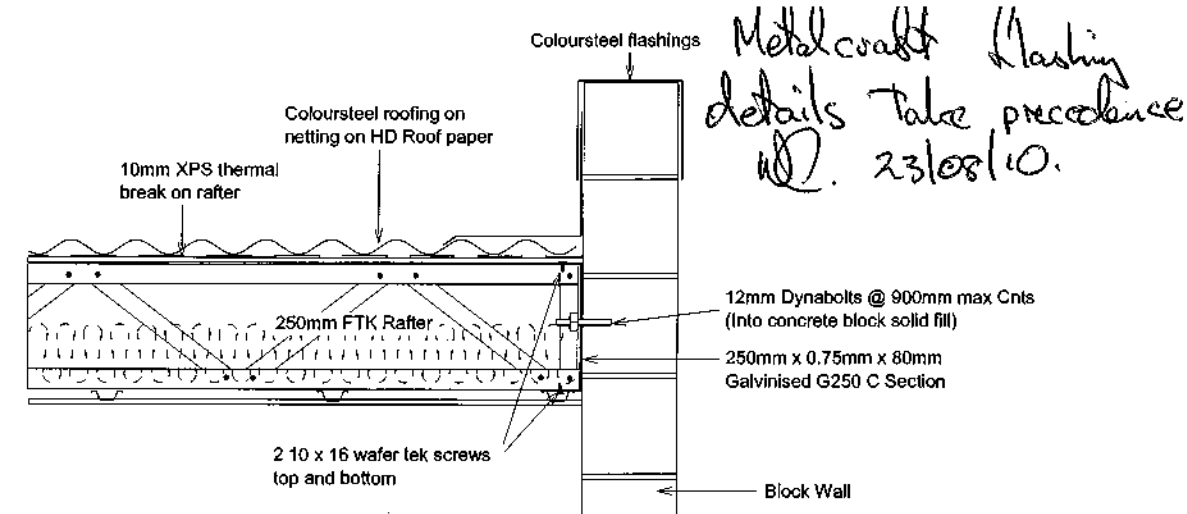


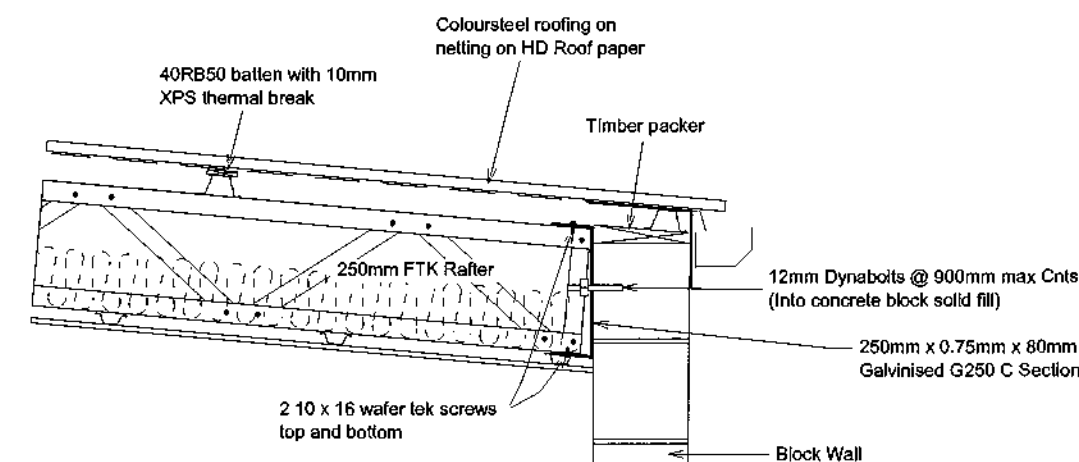
NOTE All timber in near contact to concrete, steel or cement based products shall be separated with a malthoid strip DPC of sufficient width to prevent contact between the two.



Metalcrafft Flashing details take precedence WC. 23/08/10.

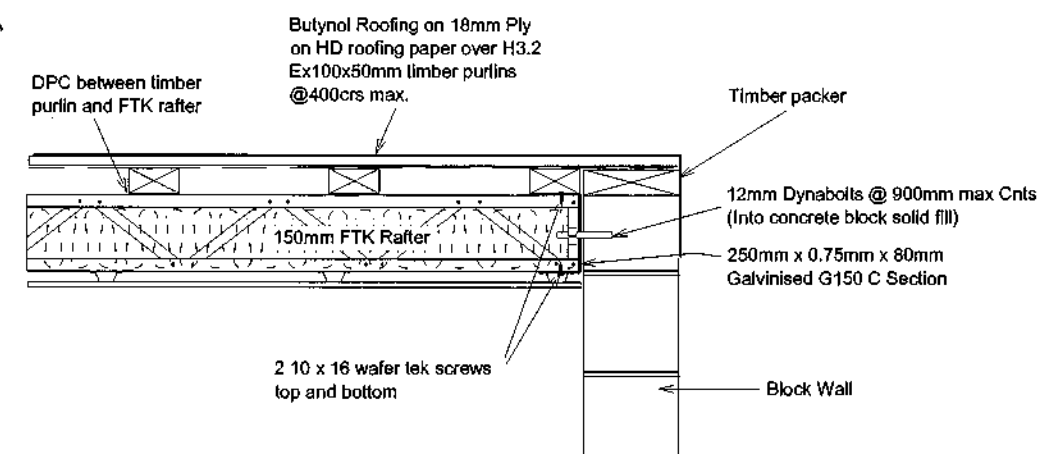
Detail 1

NOTE All flashings that are shown are diagramatic only



Detail 2

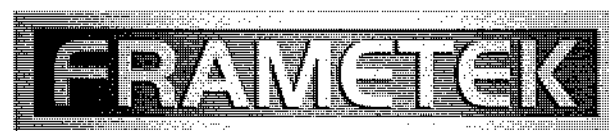
NOTE All flashings that are shown are diagramatic only



Detail 3

NOTE All flashings that are shown are diagramatic only

House



Wellington
P.O.Box 89
Paraparaumu.
Phone 0800 50 78335

Auckland
P.O.Box 62070
Epsom Auckland.
Fax (04) 902-9170

Proposed Roof Plan For: B Cargill
104 Raukawa Road
Peka Peka.

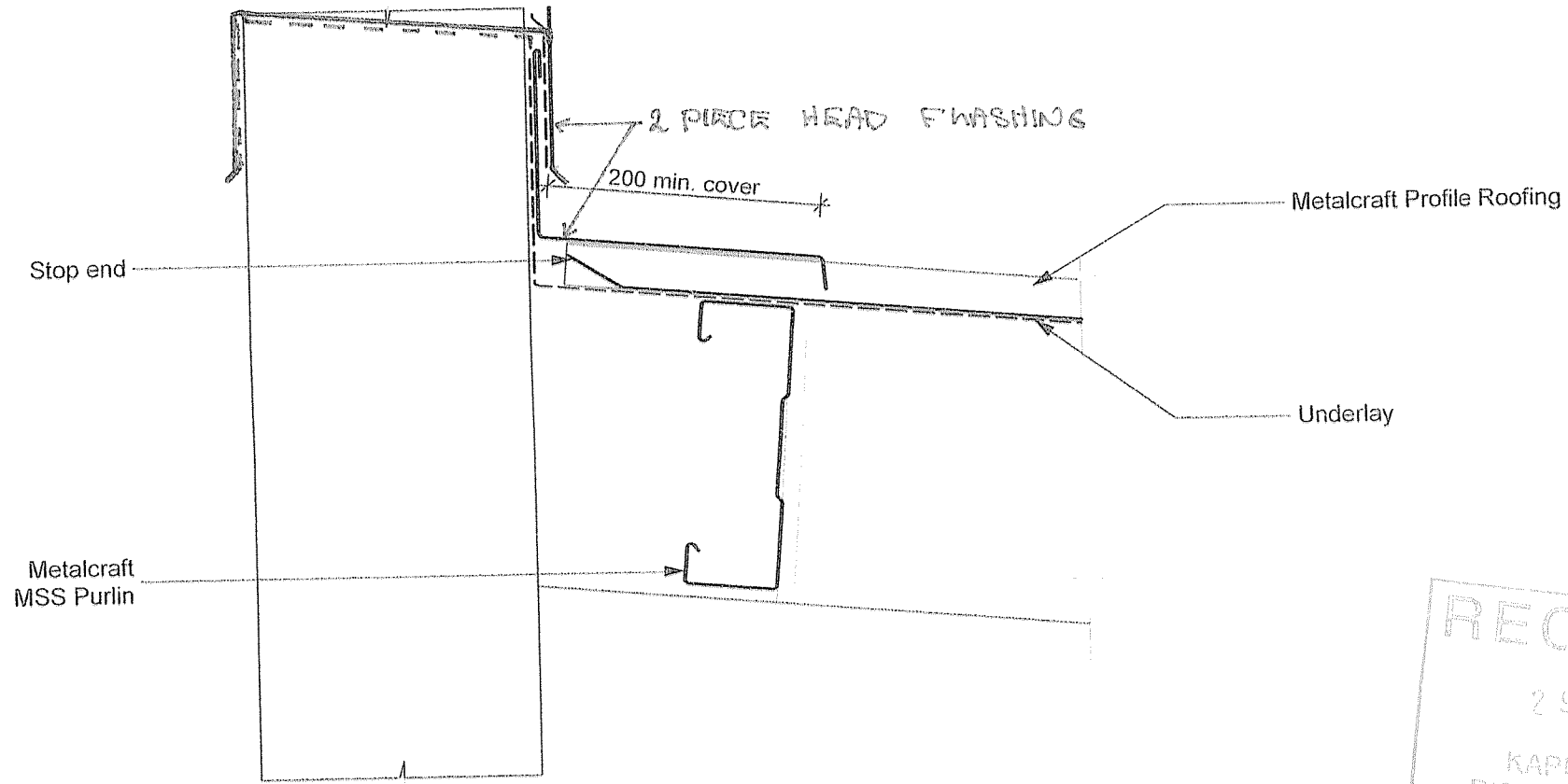
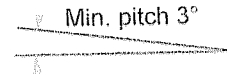
Date
16 July 2010

