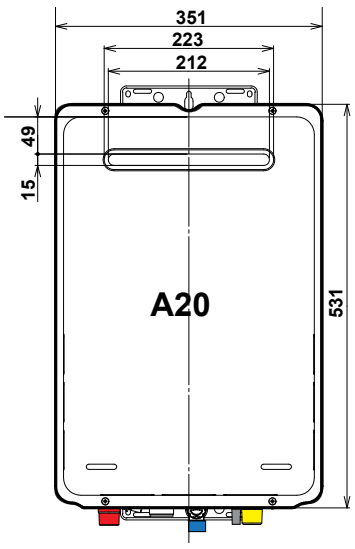

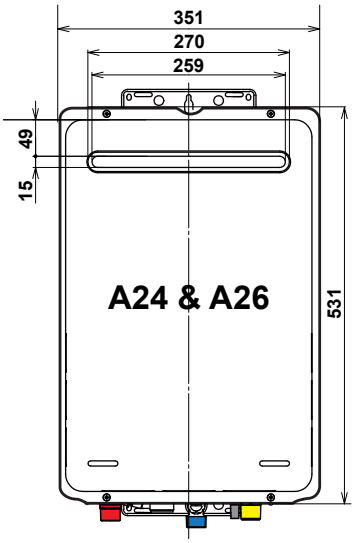

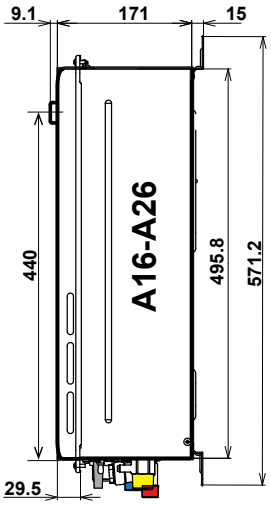

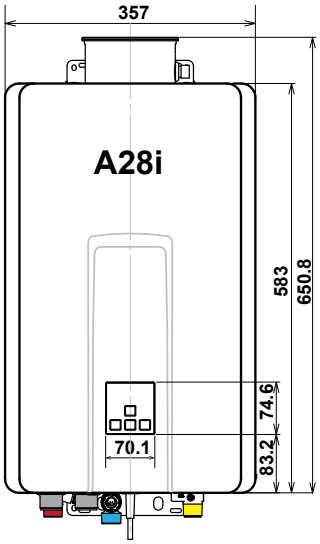

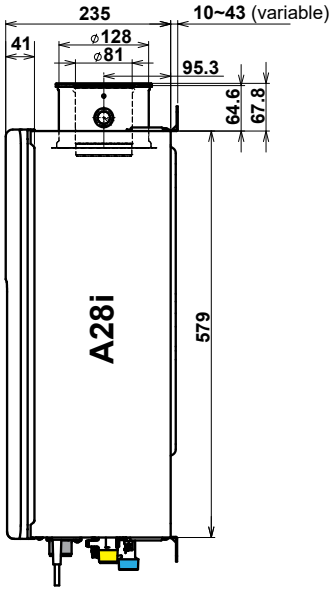

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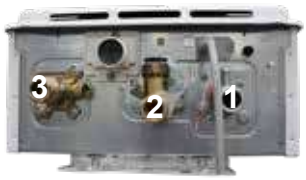
Connection dimensions under unit

		A16-A26	A28i
			
1	Gas connection from wall Gas connection from centre Gas connection length from base	62 mm 83 mm 40 mm	89 mm 89 mm 36.4 mm
2	Cold water inlet from wall Cold water inlet from centre Cold water inlet length from base	53 mm 10 mm 50 mm	60.1 mm 27 mm 46.1 mm
3	Hot water outlet from wall Hot water outlet from centre Hot water outlet length from base	72 mm 105 mm 41 mm (A16—39 mm)	81.1 mm 110 mm 36.3 mm

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Rinnai INFINITY EF26

Description
Designed and made in Japan, the Rinnai INFINITY EF26 is an external gas condensing continuous flow hot water heater with inbuilt frost protection. It has electronic ignition and requires electricity to operate. It is factory preset to deliver water at 55 °C (maximum set temperature is 65 °C).

Scope of use
Suitable for RESIDENTIAL applications only. The 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.

It is not suitable as a spa or swimming pool heater, or for hydronic applications. It is 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.

REU number	E2626W-ZK
Code Natural Gas	INFEF26N
Code LPG	INFEF26L
Thermal efficiency on high	91.5%
Hot water capacity	1.5-26 L/min
Hot water capacity at a 25° rise	26 L/min 1560 L/h
Input	16.3-175 MJ/h
Output	44.5 kW
Weight	18 kg
Nominal operating pressure	220-1000 kPa
Connection - hot	R ¾ (20 mm)
Connection - cold	R ¾ (20 mm)
Connection - gas	R ¾ (20 mm)
Connection - condensate	R ½ (15 mm)
Ingress protection rating	IPX5
Noise level (1 m) away	50 dB(A) approx.
Power consumption • **normal** • **standby** • **automatic frost protection**	 63 W 2 W 92 W
Please note Joining units together is not possible. The EF26 model is unable to be electronically manifolded.	

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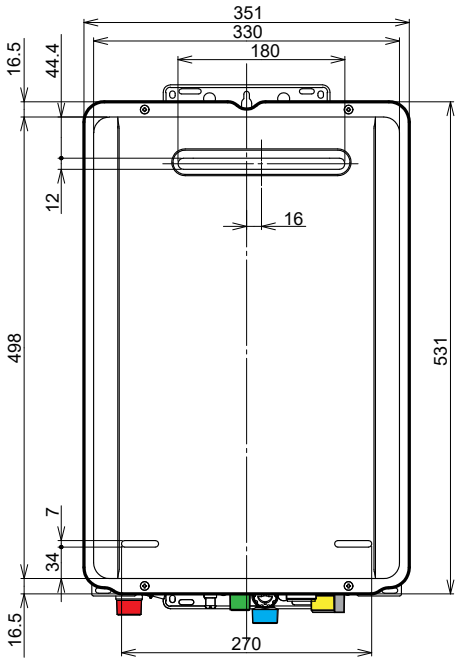

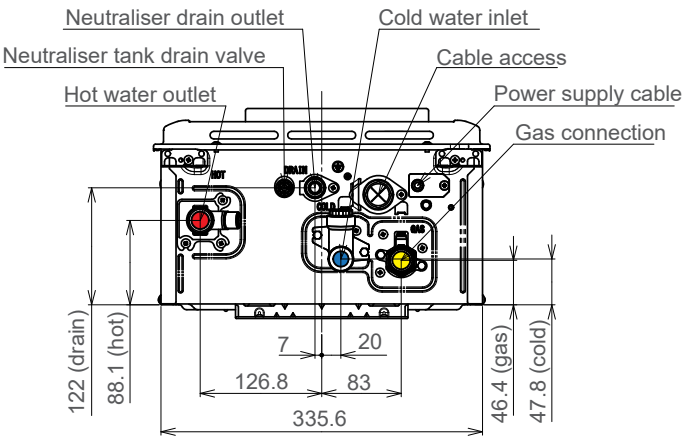

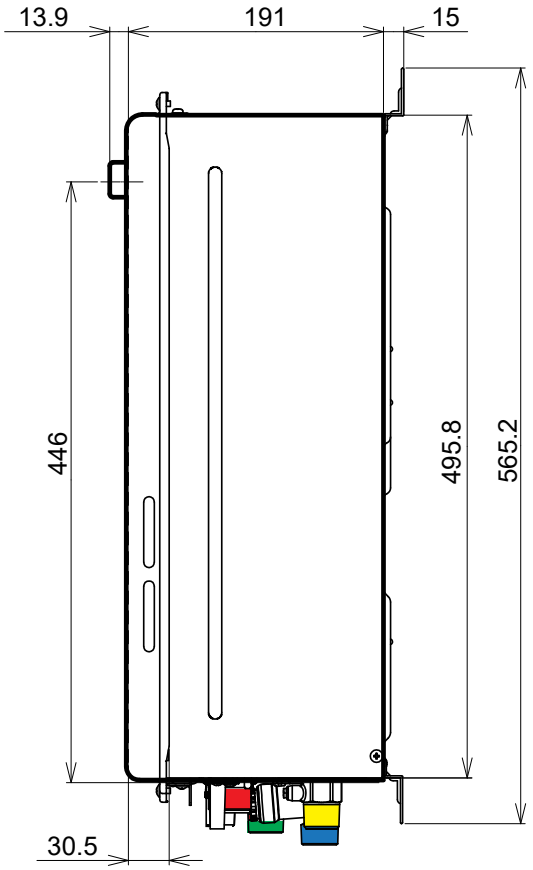

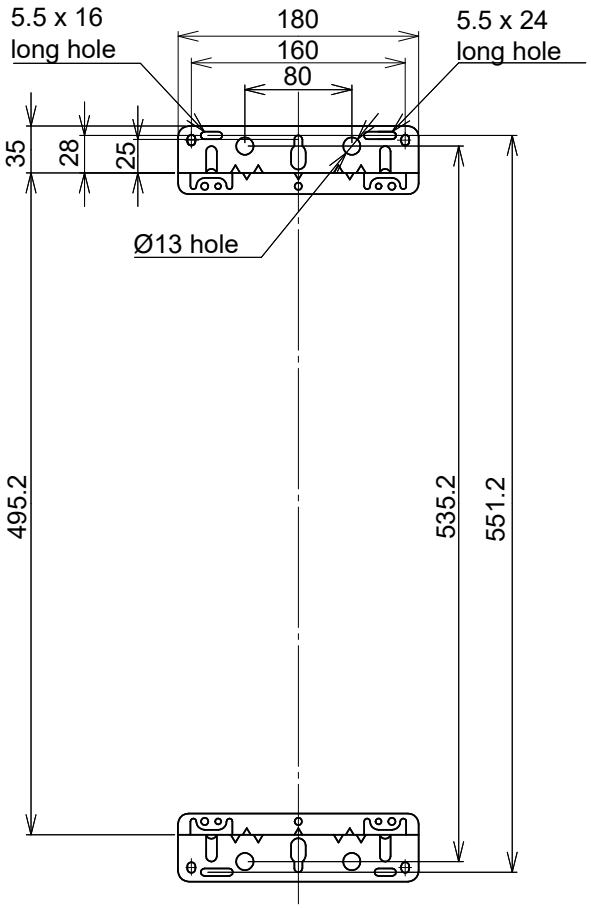

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Rinnai INFINITY HD49 and HD250

HD49kWe external model pictured

Description

Designed and made in Japan, the Rinnai INFINITY HD units are gas continuous flow hot water heaters with inbuilt frost protection. They have electronic ignition and require electricity to operate. The internal unit is a room sealed appliance. The INFINITY HD250 is factory preset to 55 °C, the HD49 units are factory preset to 75 °C.

Scope of use

Suitable for residential and commercial applications. The external HD49kWe / HD250 units are designed to be externally mounted on an outside wall. The internal HD49kWi is designed for internal installations only and can be installed in an enclosure if the requirements of AS/NZS 5601.1 are satisfied. They are designed to be 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, or for hydronic applications.

Hard or acidic water will need to be treated to use this product.

	HD49kWe external	HD49kWi internal	HD250 external
REU number	VCM2837WC-ZK	VCM2837FFC-ZK	VR3237WG-ZK(S)
Code Natural Gas	INFHD49N	INFHD49FFN	INFHD250HNCN
Code LPG	INFHD49L	INFHD49FFL	INFHD250HNCL
Thermal efficiency on high	83.5%	83.5%	83%
Hot water capacity[1]	1.4-37 L/min	1.4-37 L/min	3.2-37 L/min
Hot water capacity at a 25° rise	28 L/min 1680 L/h	28 L/min 1680 L/h	32 L/min 1920 L/h
Input	11-210 MJ/h	11-210 MJ/h	20-249 MJ/h
Output	48.8 kW	48.8 kW	57.8 kW
Weight	20 kg	21 kg	29 kg
Nominal operating pressure	200-1000 kPa	200-1000 kPa	200-1000 kPa
Connection - hot	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Connection - cold	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Connection - gas	R ¾ (20 mm)	R ¾ (20 mm)	R ¾ (20 mm)
Ingress protection rating	IPX5	IPX2	IPX4
Noise level (1 m) away	52 dB(A)	54 dB(A)	50 dB(A)
Power consumption • **normal** • **standby** • **automatic frost protection**	 66 W 2 W 104 W	 95 W 2 W 120 W	 72 W 2 W 116 W

[1] The higher figures are only applicable in areas where the incoming water temperatures are high, for example 20 °C. Rather than all the water going through the heat exchanger, some of the water will go through the bypass tube allowing a greater capacity of water to be delivered.

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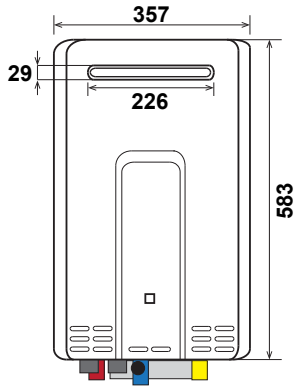
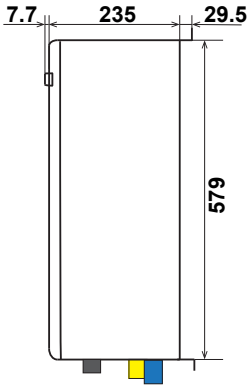
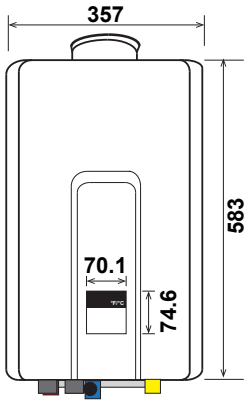
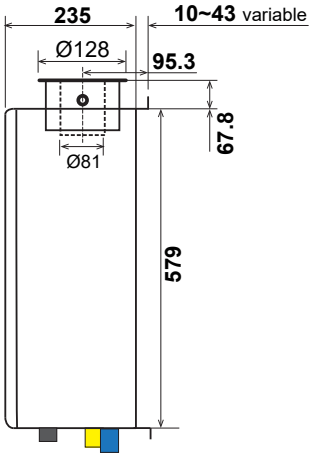
HD49kWe



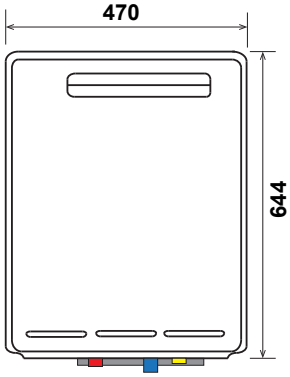


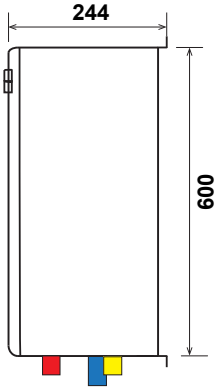
HD49kWi

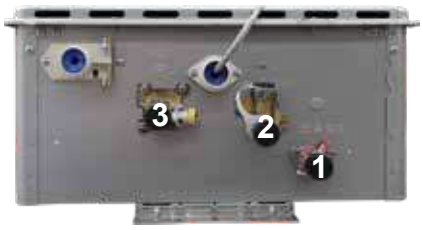




HD250







Connection dimensions under unit

		HD49kWe	HD49kWi	HD250
1	Gas connection from wall	74.5 mm	89 mm	61 mm
	Gas connection from centre	89 mm	89 mm	110 mm
	Gas connection length from base	36.4 mm	36.4 mm	41 mm
2	Cold water inlet from wall	45.6 mm	60.1 mm	99 mm
	Cold water inlet from centre	27 mm	27 mm	52 mm
	Cold water inlet length from base	46.1 mm	46.1 mm	51 mm
3	Hot water outlet from wall	66.6 mm	81.1 mm	115 mm
	Hot water outlet from centre	110 mm	110 mm	61 mm
	Hot water outlet length from base	36.3 mm	36.3 mm	42 mm

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Rinnai INFINITY N-Series

N56kWe external model pictured

Description

Designed and made in Japan, the Rinnai INFINITY N-Series are condensing continuous flow water heaters with inbuilt frost protection. They have electronic ignition and require electricity to operate. The internal unit is a room sealed appliance.