Job No	Drawing No
2467	1

Last reviewed
20/08/2010
11:30:37 a.m.

Scale (A3)
1:75

BC 100637



This detail is used for:
MC700, T-Rib, MC760, MC1000
Head Apron Detail

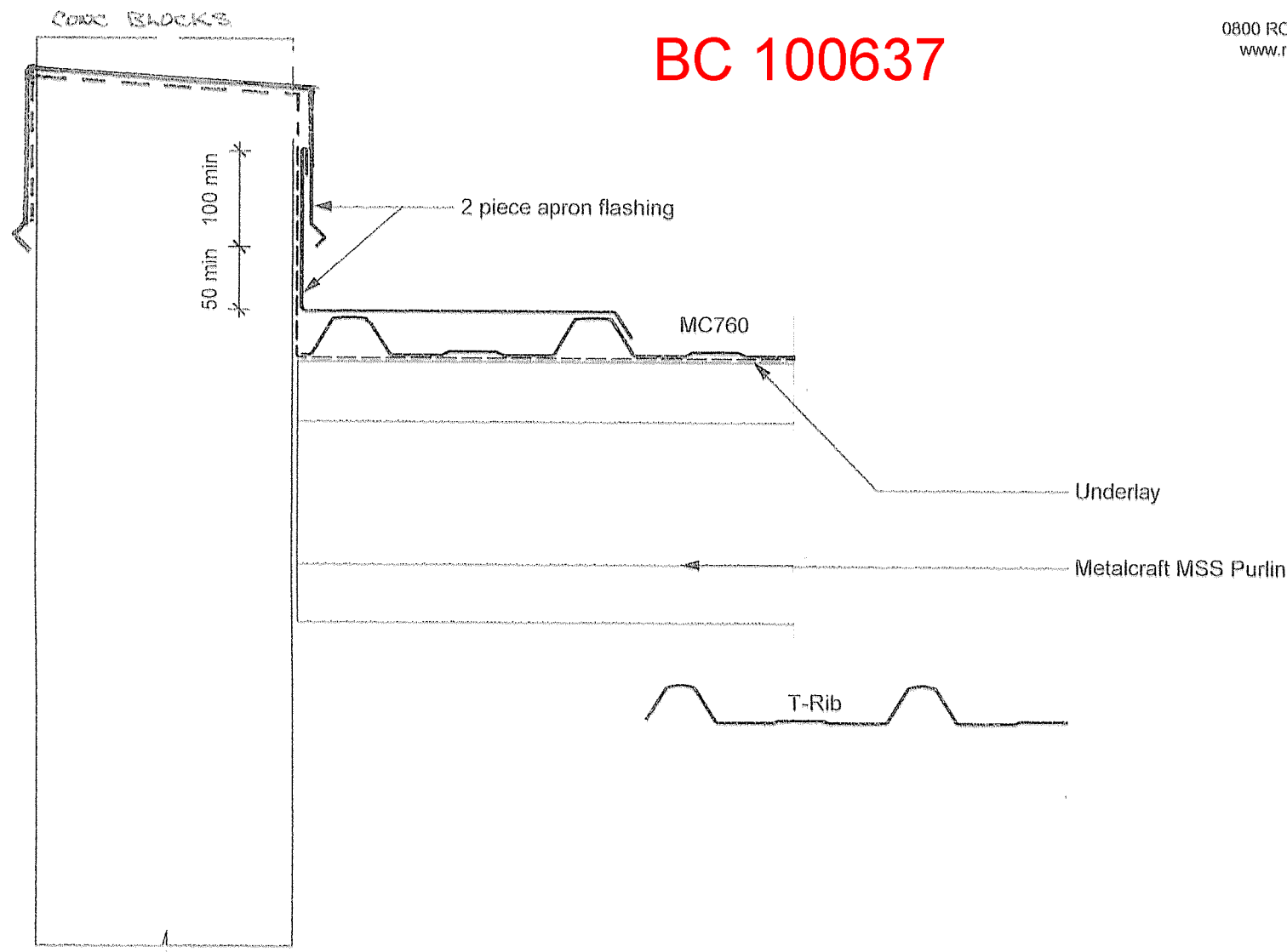
Website Flashing Disclaimer

Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay and netting are detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and

Commercial Details



BC 100637



This detail is used for:
MC700, T-Rib, MC760, MC1000
Side Apron Detail

Website Flashing Disclaimer

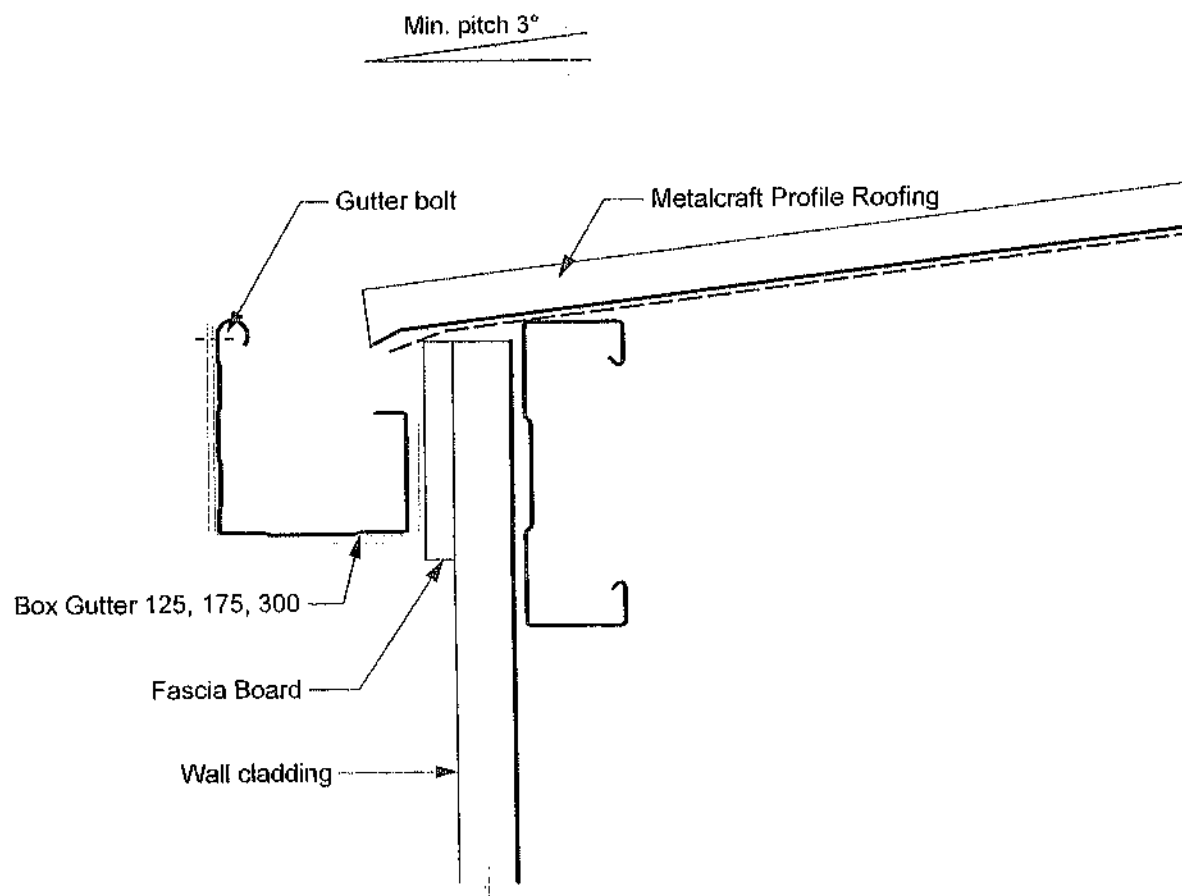
Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay and netting are detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Commercial Details

1:5

Aug 08

C306A



This detail is used for:
MC700, T-Rib, MC760, MC1000
Gutter Detail

Profiled Cladding and Fascia Board
with External Bracket

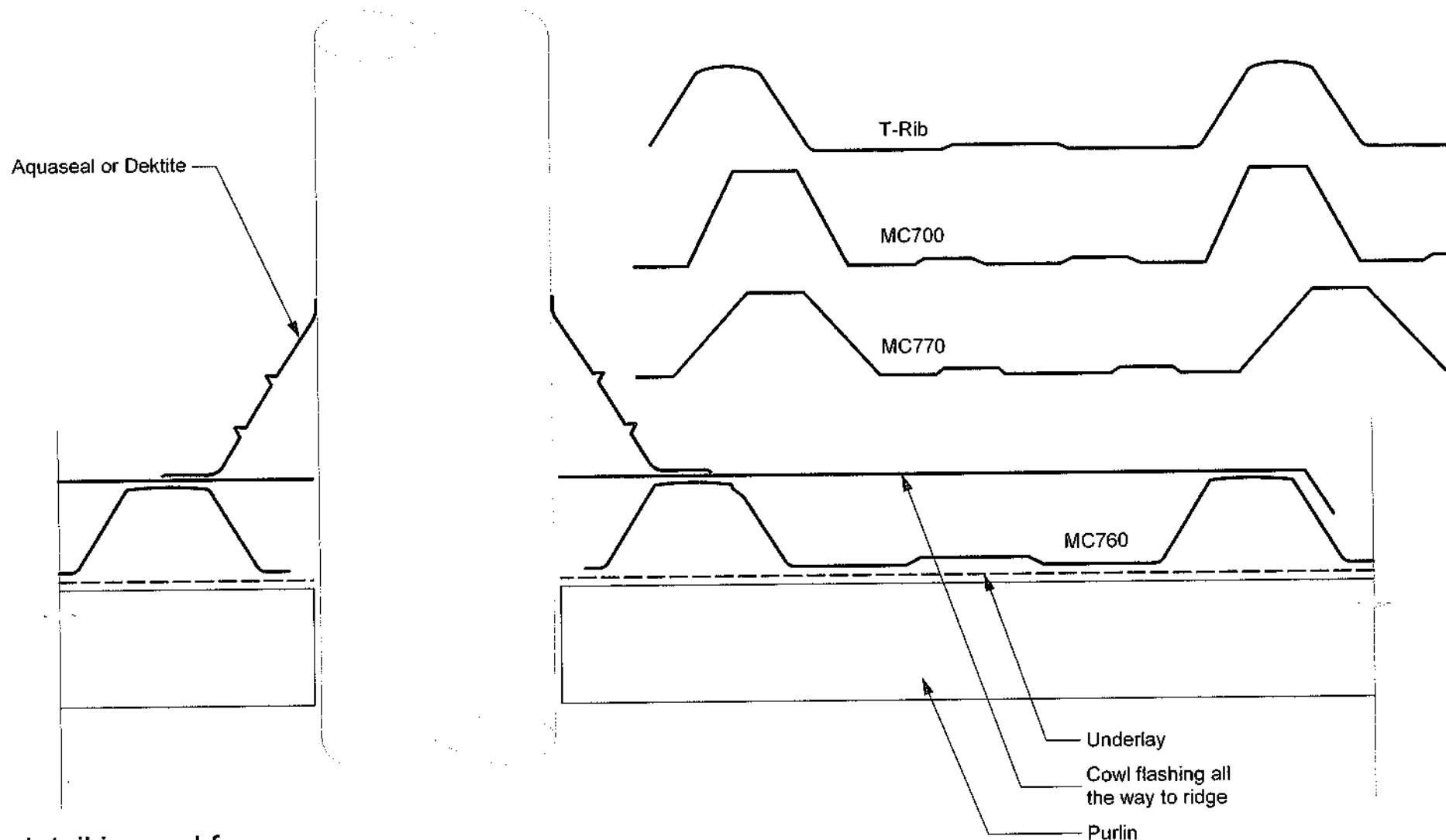
Website Flashing Disclaimer

Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay and netting are detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Commercial Details



© copyright Metalcraft Roofing 2008



This detail is used for:
MC700, T-Rib, MC760, MC770

Pipe penetration Detail

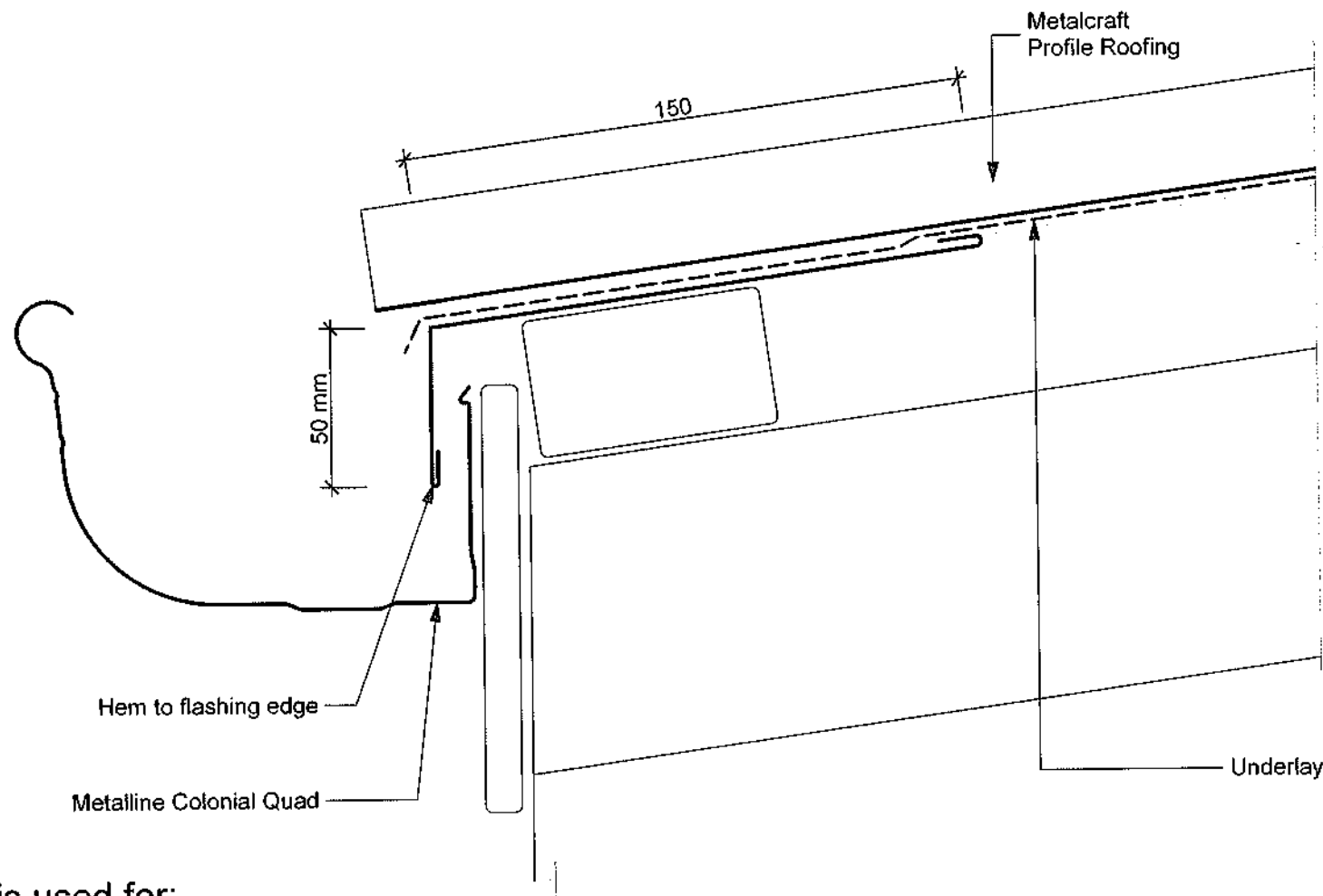
Cross - sectional View

Website Flashing Disclaimer

Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay is detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Residential Details





This detail is used for:
MC700, T-Rib, MC760, MC770

Gutter Flashing Detail

Timber Fascia with External Bracket

Website Flashing Disclaimer

Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay is detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Residential Details



Attacher Some BC 100637.