The INFINITY N-Series units are factory preset to 55 °C.

Scope of use

Suitable for residential and commercial applications. The external N56kWe is designed to be externally mounted on an outside wall. The internal 56kWi is designed for internal installations only and can be installed in an enclosure if the requirements of AS/NZS 5601.1 are satisfied. They are designed to be 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 domestic ring main applications[1].

Hard or acidic water will need to be treated to use this product.

	N56kWi internal	**N56kWe external**
REU number	N3237FFUC-ZK	N3237WC-ZK
Code Natural Gas	INFN56FFN	INFN56N
Code LPG	INFN56FFL	INFN56L
Thermal efficiency on high	97%	97%
Hot water capacity[2]	1.5-37 L/min	1.5-37 L/min
Hot water capacity at a 25° rise	32 L/min 1920 L/h	32 L/min 1920 L/h
Input	16-209 MJ/h	16-209 MJ/h
Output	55.5 kW	55.5 kW
Weight	29 kg	29 kg
Nominal operating pressure	300-1000 kPa	300-1000 kPa
Connection - hot	R ¾ (20 mm)	R ¾ (20 mm)
Connection - cold	R ¾ (20 mm)	R ¾ (20 mm)
Connection - gas	R ¾ (20 mm)	R ¾ (20 mm)
Connection - condensate	R ½ (15 mm)	R ½ (15 mm)
Ingress protection rating	IPX5	IPX5
Noise level (1 m) away	49 dB(A)	54 dB(A)
Power consumption • **normal** • **standby** • **automatic frost protection**	 70 W (NG), 85 W (LPG) 2 W 150 W	 70 W (NG), 85 W (LPG) 2 W 100 W

[1] If a domestic ring main is req. we have a plumbing configuration, refer to the N-Series website product page for more information

[2] The higher figures are only applicable in areas where the incoming water temperatures are high, for example 20 °C. Rather than all the water going through the heat exchanger, some of the water will go through the bypass tube allowing a greater capacity of water to be delivered.

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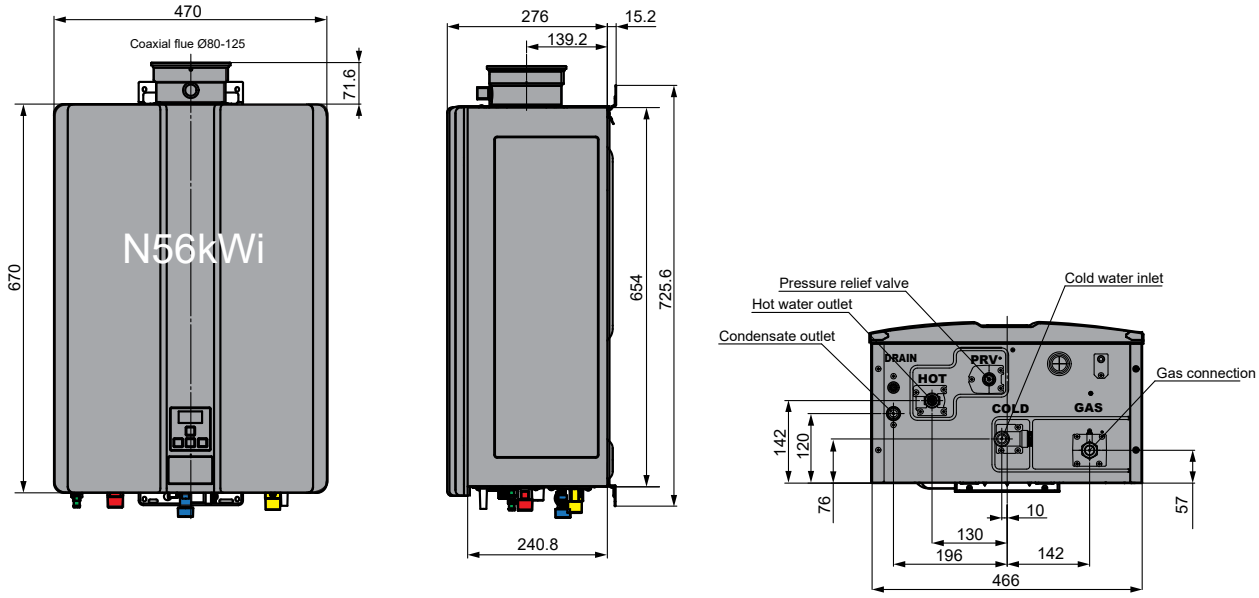

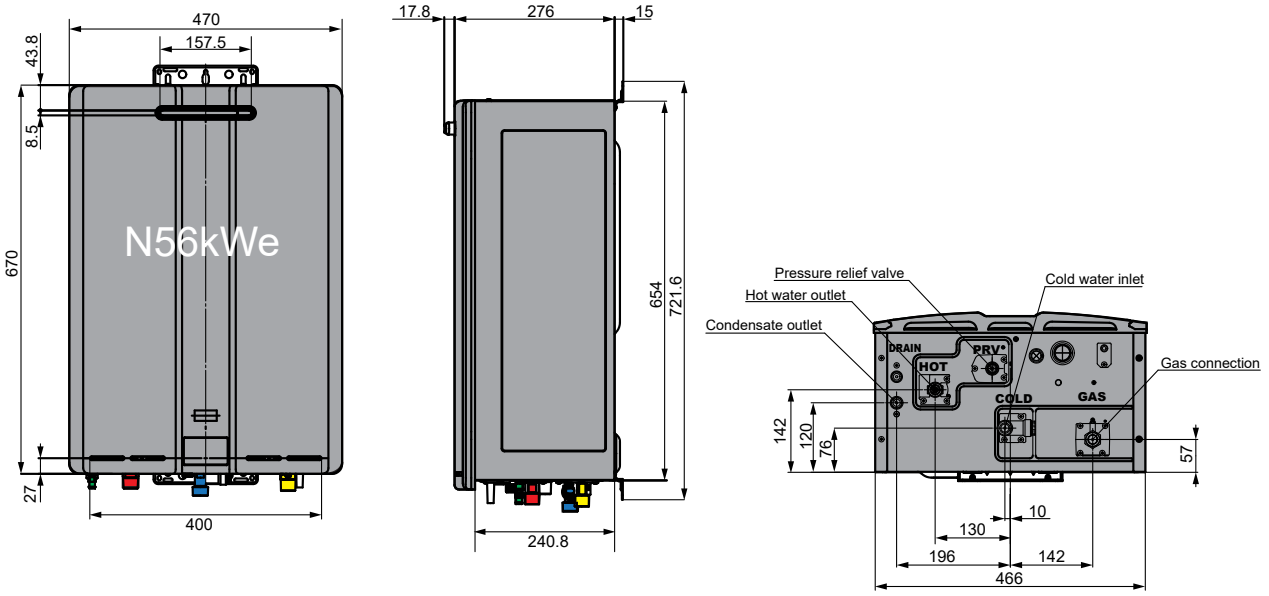

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Manifolding

N56 models can be electronically connected (up to 24 units) using the N-Series cascade cable.

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Rinnai INFINITY accessories matrix

Part number	Description	Image
CONTROLLERS		
MC601A	**Compact controller** Suitable for all Rinnai INFINITY units	1
BC100V1Z	**Bathroom Deluxe controller** Suitable for all Rinnai INFINITY units	2
MC100V1Z	**Kitchen Deluxe controller** Suitable for all Rinnai INFINITY units	3
RECESS BOX		
R1405	**Metal recess box** Suitable for all A-Series external models	4
R1407	**Metal recess box** Suitable for EF26, HD49kWe, and HD250	4
There is no recess box available for the N56kWe due to the significant size of the unit.		
PIPE COVERS		
R1385	**A-Series white pipe cover** Suitable for all A-Series external models	5
R1402SC	**HD250 silver pipe cover** Suitable for the HD250 model only	6
R1415	**N-Series gunmetal grey pipe cover** Suitable for the N56kWe / N56kWi models only	7
R1416	**EF26 white pipe cover** Suitable for the EF26 only	8
R1417	**HD49 silver pipe cover** Suitable for the HD49kWe / HD49kWi models only	9
SECURITY BRACKET		
ACC1395	**Security bracket** Suitable for ALL Rinnai INFINITY models	11
FLUE DIVERTERS		
FDS16A	**Sideways A16 flue diverter** Suitable for the A16 model only	12
FDS20	**Sideways A20 flue diverter** Suitable for the A20 model only	12
FDS24	**Sideways A24/A26 flue diverter** Suitable for the A24 and A26 models only	12
FDS26E	**Sideways EF26 flue diverter** Suitable for the EF26 model only	13
FDU16	**Upwards A16 flue diverter** Suitable for the A16 model only	14
FDU24	**Upwards A24/A26 flue diverter** Suitable for the A24 and A26 models only	14
FDU32	**Upwards HD250 flue diverter** Suitable for the HD250 model only	14
FFP100DIV	**N-Series flue diverter** Suitable for the N56kWi internal model only	15
There are no flue diverters for the HD49kWe		

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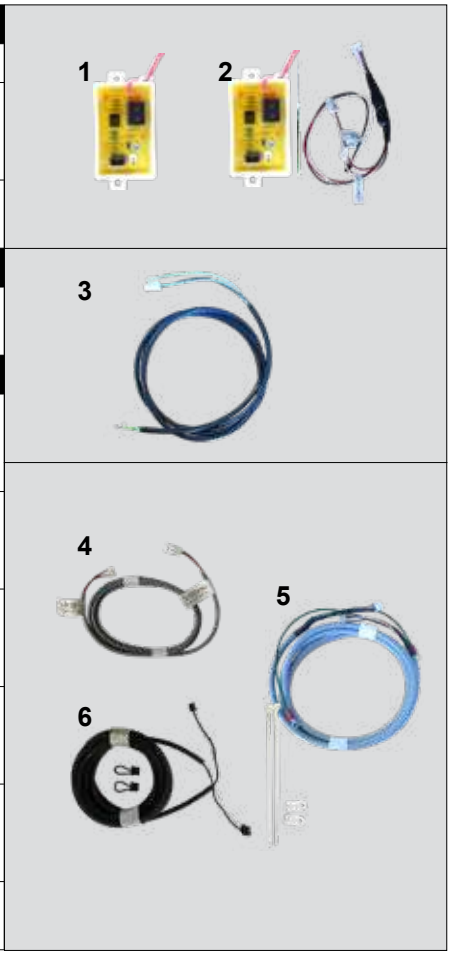
ERROR SWITCHES		
Part number	**Description**	**Image**
R1070	**HD error indication switch** Suitable for HD49kWe, HD49kWi and HD250 models only	1
REUOPU3	**N-Series error indication switch** Suitable for N56kWe and N56kWi models only	2
N-SERIES PUMP ACCESSORIES		
R1071	**N-Series pump cable 2 m** Suitable for N56kWe and N56kWi models only	3
CONNECTING CABLES		
REUEZC	**EZ connect cable** Suitable for HD49kWe, HD49kWi, A28i, and HD250 models only	4
REUMSBM	**HD internal master manifold** Suitable for HD49kWe, HD49kWi, and HD250 models only	-
REUMSBMB	**HD external master manifold** Suitable for HD49kWe, HD49kWi, and HD250 models only	-
REUMSBC1	**HD manifold slave cable** Suitable for HD49kWe, HD49kWi, and HD250 models only	5
REUMSBC2	**HD manifold joiner** Suitable for HD49kWe, HD49kWi, and HD250 models only	-
REUCSAC1	**N-Series cascade cable** Suitable for N56kWe and N56KWi models only	6



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Rinnai INFINITY internal flueing

With the introduction of the high efficiency N56kWi internal water heater, we now have three flueing options. These flueing options are specific to the model of water heater and type of installation, they **CANNOT BE INTERCHANGED**.

Detailed in this section is a high level view of the options available and the flue components.

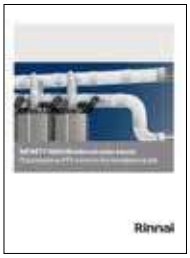
HD49kWi and A28i	N56kWi ONLY	N56kWi ONLY
Individual flueing	Individual flueing (concentric)	Common flueing
Stainless steel inner pipe and thermoplastic outer pipe	Polypropylene concentric flueing	Polypropylene common flueing

Flue length (m)	Number of bends				
	0	1	2	3	4
1					
2					
3					
4					
5					
6					
7					
9					
11					
13					
15					

Flue length (m)	Number of bends				
	0	1	2	3	4
1					
2					
3					
4					
5					
6					
7					
8					
9					
11					
12					
14					
15					
17					
18					
20					

	Ø110 mm header and flue	Ø110 mm header and Ø160 mm flue
For every 90° bend used, subtract 3 m from the lengths below		
No. of water heaters	**Maximum flue length**	
2	45 m	45 m
3	45 m	45 m
4	20 m	45 m
5		45 m
6		45 m
7		21 m

Important and detailed information on each of the flueing options is available in the flueing installation guides available on www.rinnai.co.nz.



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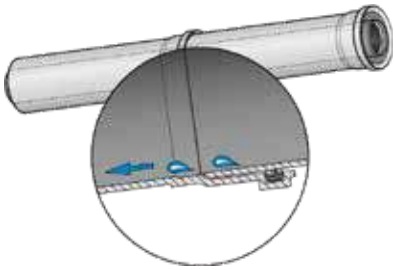
Internal flueing guidelines

The flue terminal is to terminate in a location so as not to cause a nuisance, in accordance with AS/NZS 5601.

Polypropylene flueing CANNOT be used for the HD49kWi / A28i internal water heaters. Flue gases from these units run much hotter than the N-Series and there is risk of the plastic flue components melting.

Flue fall back to the water heater
The flue terminal in all applications must FALL BACK towards the water heater and not towards to the flue terminal. The degree in which this occurs is dependent on the flueing application, refer below.

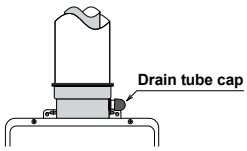


- **Stainless steel flueing (HD49kWi / A28i)**
  Slope horizontal flues back towards the water heater at a 20 mm fall per meter to drain condensate.
- **PP individual flueing (N56kWi)**
  Slope horizontal flues back towards the water heater at a 25 mm fall per meter to drain condensate.
- **PP common flueing (N56kWi)**
  Slope horizontal flues back towards the water heater at a 54 mm fall per meter to drain condensate.

Condensate
The condensate trap (HD49kWi and A28i) or condensate drain (N56kWi) collects any condensate from the unit and prevents it entering the water heater and causing damage.

Condensate is a by-product of high efficiency gas combustion and is mildy acidic. For this reason copper tube and fittings must not be used as it will corrode. Instead Rinnai recommends plastic pipe and fittings such as UPVC or PE.

Handling condensate for the HD49kWi /A28i
A condensate trap kit (FFSSCOND) is required for lengths over 1.5 m. If flueing is less than 1.5 m the flue spigot on top of the unit is capped using the drain tube cap supplied with the unit.