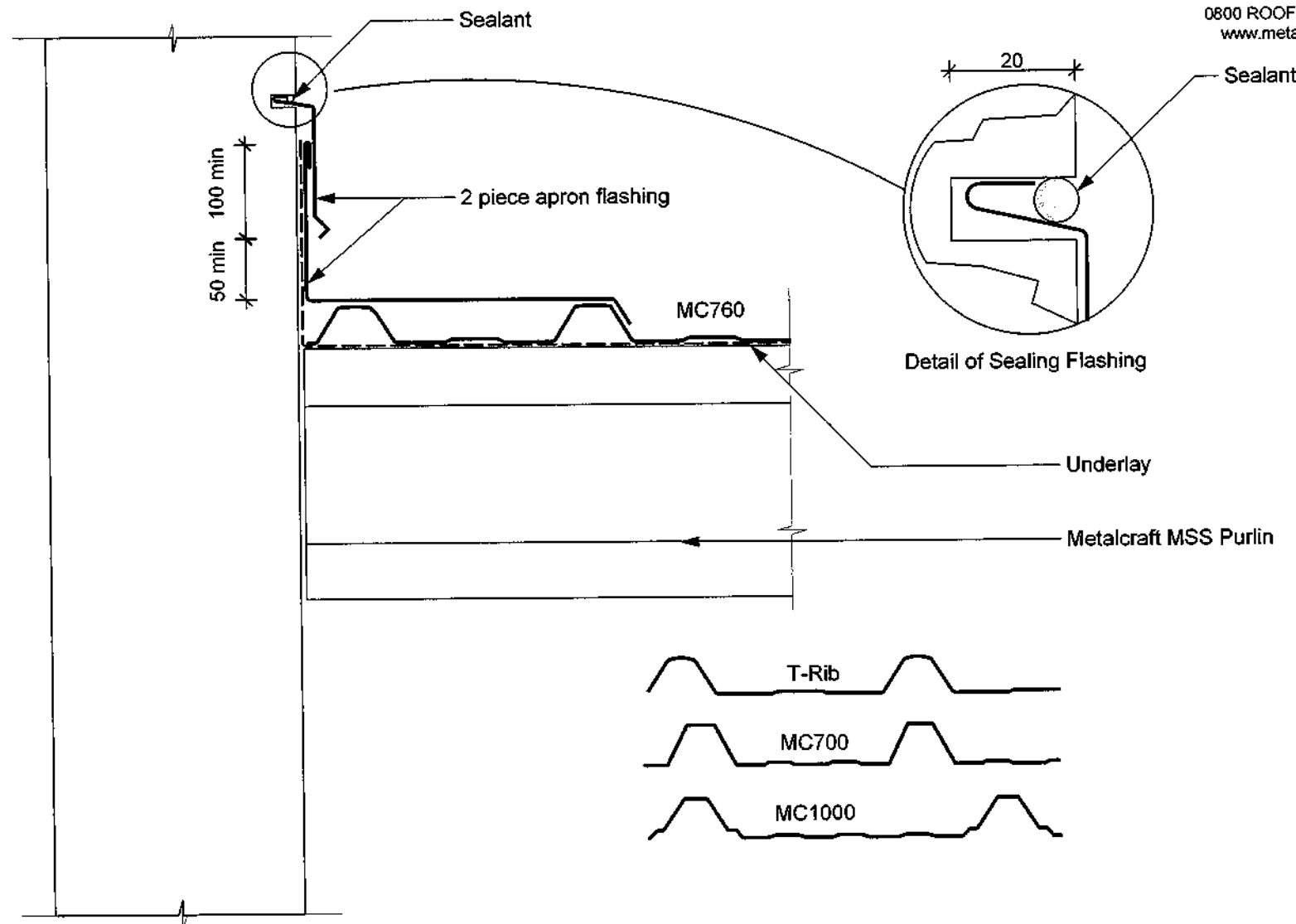
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Received by
Kapiti Coast District Council
at Paraparaumu
23 AUG 2010
By Anne, Time 1:30

 **Metalcraft**

ROOFING

0800 ROOFNZ (0800 766369)
www.metalcraftroofing.co.nz



This detail is used for:
MC700, T-Rib, MC760, MC1000
Side Apron Detail
With Chase Flashing to Parapet

Website Flashing Disclaimer

Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary with roof pitch. The underlay and netting are detailed as a single line for simplicity and is indicative only. For pitches below 10 degrees netting is required. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Commercial Details

Scale: 1:5
Date: Aug 08
Reference: **C306A**

4311M METALCRAFT PROFILED ROOFING – T-Rib

The following branded section has been prepared by Construction Information Ltd (Masterspec) in conjunction with the product manufacturer. The downloading and/or use of this section are subject to the following terms and conditions:

- Users of this section shall rely solely on their professional judgment and skill in determining the appropriateness of using or referring to this section and to satisfy themselves as to the accuracy of the data it contains.
- Users acknowledge that neither Construction Information Limited nor the manufacturer of the products and systems described in the text are in any way liable in respect of any particular use or application of the material provided.

Masterspec sections must be customised to suit the project being specified, by removing irrelevant information and adding project-specific information and selections.

1. GENERAL

This section relates to the supply and fixing of Metalcraft profiled roofing complete with accessories.

Modify or extend the above description to suit the project being specified.

Related work

1.1 RELATED SECTIONS

Refer to ~ for ~.

Include cross references to other sections where these contain related work.

This section does not include for rainwater gutters, spoutings and pipework. Some flashing work is also often covered elsewhere.

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

AS/NZS 1170.2 Structural design actions - Wind actions

AS 3566 Self-drilling screws for the building and construction industries

NZS 3604 Timber framed buildings

NZMRM NZ Metal roof and wall cladding - Code of practice

Documents listed above and cited in the clauses that follow are part of this specification.

However, this specification takes precedence in the event of it being at variance with the cited document.

Delete from the DOCUMENTS clause any document not cited. List any additional cited documents.

RELATED DOCUMENTS

Refer to the following related documents when preparing this section:

NZBC E2/AS1 External moisture, 8.0 Roof claddings

AS 1397 Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
AS/NZS 2728 Prefinished/pre-painted sheet metal products for interior/exterior
building applications - performance requirements
NZS 3403 Hot-dip galvanized corrugated steel sheet for building purposes
BS EN 2070 Aluminium and aluminium alloy wrought products. Technical
specification. Sheet, strip formed profiles and plate.

BRANZ BU 488 Coil-coated metal claddings
BRANZ BU 318 Care of coil-coated metal claddings
BRANZ BU 358 Crest fixing of profiled metal roofing
BRANZ BU 393 Powder-actuated and mechanically powered fasteners
BRANZ BU 408 Roofs on exposed sites
BRANZ BU 465 Domestic flashing installation
BRANZ BU 466 Timber-frame parapets, balustrades and columns
BRANZ BU 467 Principles of flashing design
BRANZ publication Selecting roof claddings

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are available on the website or by contacting Metalcraft Industries Ltd.

For technical assistance contact Metalcraft Roofing
Web: www.metalcraftroofing.co.nz

Metalcraft area office details are available through the website.

1.4 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:
BMT Base metal thickness NZMRM New Zealand Metal Roofing Manufacturers Inc

Refer general section INTERPRETATION & DEFINITIONS for abbreviations used throughout the specification.

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.6 QUALIFICATIONS

Roofers are to be Metalcraft Approved Installers, or experienced, competent roofers familiar with Metalcraft products.

1.7 MAINTENANCE INSTRUCTIONS

Provide one bound copy of all relevant Metalcraft Roofing maintenance information on completion of the roofing work.