Handling condensate for the N56kWi
A condensate trap kit is not needed for the N56kWi as there is a different method for draining condensate. As there is a continuous flow of condensate being produced the unit must be drained via a pipe to a suitable discharge point. Refer to the install guide for further information.

Vertical terminations (all applications)
To ensure products of combustion are cleared adequate clearance from the building is required. The vertical cowl should have a 500 mm clearance from any part of the building. This also applies to steeped and pitched roofs, where the flue cowl should be 500 mm clear of the ridge line. An adequate flow of fresh air must exist around the flue cowl following installation.

Minimum clearances are shown in AS/NZS 5601.1.

Flue supports
Ensure the flue is supported independently of the appliance by use of suitable clips or brackets in accordance with AS/NZS 5601.

For individual stainless steel and polypropylene flueing, flue supports are supplied with each roof cowl and flue pipe.

For polypropylene common flueing, flue supports are not provided with any component and must be ordered separately.

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Rinnai INFINITY HD49kWi / A28i internal flueing
stainless steel flue kits and components

Code	Description	Image
FFSSKIT	Direct flue kit for horizontal installations—can be cut to size. Includes black and white wall seals.	
FFSSROOFCOWL	Roof cowl for vertical installations—can be cut to size. Includes three black UV components (1 collar adapter, 2 roof protectors (shown below)), for covering and protecting the white flue pipe from UV damage. Roof protector can also be ordered as a spare (12693, one protector). Kit also includes a flue pipe clamp to support the flue.	
FFSSPIPE1000	1000 mm flue pipe—can be cut to size. Includes Munzing ring to support the flue.	
FFSSBEND90	Single 90 degree bend.	
FFSSBEND45	Two 45 degree bends, sold as a pair.	
FFSSCOND	Condensate trap kit for the HD49kWi and A28i ONLY. Comes with approximately 500 mm of black rubber hose, refer image below.	

Horizontal terminal

Roof cowl

90° bend

Photo 45° bends

UV roof protector

Condensate trap kit

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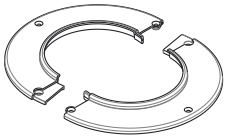
Rinnai INFINITY N56kWi concentric flueing
polypropylene flue kits and components

Polypropylene flueing CANNOT be used for the HD49kWi / A28i internal water heaters. Flue gases from these units run much hotter than the N-Series and there is risk of the plastic flue components melting.

Code	Description	Image
FFP100HKIT	Direct flue kit for horizontal installations—can be cut to size. Includes horizontal adapter, black and white wall seals and a tube of centrocerin lubricant.	
FFP100VKIT	Vertical termination kit—can be cut to size. Includes the vertical adapter, which reduces the flue diameter from Ø80/120 mm to Ø60/100 mm, and black UV flue protectors, for covering and protecting the white flue pipe from UV damage. Also includes a flue clamp to support the flue, and a tube of centrocerin lubricant.	
FFP100PIPE	1000 mm flue pipe—can be cut to size. Includes flue bracket to support the flue.	
FFP100HADAPT	Horizontal adapter 60/100, required in combination flueing where the flue starts off horizontally. The horizontal adapter connects into the flue spigot of the N56kWi.	
FFP100BEND	Two 45 degree bends, sold as a pair. One 90° bend equates to 3 m, and one 45° bend equates to 1.1 m.	
FFP100BRACKET	Flue bracket support—white. Purchased if additional support is required. Every length of flue should be supported. Please note: The FFP100BRACKET is supplied with each flue pipe.	
FFP100PLATE	Inside wall plate—internal white wall plate/ seal, used to tidy up any installation work. Comes as part of the FFP100HKIT, but can be ordered for other flueing applications. Comes in two pieces.	
FFP100SEAL	Typically only ordered if the inner seal has been damaged. For example we have had a couple of instances where installers have mistakingly used the incorrect lubricant and had to order another seal.	
CF790025	Centrocerin lubricant. Water soluble lubricant designed to ease assembly of flue components. Other lubricants are not suitable as they will damage the flue. Please note: This comes with the horizontal and vertical flue kits.	

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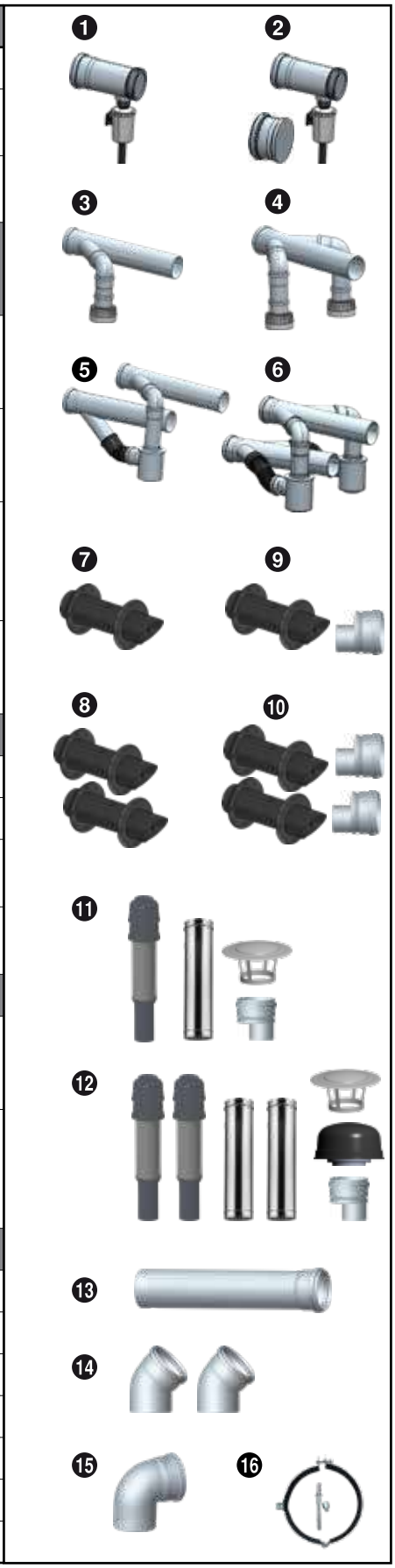
Rinnai INFINITY N56kWi common flueing
polypropylene flue kits and components

Starter kits, one starter kit is required for each application		
Code	**Description**	**Image**
CFKRS110	Room air starter kit 110 mm. Contains; room air vent, condensate trap, and centrocerin lubricant.	1
CFKOS110	Outside air starter kit 110 mm. Contains; room air vent, end cap, condensate trap, and centrocerin lubricant.	2
Header connection kits • inline, one kit for each water heater • back-to-back, one kit for every two water heaters		
CFKRCS110	Room air inline connection kit. Contains; collector Ø110 mm 1-branch, 90° bend, extension 500 mm, room air adapter.	3
CFKRCB110	Room air back-to-back connection kit. Contains; collector Ø110 mm 2-branch, 90° bend (x2), extension 500 mm (x2), room air adapter (x2).	4
CFKOCS110	Outside air inline connection kit. Contains; collector Ø110 mm 1-branch (x2), 90° bend, extension 500 mm, outside air adapter and rubber flex.	5
CFKOCB110	Outside air back-to-back connection kit. Contains; collector Ø110 mm 2-branch (x2), 90° bend (x2), extension 500 mm (x2), room air adapter (x2)	6
Horizontal termination kits		
CFKRWT110	Room air Ø110 mm horizontal termination kit	7
CFKOWT110	Outside air Ø110 mm horizontal termination kit	8
CFKRWT160	Room air Ø160 mm horizontal termination kit, includes flue adapter	9
CFKOWT160	Outside air Ø160 mm horizontal termination kit, includes flue adapters	10
Vertical termination kits		
CFKRVT160	Room air Ø160 mm vertical termination kit. Contains; vertical terminal, stainless UV sleeve, exhaust rain cap, Ø110-160 mm adapter.	11
CFKOVT160	Outside air Ø160 mm vertical termination kit. Contains; vertical terminal (x2), stainless UV sleeve (x2), exhaust rain cap, intake rain cap, Ø110-160 mm adapter.	12
Common parts		
CF790028	Flue pipe Ø110 mm	13
CF790089	Flue pipe Ø160 mm	13
CF790026	45 ° bends Ø110 mm	14
CF790086	45 ° bends Ø160 mm	14
CF790087	90 ° bend Ø160 mm	15
CF790091	Flue support Ø110 mm	16
CF790092	Flue support Ø160 mm	16



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Rinnai **INFINITY**

accessory product pages

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Digital controllers

With a Rinnai INFINITY controller you choose your own personalised settings. Just select the water temperature you want between 37-55 °C in up to four different locations.

Why have controllers?

- Safety feature for young children, control the temperature coming out of the hot water tap.
- Reduce temperature fluctuations when other taps are used in the house.
- An extra two year warranty on your Rinnai INFINITY when controllers are installed.
- Use as a troubleshooting diagnostic tool, error codes will display when there is a problem with the INFINITY.

Residential controller configurations

A maximum of four (three for the HD49kWi / A28i indoor models, and N-Series) can be fitted, with the following provisos:

- Only one Kitchen Deluxe controller—only installed if a Bathroom Deluxe controller is installed
- Maximum of two Bathroom Deluxe controllers
- Only one controller can be set to deliver 55 °C, this cannot be a controller in a bathroom

Each controller can be individually programmed, but the water heater can only deliver one set temperature at any time. For example, John is in the shower and has set the controller to 42 °C. Megan can only change the programmed temperature at the kitchen once John is out of the shower.

	Compact controller	Bathroom Deluxe controller	Kitchen Deluxe controller
Code	MC601A	BC100V1Z	MC100V1Z
Colour	Off-white	Silver	Silver
Dimensions	H - 120 mm W - 90 mm D - 20 mm	H - 97 mm W - 195 mm D - 20 mm	H - 120 mm W - 128 mm D - 20 mm
Suitable for	Anywhere in the house	Bathrooms[1]	Kitchens and laundries[2]
Cable	Comes with 10 m of cable	Comes with 10 m of cable	Comes with 10 m of cable
Additional cable	Additional 10 m cable R1069	Additional 10 m cable R1069	Additional 10 m cable R1369

[1] Set the desired temperature and water level and walk away. A voice message will let you know when your bath is ready. If you have other deluxe controllers around the house the message will play on all of them.

[2] The Kitchen Deluxe controller is designed to be used in conjunction with the Bathroom Deluxe controllers.

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Water temperature control
Only the Kitchen Deluxe controller can be designated as the master water controller, as the name suggests, the location for this is in the kitchen. All the remaining controllers are designated sub-controllers and are for use in bathrooms, toilets, and laundries. The maximum temperature for sub-controllers is 50 °C, to minimise the risk of burns.

Any controller that has priority is capable of setting the water temperature to be delivered. Priority can only be given to one controller at a time, and changing priority can only be done when all hot water taps have been closed.

Available controller temperatures are:

Controller	Temperature °C
Kitchen	37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 50, 55, 60*, 65*, 75*
Bathroom (hot water)	37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 50
Bathroom (bath fill)	37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

* Some Rinnai water heaters can be programmed to deliver higher temperatures from the master water controllers, i.e. in commercial applications

To obtain water temperatures lower than 37 °C, open the cold water tap and add cold water until the desired lower temperature is reached.

Controllers are not suitable for all installations
Some limitations and exclusions to be aware of:

- If an EZ Connect cable is used, the bath fill function on the Bathroom Deluxe controller won't work
- Controllers cannot be used with Rinnai INFINITY units connected to a solar system as they are not compatible with the higher temperatures coming from the INFINITY (dip switch change from 55 to 75 °C).
- Controllers are not suitable for ring main applications using N-Series models

Water controller cables
Water controllers operate at extra low voltage (12 V DC), which is supplied from the water heater.

Controllers come with 10 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm^2 may be used.

Maximum individual cable runs:
- One controller = 100 m
- Two controllers = 50 m (per controller)
- Three plus controllers = 20 m (per controller)

Water controller cables are not polarity sensitive.

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Metal recess box

A recess box enables an external continuous flow water heater to be partially or fully recessed into an external wall, covered, and out of sight.

Positioning

A Rinnai INFINITY unit positioned inside a recess box operates at a slightly louder level than a Rinnai INFINITY installed on an outside wall. Please keep this in mind if positioning near a bedroom as the operating noise could affect some people.

Building code compliance

Local councils may have their own requirements regarding a recess box installation, as it is similar in detail to installing a meter box. If in doubt over compliance, it is advisable to consult the local council prior to installation.

Suitability

- Outdoor installations only
- New construction or major renovation—installation needs to commence during the framing stage and before internal linings, cladding, or building wrap is applied

Code	R1405	R1407
Construction	Folded galvanised steel, powder coated white—can be painted to match the exterior cladding.	
Colour	White	White
Dimensions	H - 945 mm W - 417 mm D - 205 mm	H - 945 mm W - 514 mm D - 270 mm
Suitable for - current	Current A-Series units (A16, A20, A24, A26)	Current HD49kWe, HD250, and EF26
Suitable for - discontinued	Discontinued VT range (VT16, VT20, VT24, VT26)	Discontinued HD200, and EF24

There is no recess box for our N56kWe due to the significant size of the unit.

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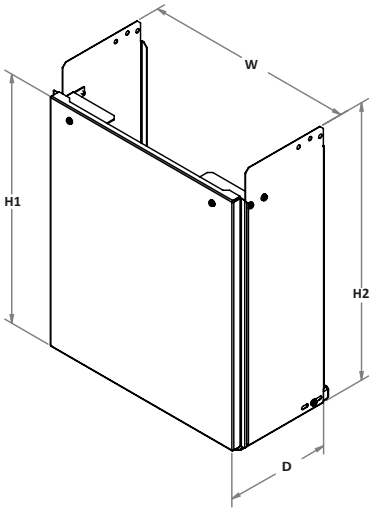
Pipe covers

If you want a clean smooth finish to the installation, the Rinnai INFINITY pipe cover can be used to cover pipes, valves, and even the external power point. The pipe cover kits vary in size and colour depending on the model.

The pipe cover kits are sold as a flat pack and require assembly. With our current range of water heaters assembly can be done by the homeowner—this is because assembly does not require taking the cover off the water heater.



	A-Series external pipe cover	EF26 pipe cover	HD250 pipe cover	HD49 pipe cover	N56 pipe cover
Code	R1385	R1416	R1402SC	R1417	R1415
Colour	White	White	Silver	Silver	Gunmetal grey
Suitable for	A16, A20, A24, A26	EF26	REU-VR3237-WG	HD49kWi and HD49kWe	N56kWi and N56kWe
Dimensions	H1 394 mm W 334 mm D 167 mm H2 438 mm	H1 450 mm W 350 mm D 186 mm H2 428 mm	H1 394 mm W 453 mm D 230 mm H2 428 mm	H1 450 mm W 355 mm D 218 mm H2 485 mm	H1 450 mm W 465 mm D 243-254 mm H2 465 mm

Note
H1 is the height of the panel in the front, H2 is the height of the panel in the back, refer line drawing above.

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Rinnai INFINITY flue diverters

A-Series sideways diverter pictured above

A-Series side diverter

EF26 side diverter

Upwards diverter

Rinnai stainless steel flue diverters are an accessory that can be fitted to an external Rinnai INFINITY water heater to expel combustion gases in either a sideways or upwards direction. The flue diverter is fitted with screws to the flue terminal of the water heater[1].

Suitability

- Externally mounted Rinnai INFINITY continuous flow water heaters NOT installed in a recess box.
- Balconies, patios or other enclosed areas where products of combustion can be rapidly dispersed into the open-air.
- **Sideways flue diverter only**—external single water heater applications, can be installed for left or right handed installations.

Specific applications

Noise reduction, where the unit is positioned close to a neighbouring property.

Where there may be an obstruction such as a tree, fence, wall or other structure, that even though the Rinnai INFINITY is installed with the required clearances, will perform more efficiently if the flue gases are expelled away from the obstruction.

Important

[1] The flue diverter **MUST** remain as a permanent fixture as removal could mean the water heater position no longer complies with AS/NZS 5601.1, translation, once a flue diverter is fitted it MUST NOT be removed.

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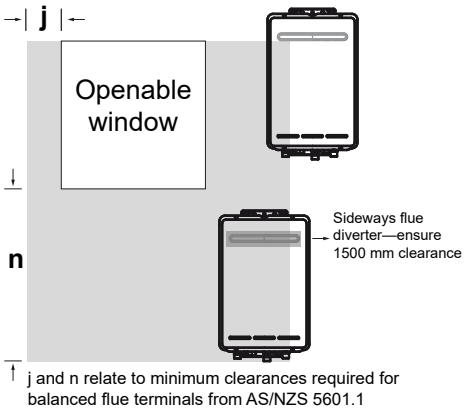
Sideways flue diverters

Where clearance to an openable window or other building structure is tight, the clearance shifts to the point of discharge, close to the edge of the water heater case.

Codes

FDS16	A16
FDS20	A20
FDS24	A24 and A26
FDS26E	EF26

There are no sideways diverters for the N49kWe or N56kWe.



A-Series sideways flue diverter

EF26 sideways flue diverter

Upwards flue diverters

Specific commercial application

Where there are multiple units installed that are positioned facing each other there is the potential for the units to suffocate from the flue gases directly opposite. With an upwards flue diverter the flue gases can be expelled upwards and away from the units.

Codes

FDU16	A16
FDU20	A20
FDU24	A24 and A26
FDU32	HD250

There are no upwards diverters for the N49kWe or N56kWe.

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N56kWi internal flue diverter kit

The N56kWi internal flue diverter is a flue accessory kit that allows you to move the flue terminal position up and away from the air intake by up to 1.5m.

It is designed for when a traditional horizontal terminal cannot be installed due to the flue being a nuisance or due to flue restrictions. It works in conjunction with the horizontal flue terminal (part FFP100HKIT).

Flue diverter kit includes:
- 90 ° elbows (x2)
- connecting flue pipe 1000 mm
- flue extension 695 mm
- wall brackets (x3)

Code	FFP100DIV
Construction	The N56kWi (internal) flue diverter is manufactured from black UV resistant PVC. It has been tested and can ONLY BE used with the Rinnai INFINITY N56kWi water heater.
Installation	If you don’t need to extend the full 1.5 m, you can just use the connecting pipe.

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Security bracket

A sturdy security bracket can be installed to act as a deterrent to thieves. Consisting of two U-shaped 2 mm powder coated galvanised steel plates, which interlock through the lower bracket of the Rinnai INFINITY. The bracket is secured with a padlock (not included).

Ideal for builders who need to protect the Rinnai INFINITY before the home is sold or handed over to the new owners.

Colour is off-white—can be painted.

Code	ACC1395
Suitable for	All Rinnai INFINITY continuous flow gas water heaters—can be retrofitted to existing installations. Can be installed on all cladding systems, like weatherboard, brick, and plaster. Can also be installed inside a recess box.
Dimensions	• Height - 70 mm • Width - 190 mm • Depth - 33.5 mm
How it works	The bracket prevents access to the bolts fixing the unit to the wall, this locks the lower section of the INFINITY in place, and prevents the unit from being quickly removed from the wall.

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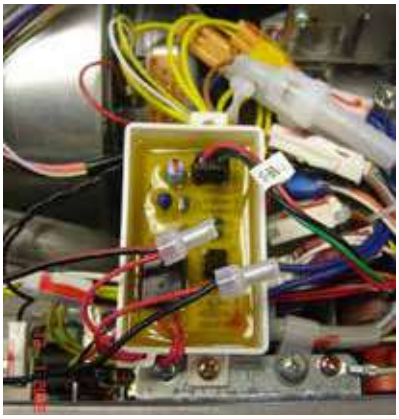
Commercial error switch



The Rinnai INFINITY error indication switch is a volt-free, normally open switch. The switch will shift to a closed position when there is an active error in the water heater.

The switch is intended to be connected to a monitoring system such as a building management system, or audible error indication system.

System designers should note that some errors will reset an inactive (open) state under particular conditions. It is important that this is clearly understood when developing monitoring and response systems.

Code	• R1070 (HD49kWe, HD49kWi, HD250) • REUOPU3 (N56kWe and N56kWi)
Suitable for	Suitable for commercial applications with the HD49kWe, HD49kWi, HD250, N56kWi, and N56kWe.
Load switching	Will switch the following maximum loads. Systems requiring loads greater than this should be configured via an external relay. • Voltage (AC or DC) → 24 Volts • Current → 1 Amp

HD EZ connect cable

The EZ connect cable allows two Rinnai INFINITY HD water heaters to be connected so they can function as one large unit.

The water heaters can be installed 5-460 mm apart. The maximum distance of 460 mm is so the cable will reach between the units, and to prevent temperature fluctuations when the water is turned on and off.

Installation by a certified tradesperson is required.

Code	REUEZC
Cable length	1850 mm
Suitable for	Suitable for the all HD Rinnai INFINITY water heaters[1]. **Please note** The bath fill function on the Bathroom Deluxe controller will not work if an EZ connect cable is fitted. [1] The A28i can also use the EZ connect cable for connecting two water heaters in a residential application.

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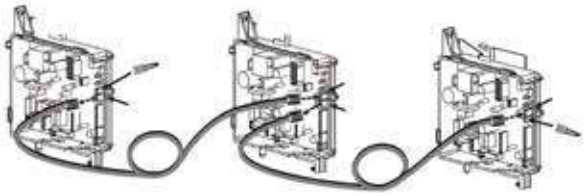
N-Series cascade cable 3 m

With the use of the cascade cable, up to 24 N-Series water heaters can be electronically connected.

This connection will rotate the water heater operation order to ensure equal usage of each appliance and enable all water heaters connected to modulate operation and function as one hot water source.



Code	REUCSAC1
Suitable for	Suitable for the N-Series N56kWe and N56kWi water heaters. One cable is required for each water heater. Cable kit includes: • One cable • Two cascade jumpers • Two cable ties and two cable tie clamps

N-Series pump cable 2m

The N-Series water heaters have the ability to control a circulation pump (commercial ring main application) with the use of a pump cable connector. This allows hot water to cycle through the ring main, ensuring hot water is quickly available when a tap is opened.

Cable is UV resistant and rated for outdoor installation.

Code	R1071
Suitable for	• Single unit N56 commercial installation • Commercial / showerblock installations with multiple N56 units as specified by Rinnai commercial **Please note:** Rinnai INFINITY digital controllers are not compatible with the N-Series pump cable and ring main applications.

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INFINITY HD manifolding

Rinnai INFINITY HD units can be manifolded together, in banks of five (up to 25 units), by connecting them together in parallel to enable a greater hot water flow rate than is possible with a single unit.

A manifold electronic control system (MECS) links each HD unit in the system, and will turn on each unit as required. The system is designed to ensure gas is not wasted and that an endless supply of hot water is always available.

How it works

A master, located internally or externally, and sub-communication PCB is installed in the first unit, other units have a sub-communication slave cable installed. The master communication PCB receives information about flow rates from each unit and balances the load on each unit.

Random selection of the units required to supply the demand means all units share the workload evenly.

All information is transmitted via communication cables to the slave units. The master control also has an inbuilt fault detection system and will allocate a replacement should one unit fail.

MECS	**Master PCB**		**Slave**	**Joiner**
Position	INSIDE the INFINITY **OR**	OUTSIDE the INFINITY	REUMSBC1	REUMSBC2
Code	REUMSBM	REUMSBMB		
Number of water heaters				
2	1	1	-	-
3	1	1	1	-
4	1	1	2	-
5	1	1	3	-
6	2	2	2	1
7	2	2	3	1
8	2	2	4	1
9	2	2	5	1
10	2	2	6	2
11	3	3	5	2
12	3	3	6	2
13	3	3	7	2
14	3	3	8	2
15	3	3	9	2
16	4	4	8	3
17	4	4	9	3
18	4	4	10	3
19	4	4	11	3
20	4	4	12	3
21	5	5	11	4
22	5	5	12	4
23	5	5	13	4
24	5	5	14	4
25	5	5	15	4

Suitability

- HD49kWe ext. REU-VCM2837WC-ZK
- HD49kWi int. REU-VCM2837FFC-ZK
- HD250 ext. REU-VR3237WG-ZK(S)

Codes

- REUMSBM internal master manifold kit for a connection made inside the unit
- REUMSBMB external master manifold kit for a connection made outside the unit
- REUMSBC1 manifold slave cable
- REUMSBC2 joiner for greater than five manifolded HD units

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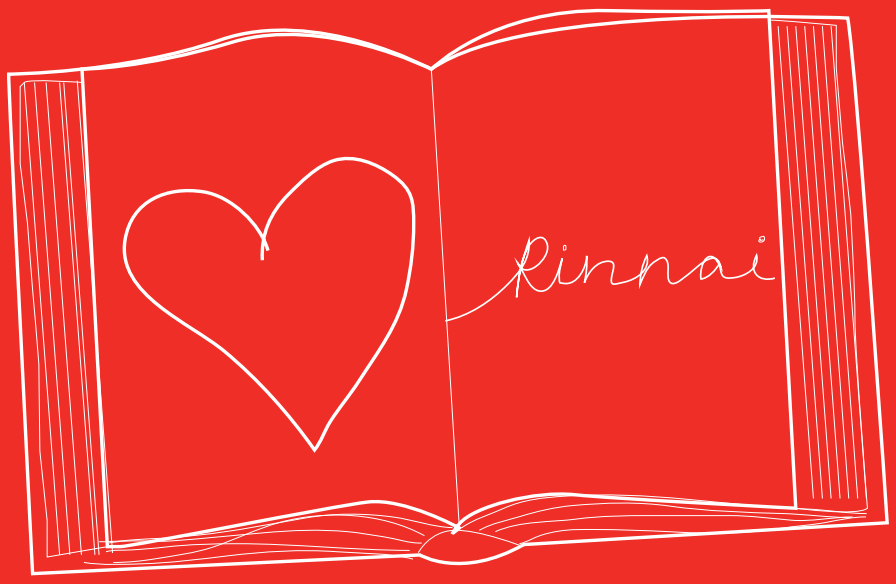
Appendices



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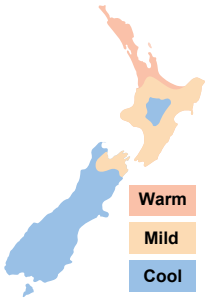
Appendix 1
water flow and gas usage



When determining the Rinnai INFINITY model it's important to know what the incoming water temperature will be—this is calculated using the worst case scenario (winter). This temperature is needed to work out the temperature rise to produce the hot water needed.

Approximate incoming water temperatures in winter

- Northland and Auckland — use 15 °C
- BOP, Gisborne, and Hawkes Bay — use 10 °C
- Waikato, and South Island (excl. Nelson & Marlborough) — use 5 °C

Degree temperature rise

In the specification pages for the Rinnai INFINITY models we express a parameter called 'nominal water capacity'. This means at a 25° rise, the unit will produce a certain number of litres per minute of hot water.

For example:

- The A26 external will produce 26 litres per minute at a 25° rise
- The A24 external will produce 24 litres per minute at a 25° rise

Using the above example, for incoming water at 10 °C and a required temperature of 55 °C, the A26 external will produce 14.4 litres per minute at a 45 ° rise (55-10), and the A24 external will produce 13.3 litres per minute at a 45 ° rise.

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Water flow and gas usage table Rinnai INFINITY A-Series and EF26 temperature preset to 55 °C

		5 ° temperature rise				10 ° temperature rise			
Model	Approx. min. to max. gas input (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)
A16	16.3-124	20.0	1200	100	31.0	20.0	1200	100	62.0
A20	19.9-156	24.0	1440	140	37.2	24.0	1440	140	74.4
A24	16.3-184	26.0	1560	180	40.3	26.0	1560	180	80.6
A26	16.3-199	26.0	1560	180	40.3	26.0	1560	180	80.6
EF26	16.3-175	26.0	1560	210	35.7	26.0	1560	210	71.4
A28i	11-210	28.6	1716	150	43.8	28.6	1716	150	87.6
		15 ° temperature rise				**20 ° temperature rise**			
A16	16.3-124	20.0	1200	100	93.0	20.0	1200	100	124.0
A20	19.9-156	24.0	1440	140	111.6	24.0	1440	140	148.8
A24	16.3-184	26.0	1560	180	120.9	26.0	1560	180	161.2
A26	16.3-199	26.0	1560	180	120.9	26.0	1560	180	161.2
EF26	16.3-175	26.0	1560	210	107.1	26.0	1560	210	142.7
A28i	11-210	28.6	1716	150	131.4	28.6	1716	150	175.2
		25 ° temperature rise				**30 ° temperature rise**			
A16	16.3-124	16.0	960	60	124.0	13.3	800	45	124.0
A20	19.9-156	20.0	1200	100	156.0	16.7	1000	70	156.0
A24	16.3-184	24.0	1440	145	184.0	20.0	1200	100	184.0
A26	16.3-199	26.0	1560	180	199.0	21.7	1300	110	199.0
EF26	16.3-175	26.0	1560	210	175.0	21.7	1300	150	175.0
A28i	11-210	28.0	1680	150	210.0	23.3	1400	120	210.0
		35 ° temperature rise				**40 ° temperature rise**			
A16	16.3-124	11.4	686	30	124.0	10.0	600	25	124.0
A20	19.9-156	14.3	857	45	156.0	12.5	750	42	156.0
A24	16.3-184	17.1	1029	70	184.0	15.0	900	45	184.0
A26	16.3-199	18.6	1114	90	199.0	16.3	975	70	199.0
EF26	16.3-175	18.6	1114	100	175.0	16.3	975	90	175.0
A28i	11-210	20.0	1200	80	210.0	17.5	1050	70	210.0
		45 ° temperature rise				**50 ° temperature rise**			
A16	16.3-124	8.9	533	20	124.0	8.0	480	18	124.0
A20	19.9-156	11.1	667	35	156.0	10.0	600	30	156.0
A24	16.3-184	13.3	800	45	184.0	12.0	720	40	184.0
A26	16.3-199	14.4	867	50	199.0	13.0	780	45	199.0
EF26	16.3-175	14.4	867	70	175.0	13.0	780	60	175.0
A28i	11-210	15.6	933	50	210	14.0	840	40	210.0

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Water flow and gas usage table Rinnai INFINITY HD models
temperature preset to 55 °C

		5 ° temperature rise				10 ° temperature rise			
Model	Approx. min. to max. gas input (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)
HD49kWe	11-210	28.6	1716	150	43.8	28.6	1716	150	87.6
HD49kWi	11-210	28.6	1716	150	43.8	28.6	1716	150	87.6
HD250	20-250	37.0	2220	200	55.3	37.0	2220	200	110.6
		15 ° temperature rise				**20 ° temperature rise**			
HD49kWe	11-210	28.6	1716	150	131.4	28.6	1716	150	175.2
HD49kWi	11-210	28.6	1716	150	131.4	28.6	1716	150	175.2
HD250	20-250	37.0	2220	200	165.9	37.0	2220	200	250.0
		25 ° temperature rise				**30 ° temperature rise**			
HD49kWe	11-210	28.0	1680	150	210.0	23.3	1400	120	210.0
HD49kWi	11-210	28.0	1680	150	210.0	23.3	1400	120	210.0
HD250	20-250	32.0	1920	140	250.0	26.7	1602	100	250.0
		35 ° temperature rise				**40 ° temperature rise**			
HD49kWe	11-210	20.0	1200	80	210.0	17.5	1050	70	210.0
HD49kWi	11-210	20.0	1200	80	210.0	17.5	1050	70	210.0
HD250	20-250	22.9	1374	60	250.0	20	1200	50	250.0
		45 ° temperature rise				**50 ° temperature rise**			
HD49kWe	11-210	15.6	933	50	210.0	14.0	840	40	210.0
HD49kWi	11-210	15.6	933	50	210.0	14.0	840	40	210.0
HD250	20-250	17.8	1068	40	250.0	16	960	40	250.0