Warranties

1.8 MANUFACTURER'S WARRANTY

Warrant this work under normal environmental and use conditions against:
15 years Failure of coating adhesion (manufacturer's standard warranty)
15 years Weatherproofing failure caused by material penetration as a result of

corrosion (manufacturer's standard warranty)
5 years Weatherproofing failure caused by substandard workmanship

From: Date of completion of installation

Refer to the general section WARRANTIES for additional requirements.

*Check with Metalcraft for the appropriate warranty terms and conditions.
Check general section WARRANTIES for the date of commencement of warranties;
which is normally practical completion of the contract. Refer to the chosen conditions
of contract as it may also contain information on warranties and guarantees.*

Performance

Note that in using the next clause you are setting a standard of performance for the contractor to meet. Specifiers should therefore consider adding some means of confirming (say by testing or certification) that the performance criteria will be or have been met. Specification of a Metalcraft Approved Installer in QUALIFICATIONS will ensure that performance criteria are met.

1.9 FIXINGS, WIND

Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604, or by wind loads given by AS/NZS 1170 Part 2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply. Confirm with Metalcraft the fastener type and fixing pattern for the load capacity required.

Modify this clause depending on whether NZS 3604, or AS/NZS 1170.2 are being used as a design basis for the project.

Confirm with Metalcraft the fastener type and location to achieve the load capacity required.

1.10 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof.

1.11 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets.

Refer to later EXECUTION clause on co-operating with others on the installation of elements which penetrate or adjoin the roofing system; including walls and parapets, skylights, sundry elements fixed through the roofing surface, service pipework, etc.

2. PRODUCTS

Select the product that suits the brief and use the PRODUCTS and EXECUTION clauses that follow to suit the product selected.

Materials - General

2.1 WIRE NETTING

Refer to WRAPS, UNDERLAYS AND DPC for wire mesh.

2.2 SAFETY MESH

Refer to WRAPS, UNDERLAYS AND DPC for safety mesh.

Consult Metalcraft for advice on when safety mesh is required. Can be supplied plastic covered. Delete this clause if safety mesh is not required,

2.3 UNDERLAY

Refer to WRAPS, UNDERLAYS AND DPC for underlays.

2.4 METALCRAFT ROOFING

Refer to SELECTIONS for type.

2.5 TRANSLUCENT ROOFING

Topglass® Ice Clear White Tint, Opalescent and Opaque UV Smart reinforced Polyester roof sheeting as manufactured by Alsynite NZ Ltd to comply with AS/NZS 4256.3 JASANZ Certification Licence No 2349.

The sheeting to be manufactured to conform to the nominated roofing and cladding profile.

2.6 FLASHINGS GENERALLY

Formable grade 0.55 mm BMT for galvanized, Zincalume® and pre-coated steel, and 0.90 mm BMT for aluminium to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

Revise the clause wording to suit the specified roofing. Soft Edge Aluminium is recommended as suitable for corrugated profile only; Flashguard can be used on all profiles below 33 mm.

2.7 FLASHINGS TO VERGE, RIDGE AND HIP

Supplied by Metalcraft to match or to suit the roofing.

Grade G300 steel is used for flashings and cappings. If specifying Zincalume® sheet use only compatible materials for soft edgings - soft pure aluminium, 0.45 mm thick, or Flashguard.

Components

2.8 FASTENERS GENERALLY

Minimum Class 4 durability and not less than the roofing material being fixed. Screw fasteners to be head stamped identifying the manufacturer and class.

2.9 FIXING SCREWS

To AS 3566. Screws appropriate to the roofing material and the supporting structure, and wind load as required by Metalcraft, and with a durability not less than the material fixed.

Length of fixing will depend on the height of the selected profile. Number of fasteners and use of washers will depend on the wind loads. Check Metalcraft requirements.

Where thermal movement might exceed 10 mm prepare a separate clause specifying profiled washers and oversized holes as required by Metalcraft and consider detailing a step in the roofing (check details with Metalcraft).

2.10 RIVETS

Sealed aluminium, minimum diameter 4.8 mm.
Refer to Metalcraft requirements.

Accessories

2.11 SEALANT

Neutral curing silicone or polymer sealant as required by Metalcraft and used as directed.

2.12 CLOSURE STRIPS

Polyurethane profiled closed cell foam strips to fit the sheet profile.

Brand: Ecofoam
Profile: T-Rib

3. EXECUTION

Conditions

3.1 INSPECTION

Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could damage the roofing.

3.2 STORAGE

Take delivery of and accept packs of roofing dry and undamaged on delivery. Reject all damaged material. Store on a level firm base clear of the ground, with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

3.3 HANDLING

Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other or other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

3.4 SEPARATION

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials. Do not use unpainted lead sheet in contact with or allow water run-off onto galvanized steel or Zinalume®.

Application

The following execution clauses are written specifically to suit profiled, pre-coated galvanized steel, or Zincalume®.

3.5 SET-OUT & LAYING

Carefully set out to allow cover flashings of equal width at the ends of the building. Lay sheets with side laps away from the prevailing wind ensuring ends of sheets are true to line. Check during fixing to eliminate creep or spread and use string lines along purlin centres to keep fastenings in line.

3.6 FORMING

Form stop-ends and downturns to Metalcraft recommendations.

3.7 END LAPS

End laps are not recommended, except where specifically detailed to Metalcraft requirements.

If end laps cannot be avoided, check detail with Metalcraft.

3.8 THERMAL MOVEMENT

Roof fixing and jointing to conform to Metalcraft requirements for thermal movement.

3.9 FIXING GENERALLY

Install and fix in accordance with the Metalcraft Roofing and Cladding Systems Manual and the NZMRM NZ Metal roof and wall cladding - Code of practice and to Metalcraft required fixing patterns and details for each area of the building roofing. Use only screws as required by Metalcraft. Paint colour matched fixings and accessories before installation.

Especially with residential work, nail fixing is still favoured by some installers. Check with Metalcraft before specifying.

3.10 FIX UNDERLAY, NETTING AND MESH

Refer to WRAPS, UNDERLAYS AND DPC for the installation of underlays, wire netting and safety mesh.

Modify to suit.

3.11 FIX INSULATION

Refer to INSULATION for the installation of thermal and acoustic insulation.

Modify to suit.

3.12 MARKING AND CUTTING

Cut only by shearing tools. Do not use black lead pencils for marking Zincalume®, Colorsteel® products.

3.13 FIX SHEETS

Fix sheets in place using the fastening system required by Metalcraft for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

3.14 FIX TRANSLUCENT ROOFING

Installation to be carried out in accordance with the requirements of AS/NZS 1562.3: 1994, NZ Roofing Code of Practice and Alsynite NZ Ltd Technical catalogue.

3.15 FLASH

Flash roof to parapets, walls and penetrations to detail in Metalcraft installation manual and to the NZMRM NZ Metal roof & wall cladding - Code of practice and Metalcraft requirements. Cut accurately and fix using sealant and rivets to detail and to Metalcraft requirements to form a weatherproof cover. Ensure flashings are designed and installed to avoid water ponding.

3.16 FIX RIDGES AND HIPS

Cut accurately and fix using primary fasteners to the purlins. Join using neutral curing silicone or polymer sealant and sealed rivets to detail and to the NZMRM NZ Metal roof and wall cladding - Code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.17 FIX VERGE AND CAP FLASHINGS

Cut accurately and fix using primary fasteners to the purlins. Join using neutral curing silicone or polymer sealant and sealed rivets to detail and to the NZMRM NZ Metal roof and wall cladding - Code of practice. Ensure flashings are designed and installed to avoid water ponding.

Add further description of associated flashings and overflashings to penetrations, parapets, roof-mounted equipment and similar installations, either here or in other sections, as appropriate to the project.

3.18 PENETRATIONS

Flash and overflash all penetrations through the roof.

Expand this very general clause to better describe the various types and forms of penetrations needing to be flashed.

3.19 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

Completion

3.20 REPLACE

Replace damaged or marked elements.

3.21 LEAVE

Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

3.22 REMOVE

Remove all trade rubbish, swarf and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

4. SELECTIONS

Select the product that suits the brief and use and EXECUTION clauses that follow to suit the product selected.

Materials - roofing products

There is also a range of finish choices offering different warranty levels. Select from the following finishes for steel depending on personal preference and environmental considerations based on AS/NZS 2728.

Unpainted galvanized steel (zinc coated steel, Z450) receives no warranty in any environment category.