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Water flow and gas usage table Rinnai INFINITY HD models
temperature preset to 75 °C

		5 ° temperature rise				10 ° temperature rise			
Model	Approx. min. to max. gas input (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)
HD49kWe	11-210	25.0	1500	150	38.3	25.0	1500	150	76.6
HD49kWi	11-210	25.0	1500	150	38.3	25.0	1500	150	76.6
HD250	20-250	24.0	1440	200	36.4	24.0	1440	200	72.9
		15 ° temperature rise				**20 ° temperature rise**			
HD49kWe	11-210	25.0	1500	150	114.9	25.0	1500	150	153.1
HD49kWi	11-210	25.0	1500	150	114.9	25.0	1500	150	153.1
HD250	20-250	24.0	1440	200	109.3	24.0	1440	200	145.7
		25 ° temperature rise				**30 ° temperature rise**			
HD49kWe	11-210	25.0	1500	150	191.4	23.3	1400	130	210.0
HD49kWi	11-210	25.0	1500	150	191.4	23.3	1400	130	210.0
HD250	20-250	24.0	1440	200	182.2	24.0	1440	140	250.0
		35 ° temperature rise				**40 ° temperature rise**			
HD49kWe	11-210	20.0	1200	90	210.0	17.5	1050	75	210.0
HD49kWi	11-210	20.0	1200	90	210.0	17.5	1050	75	210.0
HD250	20-250	22.9	1371	130	250.0	20.0	1200	100	250.0
		45 ° temperature rise				**50 ° temperature rise**			
HD49kWe	11-210	15.6	933	60	210.0	14.0	840	50	210.0
HD49kWi	11-210	15.6	933	60	210.0	14.0	840	50	210.0
HD250	20-250	17.8	1067	80	250.0	16.0	960	70	250.0
		55 ° temperature rise				**60 ° temperature rise**			
HD49kWe	11-210	12.7	764	40	210.0	11.7	700	35	210.0
HD49kWi	11-210	12.7	764	40	210.0	11.7	700	35	210.0
HD250	20-250	14.5	873	50	250.0	13.3	800	45	250.0
		65 ° temperature rise				**70 ° temperature rise**			
HD49kWe	11-210	10.8	646	30	210.0	10.0	600	28	210.0
HD49kWi	11-210	10.8	646	30	210.0	10.0	600	28	210.0
HD250	20-250	12.3	738	40	250.0	11.4	686	35	250.0
		75 ° temperature rise				**80 ° temperature rise**			
HD250	20-250	10.7	640	30	250.0	10.0	600	25	250.0

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Water flow and gas usage table Rinnai INFINITY N-Series
temperature preset to 55 °C

		5 ° temperature rise				10 ° temperature rise			
Model	Approx. min. to max. gas input (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)
N56kWi	16-209	37.0	2220	300	48	37.0	2220	300	96
N56kWe	16-209	37.0	2220	300	48	37.0	2220	300	96
		15 ° temperature rise				**20 ° temperature rise**			
N56kWi	16-209	37.0	2220	300	144	37.0	2220	300	192
N56kWe	16-209	37.0	2220	300	144	37.0	2220	300	192
		25 ° temperature rise				**30 ° temperature rise**			
N56kWi	16-209	32.0	1920	300	209	26.7	1600	300	209
N56kWe	16-209	32.0	1920	300	209	26.7	1600	300	209
		35 ° temperature rise				**40 ° temperature rise**			
N56kWi	16-209	22.9	1371	270	209	20.0	1200	170	209
N56kWe	16-209	22.9	1371	270	209	20.0	1200	170	209
		45 ° temperature rise				**50 ° temperature rise**			
N56kWi	16-209	17.8	1067	140	209	16.0	960	110	209
N56kWe	16-209	17.8	1067	140	209	16.0	960	110	209

Approximate gas consumption
Thermal efficiency calculation based on 97% from star rating test.

Pressure loss through unit
- Temperature rise 5-25 °C assumes set temperature of 37 °C → bypass fully open
- Temperature rise 30-50 °C assumes set temperature of 55 °C → bypass fully closed, actual pressure loss will be lower

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Water flow and gas usage table Rinnai INFINITY N-Series
temperature preset to 75 °C

		5 ° temperature rise				10 ° temperature rise			
Model	Approx. min. to max. gas input (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)	L/min	L/h	Pressure loss through unit (kPa)	Approx. gas consumption (MJ/h)
N56kWi	16-209	23.0	1380	300	30	23.0	1380	300	60
N56kWe	16-209	23.0	1380	300	30	23.0	1380	300	60
		15 ° temperature rise				**20 ° temperature rise**			
N56kWi	16-209	23.0	1380	300	89	23.0	1380	300	119
N56kWe	16-209	23.0	1380	300	89	23.0	1380	300	119
		25 ° temperature rise				**30 ° temperature rise**			
N56kWi	16-209	23.0	1380	300	149	23.0	1380	300	179
N56kWe	16-209	23.0	1380	300	149	23.0	1380	300	179
		35 ° temperature rise				**40 ° temperature rise**			
N56kWi	16-209	22.9	1371	270	209	20.0	1200	170	209
N56kWe	16-209	22.9	1371	270	209	20.0	1200	170	209
		45 ° temperature rise				**50 ° temperature rise**			
N56kWi	16-209	17.8	1067	140	209	16.0	960	110	209
N56kWe	16-209	17.8	1067	140	209	16.0	960	110	209
		55 ° temperature rise				**60 ° temperature rise**			
N56kWi	16-209	14.5	873	90	209	13.3	800	80	209
N56kWe	16-209	14.5	873	90	209	13.3	800	80	209
		65 ° temperature rise				**70 ° temperature rise**			
N56kWi	16-209	12.3	738	65	209	11.4	686	55	209
N56kWe	16-209	12.3	738	65	209	11.4	686	55	209
		75 ° temperature rise				**80 ° temperature rise**			
N56kWi	16-209	10.7	640	50	209	10.0	600	45	209
N56kWe	16-209	10.7	640	50	209	10.0	600	45	209

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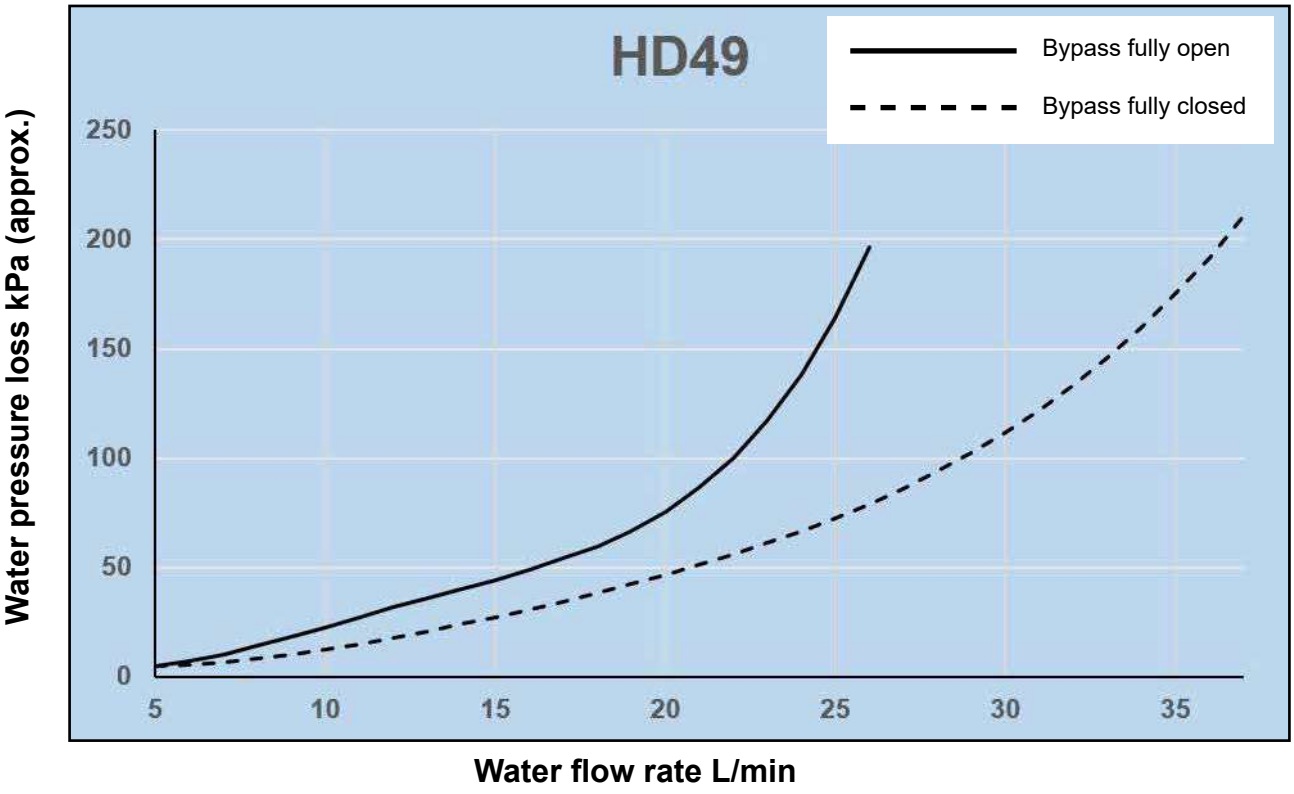
Commercial unit water pressure and flow rate graphs

Rinnai commercial INFINITY water heaters have a water flow pathway which bypasses the main heat exchanger. The flow through the bypass is electronically controlled by an actuator/water flow valve.

At lower set temperatures, generally 55 °C or less, the bypass will often be in the fully open position which reduces the overall pressure loss through the water heater. At higher set temperatures, generally 75 °C or higher, the bypass is fully closed. All water flow passes through the heat exchanger which increases the pressure loss through the appliance at any given flow rate when compared to lower set temperatures.

When sizing pumps for Demand Duo-type systems, the bypass fully closed pressure losses should be used as the Rinnai INFINITY units in these systems are commonly set to 75 °C.



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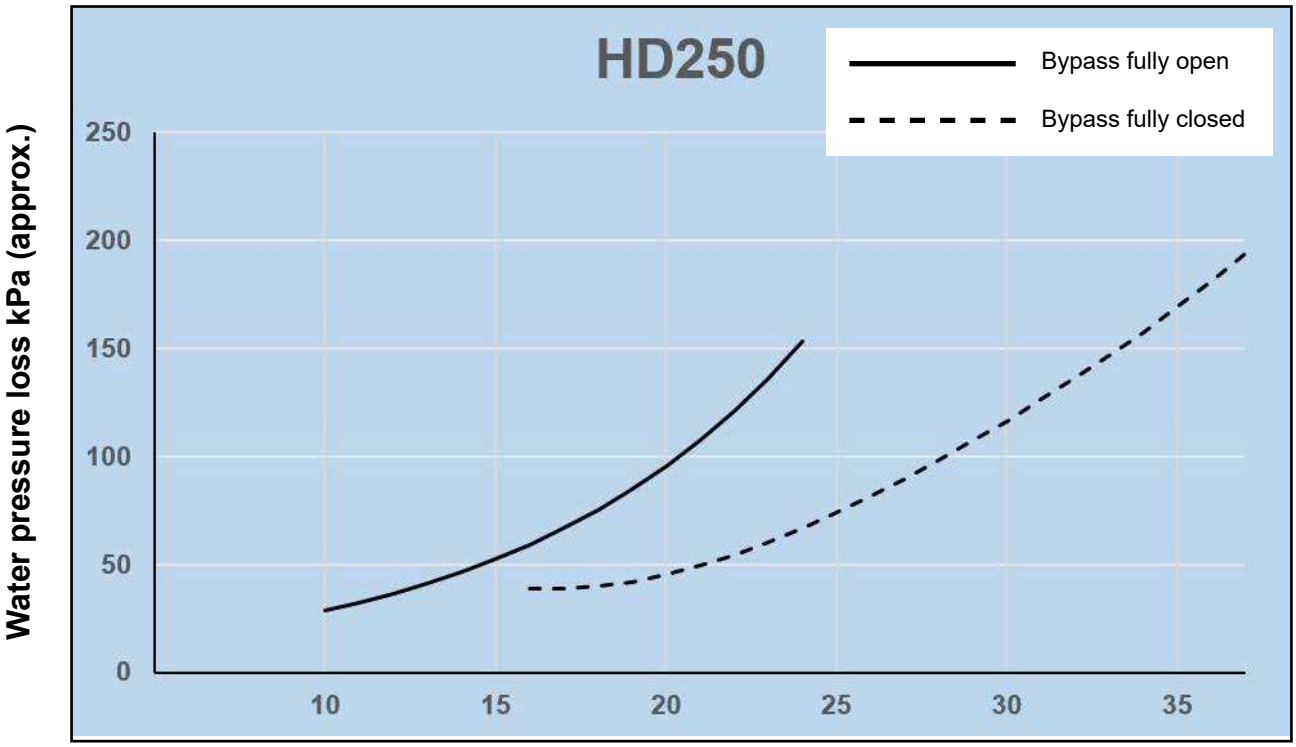

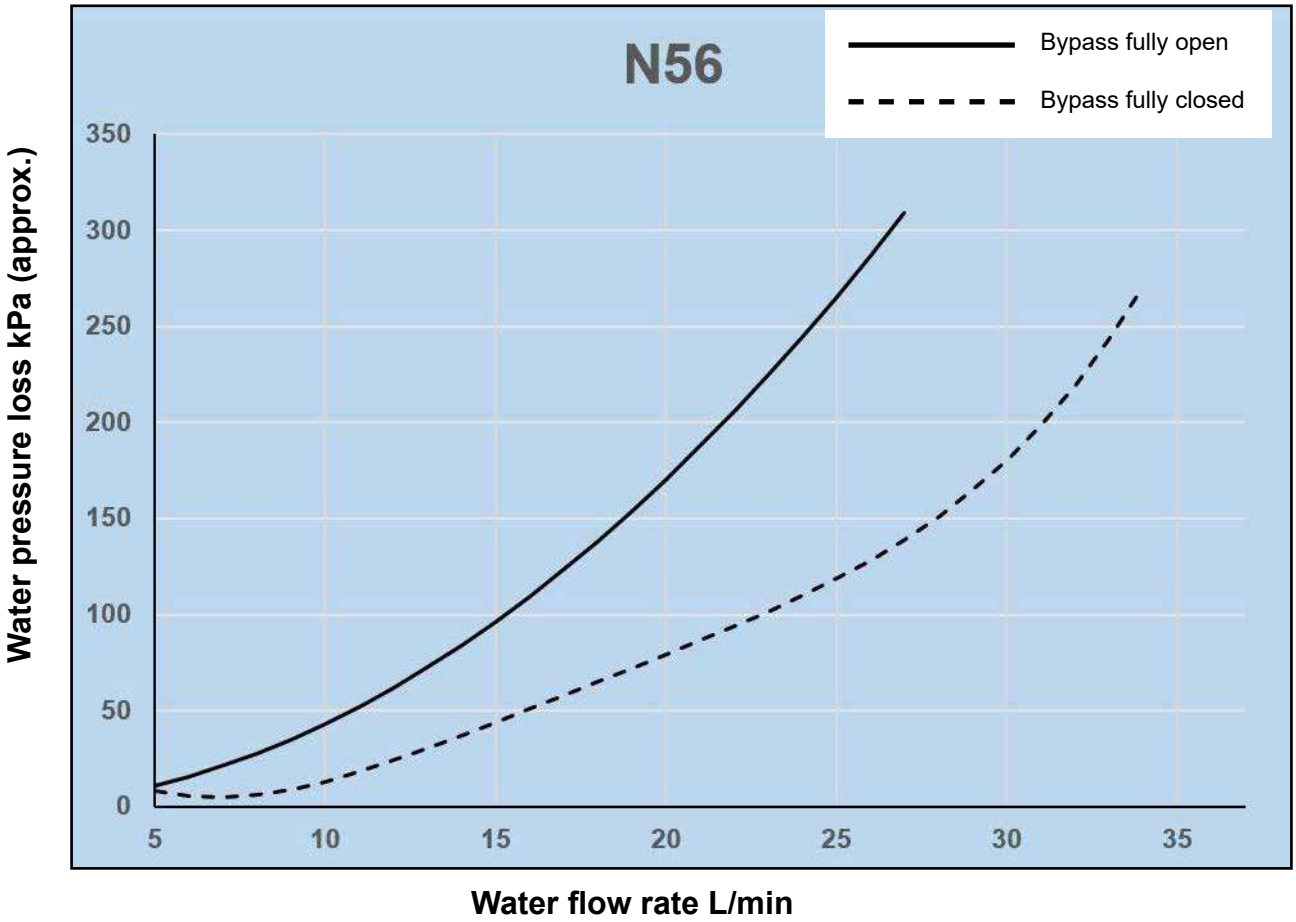

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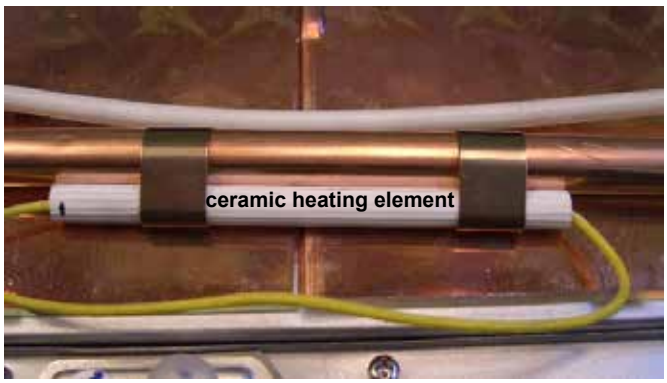
Appendix 2
Rinnai INFINITY inbuilt frost protection

Frost protection is fitted as standard on all Rinnai INFINITY models. Frost protection operates automatically, as required, whenever the appliance is connected to power.



How frost protection works
When the temperature inside the unit drops below 3.5 °C the frost protection turns on, providing heat via electricity. Once the temperature inside the unit reaches 7 °C the frost protection switches itself off.

The heat, provided by strategically placed ceramic heating elements, stops the water from freezing within the pipework of the unit.

As frost protection requires electricity, it is important that the unit is connected to the power supply at all times. If left off in an area prone to frost Rinnai recommend draining the appliance to prevent frost damage (not covered by warranty).

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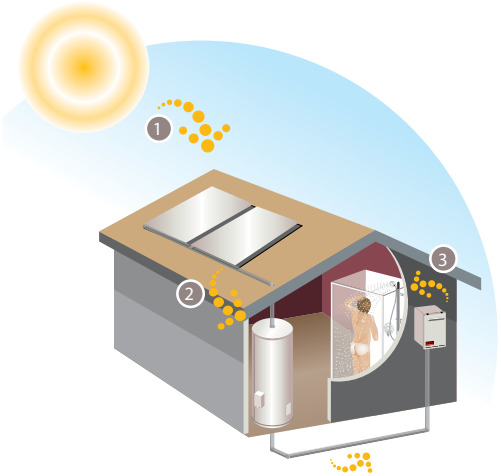
Appendix 3
gas boosted solar

Rinnai INFINITY HD and A28i models[1] can be easily plumbed to provide additional heat to a solar hot water system to heat water when solar hot water is not available.



How a gas boosted system works

1. The sun's rays heat water in the solar panels.
2. Hot water from the panels is stored in the cylinder.
3. If the water is too cold, the Rinnai INFINITY gas boost heats the water on demand as it travels from the cylinder to the tap.

The size of the Rinnai INFINITY depends on the number of bathrooms, select the Rinnai INFINITY model as if solar hot water was not available.

[1] N-Series models are also suitable for solar installations, but are not as economical as HD models—there is no gain by having a condensing water heater, as in a solar application, the water is already pre-heated.

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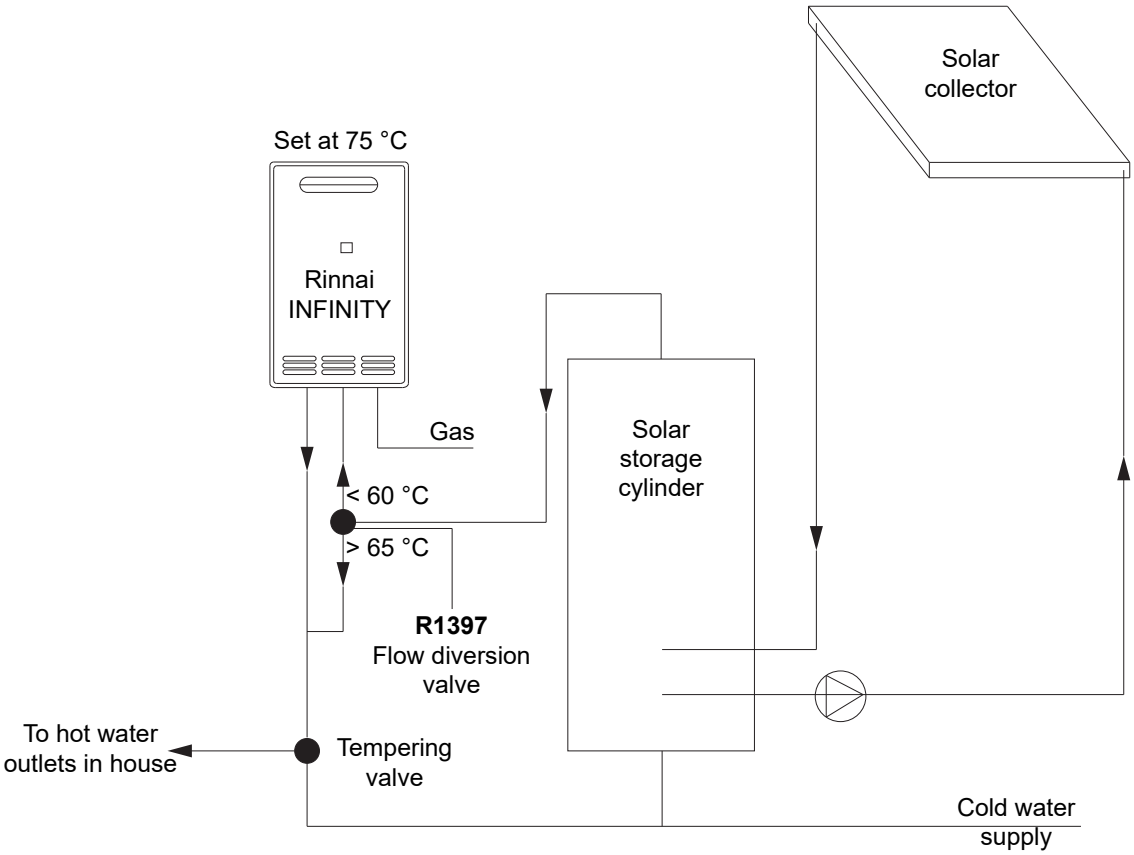
Recommended system layout using a Rinnai INFINITY and flow diversion valve



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Appendix 4
Rinnai INFINITY Limited Warranty

Rinnai warranty summary table

This warranty is applicable for all Rinnai INFINITY continuous flow water heaters manufactured from 2019 onwards. All terms of the warranty, subject to the conditions below, are effective from the date of first installation. The attending service person reserves the right to verify this by requesting a copy of the gas certificate of compliance prior to commencement of any warranty work. Proof of purchase and installation date will be required at the time of any warranty claim. This warranty is only valid within the country of purchase.

		HEAT EXCHANGER		ALL OTHER PARTS	
Rinnai INFINITY	**Application**	**Parts**	**Labour**	**Parts**	**Labour**
EF26 and A-Series models	Residential WITHOUT controllers	10 years pro rata[1]	3 years	3 years	3 years
	Residential WITH controllers	12 years pro rata[1]	3 years	5 years	3 years
	Commercial	1500 hours or 1 year[2]	1500 hours or 1 year[2]	1500 hours or 1 year[2]	1500 hours or 1 year[2]
HD and N-Series models	Residential	12 years pro rata[1]	3 years	5 years	3 years
	Commercial	5000 hours or 3 years pro rata[2]	1500 hours or 1 year[2]	1500 hours or 1 year[2]	1500 hours or 1 year[2]

[1] Under a pro rata warranty, if the heat exchanger fails before the end of the warranty, Rinnai will replace the heat exchanger at a cost that depends on the age of the heat exchanger at the time of the fault. For further details refer to the pro rata table on p.49.

[2] Whichever comes first

Residential application

A residential application is defined as an installation where a continuous flow unit is set to 55 °C[3] or lower, delivering hot water to a single residential dwelling (not used for commercial purposes[4]).

All other installations are defined as commercial applications.

For constant use applications, such as circulating ring mains, the water heater, must be sized and installed according to written guidelines from Rinnai.

General warranty terms

Rinnai reserves the right to make modifications and change specifications and its parts without notice.

For the purposes of the Consumer Guarantees Act 1993, Rinnai only guarantees the availability of repair facilities and spare parts for the express warranty period recorded in the table above.

This warranty does not limit any consumer rights or guarantees that may apply under the Consumer Guarantees Act 1993. If the product is being acquired for the purposes of a business, the provisions of the Consumer Guarantees Act 1993 do not apply and no other warranties (either express or implied by law) apart from those stated in the warranty will apply.

[3] A solar installation using a Rinnai INFINITY continuous flow unit (excluding EF26 and A-Series external models) in a single residential dwelling is considered a residential application.

[4] Examples of a commercial application in a residential dwelling; hair salon, catering kitchen, communal care facility etc. An accommodation business such as a motel, where a continuous flow unit serves the equivalent of a single family dwelling, is deemed to be a residential application.

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Warranty terms and conditions

1. All terms of the warranty are effective from the date of first installation. The attending service person reserves the right to verify this by requesting a copy of the gas certificate of compliance prior to commencement of any warranty work. The installer must issue a certificate of compliance by law in New Zealand. Warranty claims may be invalid if not accompanied by details of the installing or supervising gasfitter's registration number and the gas certification number.

2. All Rinnai appliances must be installed, commissioned, serviced, repaired and removed in accordance with the manufacturer's installation instructions, local regulations, and building codes by persons authorised by local regulations to do so.

3. All appliances must be operated and maintained in accordance with the manufacturer's operating instructions.

4. Servicing of the product is to be carried out by a Rinnai authorised service centre.

5. The warranty applies only to the components supplied by Rinnai. It does not apply to components supplied by others, such as electrical switches, electrical cables, fuses, isolating valves, pipework, and where applicable flue systems, but it is not limited to these.

6. Where the appliance has not been sited in accordance with the installation instructions or installed such that normal access is difficult, a service charge will apply. If at the discretion of the attending service person the installation is deemed illegal or access is dangerous, service will be refused. Any work required to gain reasonable access to the appliance will be chargeable by the attending service person (for example, removal of cupboards, doors, walls, or the use of special equipment to move components, but not limited to these).

7. Where the failed component is replaced under warranty, the balance of the original warranty will remain effective.

8. Rinnai reserves the right to transfer functional components from defective appliances if they are suitable.

9. Rinnai reserves the right to have installed product returned to the factory for inspection.

10. Where the water heater is installed outside the metropolitan area or further than 40 km from a Rinnai authorised service centre, travel costs shall be the owner's responsibility.

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Warranty exclusions
The following exclusions may cause the warranty to become void and will result in a service charge and costs of parts (if required).

1. Accidental damage and acts of God.

2. Failure due to abuse or misuse, improper maintenance or improper storage.

3. Failure due to incorrect or unauthorised installations.

4. Failure or damage caused by alterations, service or repair work carried out by persons other than Rinnai service persons or service centres.

5. Where the water heater has failed directly or indirectly as a result of poor water quality outside the limits specified.

6. Where it is found that there is no fault with the appliance and the issue is related to the installation or is due to failure of electric or gas supplied.

7. Subject to any statutory provisions to the contrary, Rinnai does not accept
   a. liability for consequential damage or incidental expenses resulting from any breach of the warranty.

   b. claims for damage to building or any other consequential loss either directly or indirectly due to leaks from the appliance or any other faults.

Pro rata heat exchanger warranty table
Under a pro rata warranty, if the **heat exchanger** fails before the end of the warranty, Rinnai will replace the heat exchanger at a cost that depends on the installation application and the age of the heat exchanger at the time of the fault.

	EF26 and A-SERIES		HD and N-SERIES	
Year	Residential WITHOUT controllers	Residential WITH controllers	Residential	Commercial
1	100%	100%	100%	33.3%
2	100%	100%	100%	33.3%
3	100%	100%	100%	33.3%
4	70%	90%	90%	-
5	60%	80%	80%	-
6	50%	70%	70%	-
7	40%	60%	60%	-
8	30%	50%	50%	-
9	20%	40%	40%	-
10	10%	30%	30%	-
11	-	20%	20%	-
12	-	10%	10%	-

The percentages above relate to the heat exchanger component only. It does not include labour.

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Water quality

Water quality outside the limits (as set down below) will void this warranty.

Water quality and impurity limits

TDS (Total Dissolved Solids)	Total hardness $CaCO_3$	Alkalinity (as $CaCO_3$)	Dissolved (free) CO_2	pH	Chlorides	Magnesium	Sodium	Iron	Langelier Index
Up to 600 mg/L or ppm	Up to 200 mg/L or ppm	Up to 200 mg/L or ppm	Up to 25 mg/L or ppm	6.5-8.5	Up to 300 mg/L or ppm	Up to 10 mg/L or ppm	Up to 150 mg/L or ppm	Up to 1 mg/L or ppm	Between -1.0-0.8

Most metropolitan water supplies fall within these limits. If sludge or foreign matter is present in the water supply, a suitable filter should be incorporated in the water supply.

Some examples of water quality issues where water may need to be treated:

- Hard water (areas including Whanganui)
- Aggressive water (areas including Christchurch)
- Both hard and aggressive water (some bore water)

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Appendix 5

LPG gas bottle consumption and cylinder clearances

LPG gas bottle consumption

We often get asked about how long a gas bottle will last when running a gas appliance. Using the calculation below you can work this out yourself.

LPG gas bottle energy calculation

1 kg of LPG gas contains 50.4 MJ of energy. This means that a 45 kg LPG has bottle has 45 kg x 50.4 MJ = 2268 MJ. This calculation works for different gas bottle sizes, here are the most common:

- 9 kg = 453.6 MJ
- 45 kg = 2268 MJ
- twin pack = 4536 MJ (two 45 kg bottles)

Calculating how long an LPG bottle will last

To work out how many hours an LPG bottle will last you need to divide the energy (MJ) of the gas bottle by the total MJ input of the appliance.