Mild (ISO category 1-2) Moderate (ISO cat. 2) Marine (ISO cat. 3) Industrial (ISO cat. 3-4)

Unpainted Zinalume® (zinc/aluminium coated steel, AZ150)

Colorsteel® Endura™ (Zinalume® substrate)

Colorsteel® Maxx™ (Zinalume® substrate)

Severe marine (ISO category 4)

Colorsteel® Endura™ (Zinalume® substrate)

Colorsteel® Maxx™ (Zinalume® substrate)

Very severe (ISO category 5)

Colorsteel® Maxx™ (Zinalume® substrate)

Refer to Colorsteel® / colour chart.

Refer to Metalcraft installation manual for appropriate choice of profile and base material to suit the load/span requirements.

4.1 METALCRAFT ASYMMETRICAL RIB PROFILE ROOFING

Profile: T-Rib

Base material: Steel

BMT: ~ mm

Coating system: ~

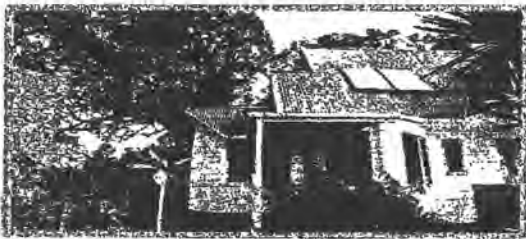
Colour: ~

T-Rib profile. Nominal rib height 29mm. Screw fixed through ribs.

BMT: 0.40 mm or 0.55 mm.

Coating system: Zinalume®, Galvsteel™, Colorsteel® Endura™, Colorsteel® Maxx™

For moderate and marine environments choose either Colorsteel® Endura™, Colorsteel® Maxx™ or unpainted Zinalume.



ENDURA™ PRODUCT DESCRIPTION

The COLORSTEEL® ENDURA™ paint system consists of a ZINCALUME® steel substrate to which a pre-painted finish system is applied. The system is designed to provide protection against corrosion in areas where moderate to severe environmental conditions are experienced. COLORSTEEL® ENDURA™ product is suitable for a wide range of rollformed roof and wall claddings, rainwater accessories and general

Copper or brass pipes must not be allowed to discharge onto COLORSTEEL® pre-painted steel products or be allowed to come into contact with them. The use of other materials in proximity to COLORSTEEL® pre-painted steel products must be in accordance with the New Zealand Steel Specifiers and Builders Guide. Mixing of brands of pre-painted material on the same building is not recommended by New Zealand Steel Limited.

The reaction between ZINCALUME® steel and lead flashings will degrade the ZINCALUME® steel material. Soft zinc or aluminium flashings should be used. Marking with lead pencils is not advised, and sealing washers should be low carbon non-conducting. Refer to the New Zealand Steel Installers Guide under the 'Marking, Cutting and Drilling' section.



APPEARANCE

COLORSTEEL® ENDURA™ products are available in a range of colours. The backer coat is AZ Backer.

IDENTIFICATION

COLORSTEEL® ENDURA™ product is identified by a brand applied to the reverse surface, indicating product type and date of manufacture.



INSTALLATION

Installation details for COLORSTEEL® ENDURA™ product are contained in the New Zealand Steel Installers Guide.

FIXINGS:

- Aluminium and factory painted fixings are acceptable.
- Stainless steel, Monel or other copper alloy fixings **must not** be used.
- Lead-head nails **must not** be used.
- Fixings that meet AS3566 class 3 and 4 are acceptable.

SEALING AND JOINING:

- Use only neutral-cure silicone rubber sealants.
- Do not** use abrasive cutting wheels.
- Do not** weld, braze or solder.

Touch Up Paints should not be used, as air drying paints have different weathering characteristics to the COLORSTEEL® pre-painted steel coating.

Clean up – all debris (particularly from roofing installation) must be removed from COLORSTEEL® ENDURA™ product surfaces at the end of each day's work. Take care not to damage the coating when removing sharp fixing debris.

Gutter Protection – Any gutter protection or leaf guard system, (or any other product), that traps water between the roof and product surfaces, thus restricting the coated steel's ability to dry, is not recommended and will invalidate the roof warranty.

EXTERNAL MOISTURE

COLORSTEEL® ENDURA™ roof cladding must be installed at a minimum of 3° or over the minimum pitch given for the profile by the profile manufacturer, whichever is greater. Factors likely to affect the resistance of COLORSTEEL® ENDURA™ pre-painted steel to external moisture include the quality of the installation, the severity of the climate, roof configuration, material profile

and the design and execution of junctions between similar materials and other elements.

SPREAD OF FIRE

COLORSTEEL® ENDURA™ pre-painted steel comprises a combustible surface adhered to a noncombustible substrate. Used on roofs, it meets the requirements of NZBC C3/AS1 in all purpose groups. Refer to C3/AS1 Section 4.0 External Walls and Roofs which covers vertical and horizontal spread of fire.

HAZARDOUS BUILDING MATERIALS

The use of roofing and wall claddings manufactured from COLORSTEEL® ENDURA™ pre-painted steel in accordance with New Zealand Steel's instructions will meet the nonhazardous performance requirements of NZBC F2.3.1.

HANDLING AND STORAGE

If COLORSTEEL® pre-painted steel products are to be stored for any time prior to forming or installation, they must be stored in dry, well ventilated conditions. Storage which allows water, (including condensation) to be trapped between the sheets may damage the coating beyond repair. COLORSTEEL® ENDURA™ products must be handled carefully during transport, fabrication and fixing to avoid damaging the surface.

AVAILABILITY

COLORSTEEL® ENDURA™ pre-painted steel is available ex stock from most roofing distributors in a range of colours. Where a colour is not available, delivery is normally within 1-4 weeks, depending on the location of the distributor.

SERVICEABLE LIFE

The COLORSTEEL® ENDURA™ coating can be repainted to extend its serviceable life. Contact New Zealand Steel for recommendations on overpainting weathered COLORSTEEL® products.

DRINKING WATER

Rainwater collected from roofs clad with products made from GALVSTEEL™, ZINCALUME® steel and COLORSTEEL® pre-painted steel, will comply with the provisions of NZBC G12.3.1, provided the water is not contaminated from other sources.

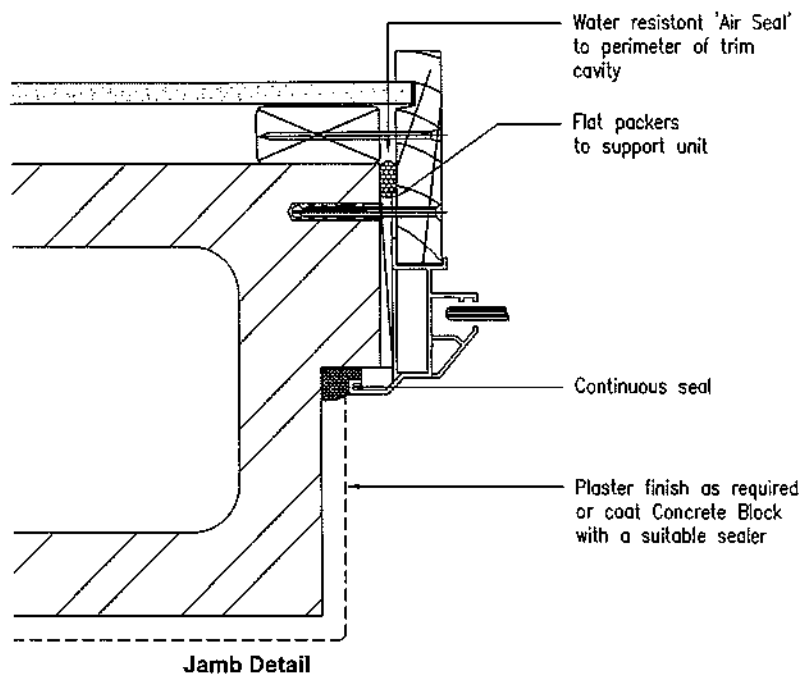
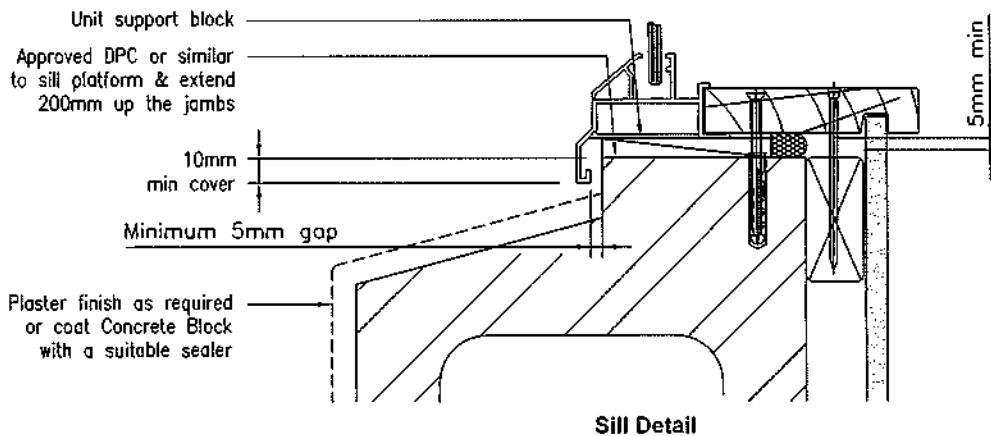
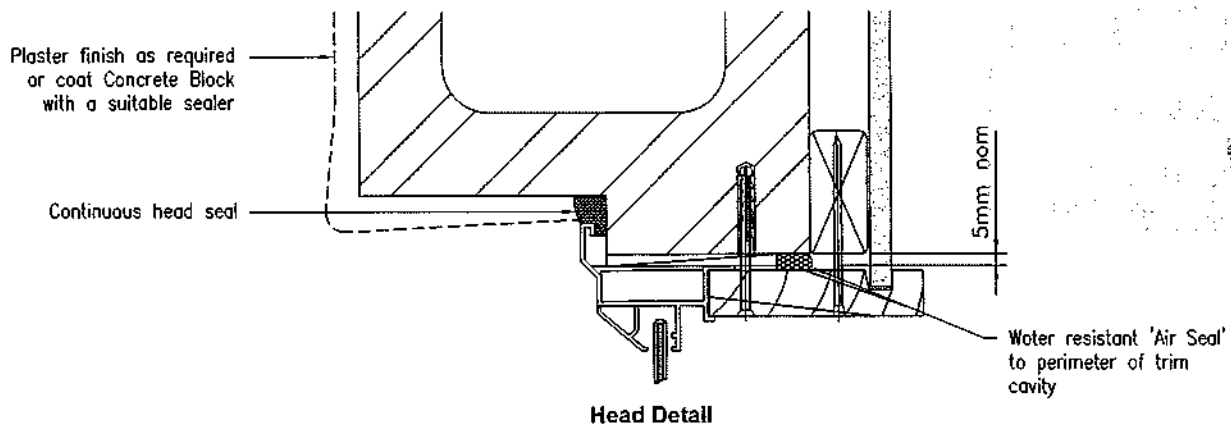
The first 25mm of rainfall from a newly installed roof must be discarded before drinking water collection starts.

Where a paint or paint system is applied to the roof, its suitability for the collection of drinking water must be established.

ACCREDITATIONS

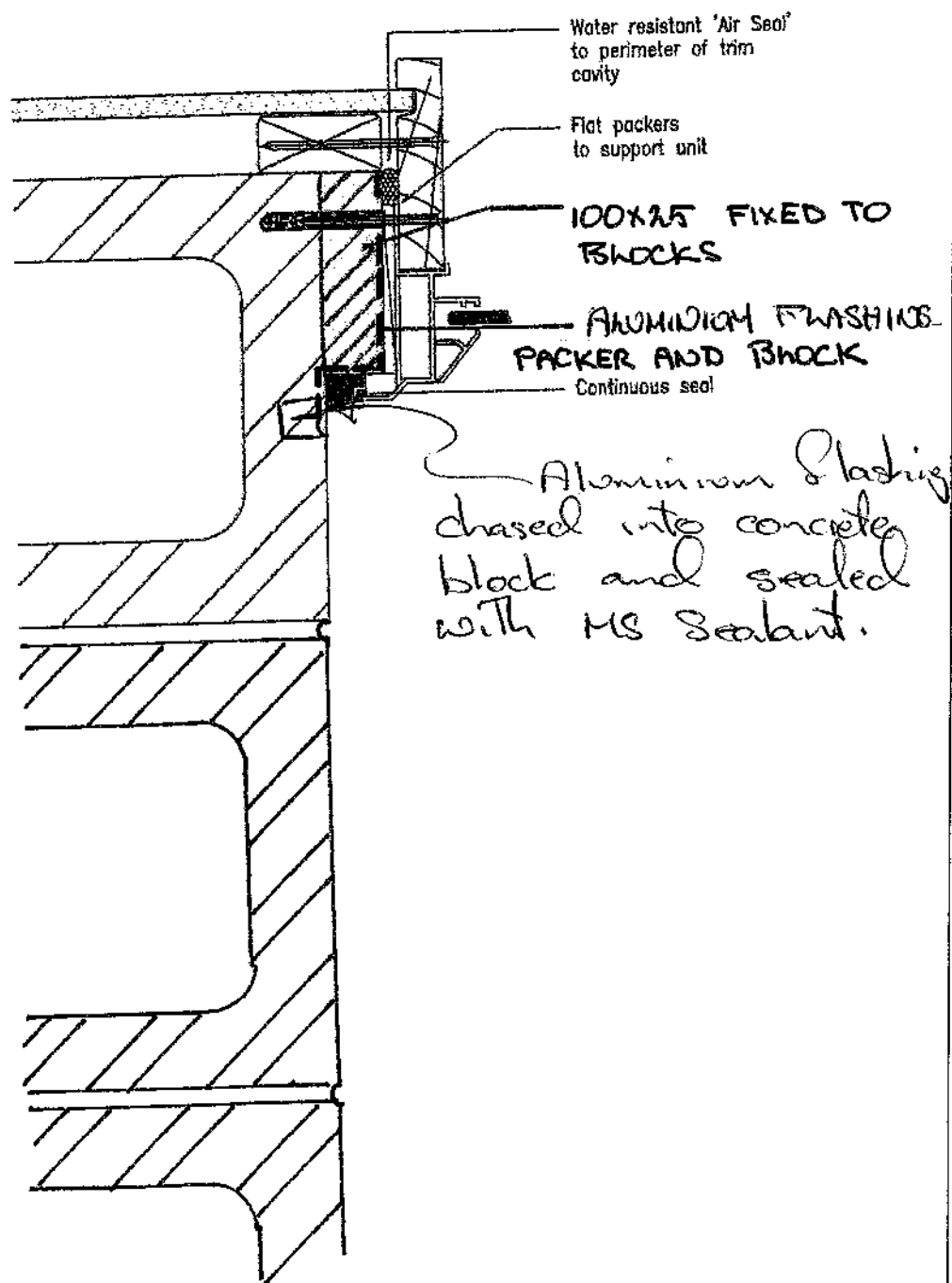
The New Zealand Steel paintline is accredited to ISO9001.





--- THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL AND ONLY WITH PRIOR WRITTEN PERMISSION ---

DOOR 2 JAMB DETAIL



Steel Frame and Truss System

SYSTEM PRODUCER STATEMENT.

I believe on reasonable grounds, based upon the following verification methods, analysis and product testing, that the Frametek 2007 Ltd (FTK) steel frame and truss system, when designed and specified in compliance with this design manual and constructed in compliance with the details and requirements of the Design Manual, FTK M1: 2008 V5 will comply with the following relevant provisions of the building code:-

NZBC Clause A1: Classified user

The Frametek 2007 Ltd steel frame and truss system is suitable for use with all seven categories of type in accordance with the NZBC clause A1.2, A1.3, A1.4, A1.5, A1.6, A1.7 and A1.8.

NZBC Clause B1: Structure

The Frametek 2007 Ltd steel frame and truss system, when used in accordance with the provisions of this manual will meet the performance requirements of NZBC clause B1.3.1, B1.3.2, B1.3.3(a), (b), (c), (f), (g), (h), (i).

The system has been designed in conformance with Section B1/VM1 paragraph 2.0 and 5.0

NZBC Clause B2: Durability

The Frametek 2007 Ltd steel frame and truss system will meet the performance requirements of NZBC clause B2.3.1(a) in a non condensation environment.

The system will be durable for 50 years as shown in the New Zealand Steel DURABILITY STATEMENT: Rev 4- Sept. 2006, Above – Floor, Steel Frame Construction and DURABILITY STATEMENT: Galvanised Steel Floor Joists

NZBC Clause C4: Structural Stability during Fire

The Frametek 2007 Ltd steel frame and truss system will meet the performance requirements of NZBC clause C4.3.1 & C4.3.2 when protected by Fire Resistance Rated systems.