For example:
A household has an A26 installed which runs approximately 20 minutes a day, three five minute showers and intermittent use of vanity and kitchen taps (approx. five minutes).

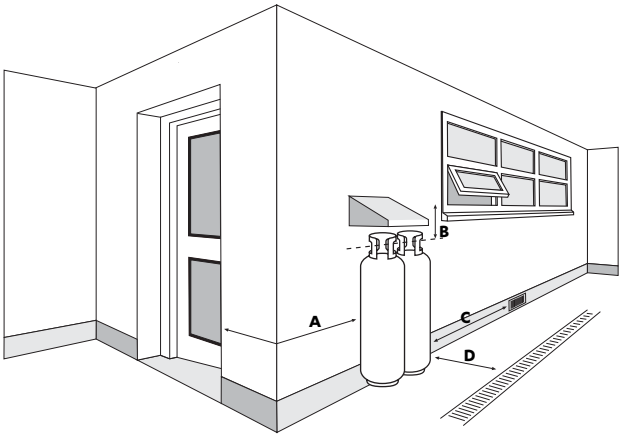
- 2268 ÷ 199 MJ/h (maximum input of unit) = 11.40 hours (running at full capacity)
- 11.40 hours x 60 minutes = 684 minutes
- 684 minutes ÷ 20 minutes (use per day) = 34.2 days (approx. one 45 kg per month)

The above example is based on the unit operating at a maximum flow rate and MJ/h input (26 L/min and 199 MJ/h). In the real-world this won't be the case as the flow rate and gas consumption when using vanity and kitchen taps is much lower (2.4 L/min and 13 MJ/h), so in reality the gas bottle will last a little longer.

Please note: This doesn't factor other gas appliances in the house.

For more information you can search the internet (how long will a 45 kg gas bottle last) as there are additional resources and blogs available.

Overview of LPG cylinder clearances



A	Min. clearance to a door	1 m
B	Min. clearance to an openable window	150 mm
C	Min. clearance to an air vent or opening	1 m
D	Min. clearance to a drain	1 m

The above diagram is a modified version of a drawing originally produced by ongas (www.ongas.co.nz). It is intended to provide an overview of the general clearances required for LPG cylinders.

For detailed information relating to LPG cylinder placement it is advisable to consult a licensed gasfitter, your nearest LPG cylinder supplier, or consult AS/NZS 5601.1 Gas Installations.

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Appendix 6
The future of gas in New Zealand

Extract from https://www.gasenergy.org.nz/future-sure website which also contains a handy downloadable Future Sure information sheet.

The flame isn't going out. Kiwi gas users can be confident that the gas they turn on isn't being turned off and will continue to flow well into the future.

If you're connected to gas now or thinking about connecting, you can be sure that natural gas and LPG will keep flowing as we make the shift to future low or zero carbon gases.

Gas energy is here to stay
The Climate Change Commission has not proposed a ban on new gas connections from 2025 but instead recommend the government sets a date, once a national energy strategy is developed and there is more clarity around the contribution future gases can make in decarbonising New Zealand's energy supply.

You can also be confident that you can use any natural gas or LPG appliances in your home for their expected lifetime. Current LPG appliances are fully compatible with BioLPG, and modern gas appliances are already able to run on a blend of natural gas and renewable hydrogen gas (up to 20%) or biogas. New compatible appliances will become widely available as we scale up towards a more renewable gas energy future.

Gas energy is here to stay, but it will be changing. What isn't changing is the value and benefits you get living in a home energised by gas.

If you like today's gas, you'll love tomorrow's
New renewable, low and zero carbon gases are the future. With hydrogen gas and biogas already being developed and trialled here in New Zealand and globally, Kiwis will continue to enjoy the benefits of gas in their lives as we move to tomorrow's gas energy.

Green hydrogen gas, made from renewable energy and water, can be used on its own or blended with natural gas to reduce carbon emissions. Renewable biogas is produced through the breakdown of organic waste (e.g. compost). BioLPG, produced from biomass (e.g. forest, crop or farm waste) is chemically identical to LPG and a direct energy replacement for your BBQ or LPG appliances.

It's likely that the blending of traditional gas with future gases like green hydrogen gas and biogas will happen in the next 3-5 years. Just like today's gas, these new gases will be subject to rigorous safety protocols and standards before they are available to homes and businesses.

Gas will help us get to 100% renewable energy
Gas energy is an important part of New Zealand's energy future. The Climate Change Commission's advice to the government on achieving our climate and carbon emissions targets acknowledges the role that low and zero carbon gases can play in decarbonising New Zealand's energy system and reducing the impact of climate change on our environment. New gas energy will help us achieve our 100% renewable energy aspirations and a net-zero carbon future by 2050.

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Wall Rangehood, 90cm, Pyramid Chimney

Series 5 | Contemporary

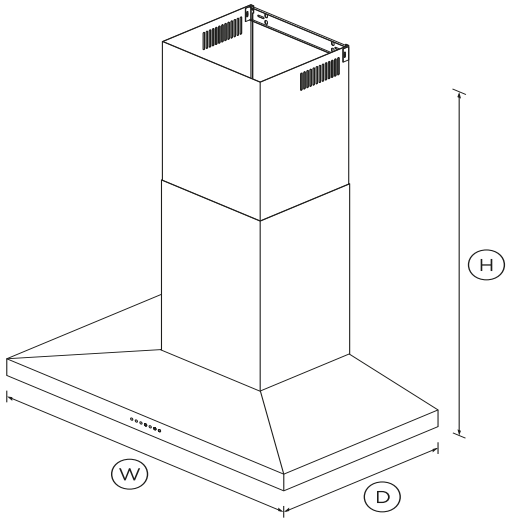
Stainless Steel

The wall chimney rangehood has contemporary styling, extracting steam, grease and cooking odours quietly and efficiently.

- With three fan speeds, select the perfect extraction rate for your cooking
- Powerful maximum air movement of 780m³/hr
- Dishwasher safe filters that are easy to remove and clean

DIMENSIONS

Height	**610-1050mm**
Width	**898mm**
Depth	**500mm**



FEATURES & BENEFITS

Easy installation
This wall chimney rangehood is the perfect partner to your Fisher & Paykel cooktop. It can be either externally ducted or internally recirculated, making it perfect for apartments.

Simple to use
Three fan speeds provide powerful extraction to ensure steam and odours are quickly removed. Simply change the fan speed with the touch of a button.

Easy cleaning
Three filters effectively trap grease particles during extraction. They are easy to remove and dishwasher safe, or can be cleaned by hand in hot soapy water.

Complementary design
This wall chimney rangehood's sleek stainless steel finish which will complement any contemporary kitchen and is designed to match the rest of Fisher & Paykel's kitchen appliance family.

SPECIFICATIONS

Accessories

Aluminium filter	**792527**
Chimney extension	**792492 (Cover duct extension**
Eave ducting kit	**PD-RHK15OE**
Light bulb	**792461**
Recirculation carbon filter	**792481**
Recirculation diverter	**791820**
Roof ducting kit	**PD-RHK150T**
Side wall ducting kit	**PD-RHK15OW**

Fan ratings

Maximum air movement	**780m³/hr**
Maximum sound rating	**65dBA**

Installation and cleaning

Dishwasher safe filters	**3**
Ducted	**Top extraction**
Recirculation	**Optional - top extraction**
Two piece height adjustable	•

Performance

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Extraction type	**Surface**
Fan speeds	**3**
Filter type	**Mesh**
Number of filters	**3**

Power requirements

Supply frequency	**50Hz**
Supply voltage	**220-240V**

Product dimensions

Depth	**500mm**
Height	**610-1050mm**
Width	**898mm**

Product information

Control type	**Push Button**

Ventilation features

Light type	**LED**

Warranty

Parts and labour	**2 years**

SKU	50007

The product dimensions and specifications in this page apply to the specific product and model. Under our policy of continuous improvement, these dimensions and specifications may change at any time. You should therefore check with Fisher & Paykel's Customer Care Centre to ensure this page correctly describes the model currently available. ? Fisher & Paykel Appliances Ltd 2020

Other product downloads available at fisherpaykel.com

- User Guide
- Service & Warranty
- Installation Guide

24/7

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MANROSE CLASSIC INLINE MOUNTED FAN KITS

SF SHOWER FAN MODELS

Duct Size	Model No.	Switching Method	Fan Type	Performance	Order Code
100mm	SF100S	Standard	Axial	23 l/s, 85m³/hr	FAN0017
100mm	SF100T	Timer	Axial	23 l/s, 85m³/hr	FAN0018
100mm	SF200S	Standard	Ctr'fgl	31 l/s, 110m³/hr	FAN0328
100mm	SF200T	Timer	Ctr'fgl	31 l/s, 110m³/hr	FAN0329
125mm	SF125S	Standard	Axial	36 l/s, 130m³/hr	FAN0064
125mm	SF125T	Timer	Axial	36 l/s, 130m³/hr	FAN0065
150mm	SF150S	Standard	Hyper	109 l/s, 394m³/hr	FAN0101
150mm	SF150T	Timer	Hyper	109 l/s, 394m³/hr	FAN0102

FAN0101

Typical Bathroom & Ensuite Extraction Fan

- With the fan mounted in the ceiling space, these inline models are able to draw steam directly from source.
- These fans have ball bearing motors to prolong the life of the motor.
- Supported by a 5 year warranty.

GENERAL INFORMATION

Models	Grille Cut-Out	Interior Grille	Exterior Grille	Duct Type	Length of duct included
SF100	115mm	White Round	White Fixed Louvre	Flexible PVC	3m supplied (should not be extended)
SF200	115mm	White Round	White Fixed Louvre	Flexible Alum	3m supplied (can be extended up to 6m)
SF125	140mm	White Round	White Fixed Louvre	Flexible PVC	4m supplied (should not be extended)
SF150	160mm	White Round	White Fixed Louvre	Flexible PVC	5m supplied (can be extended up to 12m)

Please note: Grille cut out size is a nominal diameter for a circular cut-out.

1. Standard Model - operates from remote switch (not supplied).
2. Timer Model - Fan operates from a switch, the fan continues to run for a preset time after switching off. The 100 and 125mm models are adjustable between 1-20 minutes, whereas the 150mm models include a fixed 7 minute timer. Both require: permanent phase and switched phase.

NOTE: All fan flow rates quoted are free air delivery.

Performance will be affected by the length of ducting used.

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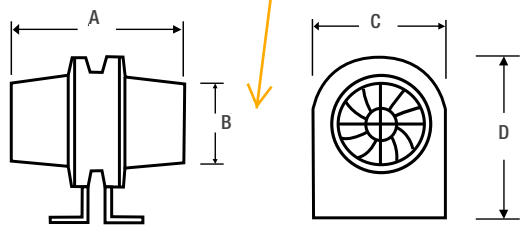
Typical Bathroom & Ensuite Extraction Fan

DIMENSION INFORMATION (MM)

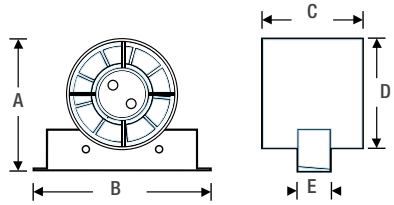
Models	A	B	C	D	E
SF100	130	155	90	100	27
SF200	155	100	100	195	258
SF125	150	155	99	118	27
SF150	187	153	109	150	27



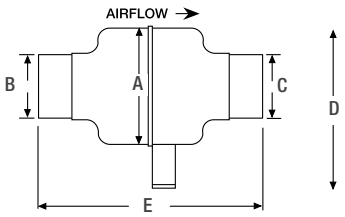
Dimensions - SF150

TECHNICAL SPECIFICATION & PERFORMANCE DATA

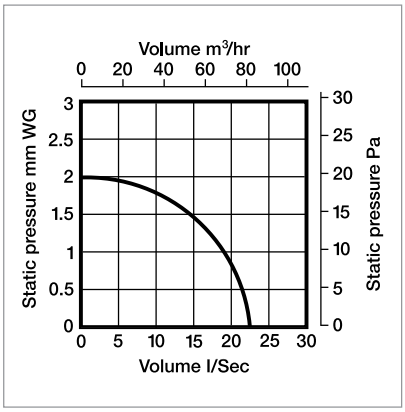
Models	SF100	SF200	SF125	SF150
Fan	ID100	CFD200	ID125	Hyper
Power	220 - 240V	220 - 240V	220 - 240V	220 - 240V
Fan Performance	23 l/s, 85m³/hr	31 l/s, 110m³/hr	36 l/s, 130m³/hr	109 l/s, 394m³/hr
Fan Wattage	20W	20W	20W	27W
Maximum Pressure	20 Pa	120 Pa	35 Pa	120 Pa
Fan Speed	2400 RPM	1400 RPM	2000 RPM	2650 RPM
Sound Level	41 dB(A)	45 dB(A)	41 dB(A)	38 dB(A)
Max Operating Temp	50°C	50°C	50°C	70°C
IP Rating	IPX4	IPX4	IPX4	IPX2



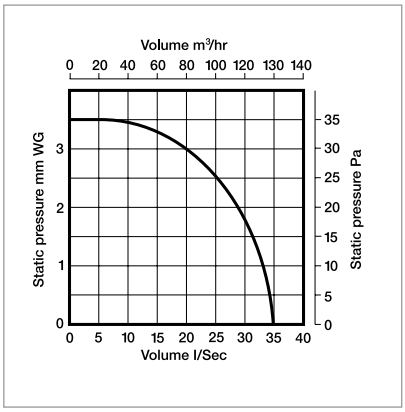
Dimensions - SF100/SF125/150



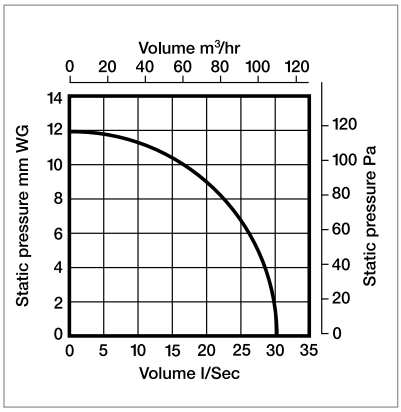
Dimensions - SF200



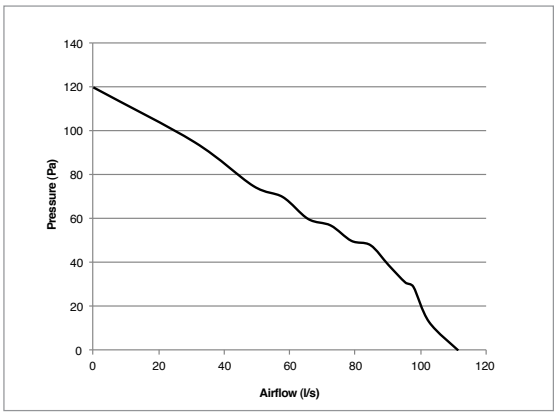
Performance - SF100



Performance - SF125



Performance - SF200



Performance - SF150

Note: PERFORMANCE - ID Fans maximum fan performance stated, this can vary depending on the length of ducting used.

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BRANZ Appraised
Appraisal No. 238 [2018]

PINK® BATTS® INSULATION

Appraisal No. 238 (2018)

This Appraisal replaces BRANZ Appraisal No. 238 (2012)

Amended 18 May 2022

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Freephone: 0800 746 522
Web: www.pinkbatts.co.nz

BRANZ
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RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

Product

1.1 Pink® Batts® Insulation is a range of resin-bonded, fibrous glasswool thermal insulating material for use in walls, ceilings and roofs of buildings. Pink® Batts® Insulation is pre-cut to suit a range of framing spacings.

Scope

2.1 Pink® Batts® Insulation has been appraised as a thermal insulation material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Pink® Batts® Insulation, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years and B2.3.1 (b) 15 years. Pink® Batts® Insulation meets these requirements. See Paragraph 8.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.1. Pink® Batts® Insulation will contribute to meeting this requirement. See Paragraphs 13.1 and 13.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Pink® Batts® Insulation meets this requirement.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 (a) and H1.3.2 E. Pink® Batts® Insulation will contribute to meeting these requirements. See Paragraphs 14.1 and 14.2.

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BRANZ Appraised
Appraisal No. 238 [2018]

Technical Specification

4.1 Pink® Batts® Insulation is a resin-bonded, fibrous, glasswool insulation, manufactured from recycled and/or virgin glass and cured urea extended phenolic resin.

4.2 Pink® Batts® Insulation is manufactured in a range of sizes to suit framing centres and cavity depths. Building Insulation Blanket (BIB) is supplied in rolls for commercial applications. Pink® Batts® Insulation is available as set out in Table 1.

Table 1: Pink® Batts® Insulation Product Table.

R-value	Length (mm)	Width (mm)	Nominal Thickness (mm)	Density (kg/m³)
Roof - Thermal Insulation				
1.8[1]	1,220	432	95	8.3
2.2[1]	1,220	432	115	8.2
2.6[1]	1,220	432	140	7.0
3.2[1]	1,220	432	170	8.4
3.2[1]	1,220	432	170	6.9
3.6[1]	1,220	432	180	7.2
3.6	1,220	432	180	8.8
4.0[1]	1,220	432	195	8.1
5.0[1]	1,220	432	220	9.5
6.0[1]	1,220	432	235	13
7.0[1]	1,220	432	260	15.8
Roof - Building Insulation Blanket				
1.2	24,000	1,200	50	12
1.8	20,000	1,200	75	12
2.4	16,000	1,200	95	12
2.6	14,000	1,200	105	12
3.2	12,000	1,200	125	12
3.6	10,000	1,200	140	12.5
Roof - Pink® Batts® Retrofit Insulation				
2.9[1]	1,220	432	150	7.7
3.3[1]	1,220	432	175	7.1
Wall - Masonry Insulation				
1.0[1]	1,220	580	40	14
1.2[1]	1,220	580	50	12.8
70 mm Wall Range - Thermal Insulation				
2.2	1,140	560	70	30
90 mm Wall Range - Thermal Insulation				
1.8[1]	1,140	560	90	9.1
2.2[1]	1,140	560	90	11.0
2.4[1]	1,140	560	90	14.2
2.4	1,140	560	90	17.4
2.6[1]	1,140	560	90	18.0
2.8[1]	1,140	560	90	25.2

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Table 1: Pink® Batts® Insulation Product Table (cont.)

R-value	Length (mm)	Width (mm)	Nominal Thickness (mm)	Density (kg/m³)
90 mm Narrow Wall Range - Thermal Insulation				
2.2[1]	1,140	360	90	11.0
2.6[1]	1,140	360	90	18.0
2.8[1]	1,140	360	90	25.21
90 mm Steel Wall Range - Thermal Insulation				
2.2[1]	1,220	610	90	11.0
2.6[1]	1,220	610	90	18.0
140 mm Wall Range - Thermal Insulation				
3.2[1]	1,140	560	140	9.6
3.6[1]	1,140	560	140	12.4
4.0[1]	1,140	560	140	17.6
4.3	1,140	560	140	28
140 mm Narrow Wall Range - Thermal Insulation				
3.2[1]	1,140	360	140	9.6
4.0[1]	1,140	360	140	17.6
4.3	1,140	360	140	28

[1] Pink® Batts® Insulation products with the Environmental Choice licence.

4.3 Pink® Batts® Insulation is pink in colour and is baled in polythene bags with labelling in compliance with AS/NZS 4859.1.

4.4 Pink® Batts® Retrofit Ceiling Insulation is pink in colour and is baled in teal polythene bags with labelling in compliance with AS/NZS 4859.1.

4.5 Accessories used with Pink® Batts® Insulation, which are supplied by the insulation installer, are wire netting, plastic strapping and fixings.

Handling and Storage

5.1 Pink® Batts® Insulation must be stored under cover and in dry conditions. Heavy objects must not be stacked on the bales. The bales must be stored in an orientation that avoids excessive compression of the product.

5.2 In general, insulation products are sensitive to the length of time they are stored under compression packaging. Product that does not recover to its nominal thickness may not achieve the stated thermal resistance (R-value).

Technical Literature

6.1 Refer to the Appraisal listing on the BRANZ website for details of the current Technical Literature for Pink® Batts® Insulation. 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.

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Design Information

General

7.1 Pink® Batts® Insulation is intended for use as thermal insulation to meet the requirements of the NZBC. Pink® Batts® Insulation can be used to meet the minimum schedule method R-values of NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Greater construction R-values can be achieved where specific design is used. For construction R-values, refer to the BRANZ House Insulation Guide. Product R-values and dimensions are given in Table 1.

7.2 The R-value of Pink® Batts® Insulation has been determined by testing to AS/NZS 4859.1, which is an acceptable method in NZBC Acceptable Solution H1/AS1.

7.3 Pink® Batts® Insulation is designed to be friction-fitted between wall, ceiling or roof framing. They can also be laid directly on a ceiling lining, over ceiling battens or joists/truss chords. In other horizontal situations, the insulation must be adequately supported by galvanised wire netting or some other suitable durable material.

7.4 Where the insulation is installed in exterior walls, the nominal thickness of the insulation material must be selected to provide a snug close fit which touches all sides of the insulation cavity between the wall underlay and the interior wall lining.

7.5 Where the insulation is retrofitted in external walls without a wall underlay, and with direct-fixed claddings, the insulation must be at least 20 mm thinner than the framing to allow a gap of at least 20 mm between the insulation and the wall cladding. Horizontal straps must be stapled into the sides of the wall studs at 300 mm centres maximum as support before the insulation is installed. Refer also to NZS 4246, Section 5.4.2.

7.6 When the insulation is installed in a wall with a drained cavity, it is recommended that specific wall products with a controlled nominal thickness be used. Where the stud spacings are greater than 450 mm, an intermediate means of restraining the insulation from bulging into the cavity must be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

7.7 Building Insulation Blanket is designed specifically for commercial roof and commercial wall applications. In residential applications, installation must be completed in line with NZS 4246.

7.8 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.

7.9 The clearance requirements for heating appliances and downlights must be met, and reference made to the manufacturer's instructions and NZS 4246. See Paragraphs 10.1-10.3.

Durability

Serviceable Life

8.1 Where the building is maintained so that provisions of NZBC Clauses E2 and E3 are met, and where the insulation is not crushed or exposed to conditions that will diminish its thermal performance (e.g. moisture), Pink® Batts® Insulation can be expected to have a serviceable life of at least 50 years.

Maintenance

9.1 Insulation that has become damp must be removed and the cause of dampness repaired. Cavities must be clean and dry before fitting new insulation of an equivalent thermal rating. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.

Prevention of Fire Occurring

10.1 Pink® Batts® Insulation is considered a non-combustible material and need not be separated from heat sources such as fireplaces, flues and chimneys. However, when used in conjunction with or attached to heat sensitive materials, the heat sensitive material must be separated or protected from heat sources. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

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Downlights

10.2 Recessed luminaires shall be of the specified luminaire types and installed in accordance with NZBC Verification Method C/VM1 and NZBC Acceptable Solution C/AS1, Section 7.4.

10.3 Insulation materials must maintain a clearance of 100 mm to undefined recessed luminaires in existing buildings.

Fire Affecting Areas Beyond the Fire Source

11.1 Pink® Batts® Insulation has a Group Number of 1-S. When used in an occupied space, Pink® Batts® Insulation may or may not need to be enclosed by an internal lining, depending on the Risk Group. Refer to the relevant NZBC Acceptable Solutions C/AS1 and C/AS2 for specific internal surface finish requirements.

External Moisture

12.1 The total building envelope must be weathertight and comply with the requirements of NZBC Clause E2 to ensure that the insulation remains dry in use.

12.2 The moisture content of the construction materials at the time of installing and enclosing the insulation must meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 10.2 a), or a lower moisture content if required by the lining manufacturer.

Internal Moisture

13.1 Buildings must provide an adequate combination of thermal resistance, ventilation and space temperature to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate. This does not apply to Communal Non-residential, Commercial, Industrial, Outbuildings or Ancillary buildings.

13.2 Roofs and walls of housing complying with the Schedule Method for Compliance with NZBC Clause H1.3.2 E will have adequate thermal resistance. Other buildings may require more thermal insulation to satisfy the requirements of NZBC Acceptable Solution E3/AS1 than that to satisfy the energy efficiency provisions alone.

Energy Efficiency

14.1 Pink® Batts® Insulation will contribute to meeting the requirements of NZBC Clause H1, Performance H1.3.1 (a) and H1.3.2 E, by compliance with NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Refer to Paragraphs 7.1-7.8.

14.2 Pink® Batts® Insulation R-values have been determined by testing to AS/NZS 4859.1 and are given in Table 1.

Installation Information

Installation Skill Level Requirements

15.1 All design and building work must be carried out in accordance with the Pink® Batts® Insulation Technical Literature and this Appraisal. All building work must be undertaken by competent and experienced tradespersons conversant with Pink® Batts® Insulation.

General

16.1 Installation of Pink® Batts® Insulation must be in accordance with the Technical Literature and this Appraisal. NZS 4246 should be used as a guide for installing insulation in residential buildings.

16.2 The product must be installed only when the building is enclosed and when the construction materials have achieved the required maximum moisture content or less.

16.3 Pink® Batts® Insulation must be released from the packaging and allowed to re-loft prior to installation. The time to loft will depend upon the length of time the product has been packaged and stored.

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16.4 Pink® Batts® Insulation is supplied in segment and blanket form (see Table 1) to suit framing layouts. The product is able to be cut to suit wall cavities and when fitted between roof or ceiling framing. The insulation must be neatly friction-fitted between framing members so that the potential for gaps and convective heat loss is reduced. In wall cavities the insulation must be neatly friction-fitted between framing members to prevent sagging. In ceiling or roofs, the insulation may be fitted between framing members or fitted over framing members and butted tightly. The insulation must extend to the external wall top plate. The insulation must not be folded or compressed. A close even fit provides the most efficient thermal performance. Whenever possible, the insulation should be fitted beneath wiring or plumbing.

16.5 The clearance requirements for heating appliances and downlights must be followed. Refer also to NZS 4246.

Inspections

16.6 The Technical Literature, this Appraisal and NZS 4246 must be referred to during the inspection of Pink® Batts® Insulation installations.

Health and Safety

17.1 Refer to the Technical Literature and NZS 4246 for guidance on health and safety requirements such as personal protective clothing and installation hazard assessment.

Basis of Appraisal

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

Tests

18.1 Thermal resistance testing of Pink® Batts Insulation in accordance with AS/NZS 4859.1 has been completed. The results have been reviewed by BRANZ technical experts.

18.2 Tests have been carried out in accordance with AS 1530.1. Pink® Batts® Insulation is not deemed combustible according to the test criteria. The results have been reviewed by BRANZ technical experts.

Other Investigations

19.1 An assessment of the durability of Pink® Batts® Insulation has been made by BRANZ technical experts.

19.2 The manufacturer's Technical Literature including installation instructions have been reviewed by BRANZ and found to be satisfactory.

Quality

20.1 The manufacture of Pink® Batts® Insulation has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.

20.2 The range of Pink® Batts® Insulation products have been assessed for their environmental impact by the New Zealand Ecolabelling Trust and comply with the requirements of the Environmental Choice Specification, Licence No. 2504017 - Thermal (resistive type) Building Insulants. The products that have the Environmental Choice licence are noted in Table 1.

20.3 Tasman Insulation New Zealand Ltd is responsible for the quality of the product supplied.

20.4 Quality of installation of the product on-site is the responsibility of the installer.

20.5 Quality of maintenance of the building to ensure the insulation material remains dry is the responsibility of the building owner.

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Sources of Information

- AS 1530.1:1994 Combustibility test for materials.
- AS/NZS 4859.1:2018 Thermal insulation materials for buildings.
- BRANZ House Insulation Guide, Fifth Edition 2014.
- NZS 4246:2016 Energy efficiency - Installing bulk thermal insulation in residential buildings.
- Ministry of Business, Innovation and Employment Record of Amendments - Acceptable Solutions, Verification Methods and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 05 September 2018.

This Appraisal has been amended to include the use of Pink® Batts® Insulation when retrofitting external walls without wall underlay with direct-fixed claddings.

Amendment No. 2, dated 26 November 2018.

This Appraisal has been amended to update Table 1 to include the Roof - Building Insulation Blanket product range.

Amendment No. 3, dated 06 August 2021.

This Appraisal has been amended to update Table 1 and sections 11 and 12.

Amendment No. 4, dated 10 March 2022.

This Appraisal has been amended to update Table 1 and the assessment of thermal test data conducted to AS/NZS 4859.1:2018.

Amendment No. 5, dated 18 May 2022.

This Appraisal has been amended to update Table 1.

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BRANZ

In the opinion of BRANZ, Pink® Batts® Insulation 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 Tasman Insulation New Zealand 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. Tasman Insulation New Zealand 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 Tasman Insulation New Zealand Ltd.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Tasman Insulation New Zealand Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
03 August 2018

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Web: www.whanganui.govt.nz

WHANGANUI DISTRICT COUNCIL
Te Kaunihera a Rohe o Whanganui

FORM 7
CODE COMPLIANCE CERTIFICATE NUMBER BCon22/0511

Section 95, Building Act 2004

Mr B Vijayan, Mrs S Sekharath
45 Oxford Road
Springvale
Whanganui 4501

Building Consent No: BCon22/0511

Issue Date: 03/04/2024

The building:

Street address of building:	***Legal description of land where building is located:***
55 Tawhero St WHANGANUI	Lot 24 DP 569376 0.0659 Ha
Building name:	***Location of building within site/block number:***
Level/unit number:	***Current, lawfully established, use:*** *[include number of occupants per level and per use if more than 1]*
	Single Detached Residential
Year first constructed:	
2022	

The owner:

Name of Owner:	
Mr B Vijayan, Mrs S Sekharath	
Mailing address:	***Street Address/registered Office:***
45 Oxford Road Springvale Whanganui 4501	45 Oxford Road Springvale Whanganui 4501

Phone numbers:

Landline:		***Mobile:***	0224180588
Daytime:		***After hours:***	
Facsimile number:			
Email address:		***Website:***	

First point of contact for communications with the building consent authority:

Contact Person:	
G J Gardner Homes Ltd	
Mailing address:	***Street Address/registered Office:***
PO Box 695, Whanganui Mail Centre, Whanganui 4541	PO Box 695, Whanganui Mail Centre, Whanganui 4541

Phone number:

Landline:		***Mobile:***	0272460668
Daytime:	063453563	***After hours:***	
Facsimile number:			
Email address:		***Website:***	

Building Work

Building consent number:	***Issued by:***
BCon22/0511	Whanganui District Council
Type of Work	
Single Detached Residential	
Description of Work	
Construct a dwelling with attached garage. + Alteration.1 Change to a tiled walk in shower in main bathroom	
Intended Life	***Estimated Value***
Indefinite but not less than 50 years.	$484450.00

Code compliance:

The building consent authority named below is satisfied, on reasonable grounds that the building work complies with the building consent.

*Compliance schedule
There are no specified systems in this building.

This is a final Code Compliance Certificate issued in respect of all of the building work under the above Building Consent.

Signed for and on behalf of the Whanganui District Council:

GJ Hoobin
Building Control Manager