NZBC Clause F2: Hazardous Building Material

The Frametek 2007 Ltd steel frame and truss system, when used and installed in accordance with the provisions of this manual will meet the performance requirements of NZBC clause F2.3.1.

Signed by:

Warren Peter Lane on behalf of Frametek 2007 Limited.
Name

Director Lane Consulting Group Ltd.
Position and Qualifications

Date: 7/4/2009

Sign: _____

ME(Fire)

BE(hons) Civil & Structural.

CPEng, JPE, No 51126

8.5 Membrane Roofs and Decks

8.5.1 Limitations

This Acceptable Solution is limited to *membranes* composed of butyl or EPDM installed over plywood substrates for:

- a) Roofs with a minimum fall of 1.5° (1:40),
- b) *Decks* with:
 - i) a minimum fall of 1° (1:60),
 - ii) a maximum area of 40 m²,
 - iii) no steps in level within *deck* area except into gutters,
 - iv) no integral roof gardens, and
 - v) no downpipe direct discharge to *deck*,

COMMENT:

Discharging gutters directly onto *decks* increases the chances of water entry into sensitive areas.

Direct discharge may be allowed into gutters calculated to have sufficient water-carrying capacity, but this is outside the scope of this Acceptable Solution.

- c) Internal gutters with a minimum fall of 1 in 100, with no seams in the gutters closer than 1 m to an outlet, and

COMMENT:

Seams should be avoided in gutters where possible. Where they cannot be avoided they should be positioned at a high point or a change in plane to reduce the risks of ponding on the seam. Seams in gutters are particularly difficult to form at outlets through *enclosed balustrade* walls, and the risk of failure is high. Failure of a seam can result in damage to underlying walls.

- d) *Decks* with removable raised surfaces to give level access as shown in Figure 17A.

The application of directly-applied wearing or decorative surfaces to *membranes* is not covered in this Acceptable Solution.

COMMENT:

EPDM and butyl rubber *membranes* are subject to damage when on trafficable roof-decks. A suitable wearing surface will help reduce such damage.

8.5.2 General

COMMENT:

It is recommended that installation of membrane *cladding* be by trained installers, approved by the manufacturer or the NZ agent (in the case of imported membrane).

Amend 2
Jul 2005

8.5.3 Plywood substrates

Plywood shall be:

- a) A minimum of 17 mm complying with AS/NZS 2269,
- b) At least CD Grade Structural plywood with the sanded C face upwards, and
- c) H3 with treatment type compatible with *membrane* and adhesives used, and kiln dried after treatment.

Amend 2
Jul 2005

COMMENT:

The compatibility of LOSP-treated plywood must be checked with *membrane* suppliers.

If using plywood containing copper-based preservatives, check the compatibility of adhesives and *membranes* with copper with the product manufacturers.

8.5.4 Butyl and EPDM

Butyl rubber and EPDM rubber used for *membrane* roofing or *decks* shall:

- a) Be a minimum thickness of:
 - i) 1 mm for roofing, or
 - ii) 1.5 mm for decks, and
- b) Comply with the following parts of Table 1 in ASTM D6134:
 - i) tensile strength,
 - ii) elongation,
 - iii) water absorption,
 - iv) water vapour permeance, and
 - v) heat aging followed by:
 - a. tensile strength
 - b. elongation, and
- c) Have adhesives, primers and seam tapes that:
 - i) comply with BRANZ EM 5, and
 - ii) are part of a complete system approved by the manufacturer or supplier of the *membrane*.

Amend 2
Jul 2005

8.5.5 Installation

8.5.5.1 Plywood

Substrates must be dry when *membranes* are applied. The plywood and the timber substructure shall have a maximum moisture content of 20% when a *membrane* is adhered.

Amend 2
Jul 2005

Amend 2
Jul 2005

X-200 Acrylic Waterproofing Membrane

Surface preparation

Cracked surfaces

Due to its high film build, Resene X-200 will completely fill cracks up to 1mm. For cracks larger than this, apply one coat of Resene Sureseal (see Data Sheet D42) before filling the crack with a suitable elastomeric paintable sealant.

New cementitious surfaces

Clean down thoroughly to remove all dirt, dust and loose material. Ensure surface is free from oil, grease, form release and curing agents. Glossy surfaces require an additional treatment of Resene Concrete Primer (see Data Sheet D405). Use Resene Limelock (see Data Sheet D809) on fresh cementitious surfaces to trap any free lime and prevent the appearance of lime staining.

Old cementitious surfaces

If moss and mould are present, treat with Resene Moss & Mould Killer (see Data Sheet D80). Waterblasting at 21,000 kps (3000 psi) is the best surface preparation method prior to painting weathered cementitious surfaces. If waterblasting is not possible, remove all loose powdery material by thorough wire brushing. Allow to dry and apply one coat of Resene Sureseal (see Data Sheet D42).

Sanding dust from old lead or chromate based paints or old building materials containing asbestos may be injurious to the health if inhaled or ingested. Seek expert advice if the presence of these materials is suspected.

Application

Airless spray

Use a LTX 523 tip or similar. Use a coarse filter in the system as the fibre reinforcement of Resene X-200 may clog finer filters. Apply two coats.

Brush

Apply two coats at specified rate.

Roller

Use a 12-20mm synthetic fibre roller or texturing roller depending on surface. Apply two coats.

Standard spray

Use a De Vilbiss JGA Gun with a D Tip DEX Needle and 107J Air Cap or equivalent.

Concrete blocks

Due to regional variations in concrete block standards, two coats may be insufficient to waterproof. Waterproofing can only be assured when all voids are filled, therefore three coats over block is a safer specification. Brush or roller application is preferred over block and essential for at least the first coat.

Precautions

1. Do not thin – thinning destroys build properties.
2. Ensure correct pre-treatment is used and correct surface preparation is undertaken.

Information contained in this Data Sheet is re-validated every two years following issue date.

Please ensure current Data Sheet is consulted prior to specification or application of Resene products.

If the surface you propose to coat is not referred to by this Data Sheet, please contact Resene for clarification.

Resene

the paint the professionals use

In New Zealand, PO Box 38242, Wellington Mail Centre,
call 0800 RESENE, visit www.resene.co.nz or email advice@resene.co.nz

In Australia, PO Box 785, Ashmore City, Queensland,
call 1800 738 383, visit www.resene.com.au or email advice@resene.com.au

Resene X-200

Acrylic Waterproofing Membrane

Resene X-200 is an acrylic waterproofing membrane incorporating the most recent advances in polymer and paint technology. Shows significant advances in the areas of film build, adhesion, penetration, application and durability.

Exterior/Interior

Typical uses

- Concrete blocks
- Concrete surfaces
- Fibre reinforced cement

Vehicle type	Pure acrylic
Pigmentation	Titanium dioxide/mineral and fibre reinforcement
Solvent	Water
Finish	Eggshell, very fine texture
Colour	Selected Total Colour System, including BS5252, Multi-Finish, Whites & Neutrals and The Range.
Dry time	1 hour at 18°C
Recoat	3 hours
Primer required	Yes, dependent on surface
Theoretical coverage	First coat: 5 sq. metres per litre Second coat: 7.5 sq. metres per litre
Dry film thickness	2 coats 180 microns
Usual no. of coats	2; blockwork – 3
Abrasion resistance	Very good
Chemical resistance	Very good
Heat resistance	Thermoplastic
Solvent resistance	Good
Durability	Excellent
Thinning and clean up	Do not thin, clean up with water
VOC	62 grams per litre (see Resene VOC Summary)

Physical properties

Performance

Performance and limitations

1. Remarkable ease of application.
2. Superior void and crack filling properties.
3. Excellent durability. Requires no further 'weathering' coats.
4. An Environmental Choice approved product.

Limitations

1. Old, weathered concrete requires surface conditioning with Resene Sureseal (see Data Sheet D42).
2. Do not apply at temperatures below 10°C, or when it is liable to drop below 10°C during the drying period.
3. Not designed to be used under ponded water.

Resene Paints Limited

32-50 Vogel Street
Naenae
Wellington
P O Box 38242
Wellington Mail Centre
NEW ZEALAND

Telephone: (64) (4) 577 0500

Fax: (64) (4) 577 0600

e-mail: advice@resene.co.nz

Emergency Phone: NZ 0800 737363

Emergency Phone: Aust. 1800 738383

MATERIAL SAFETY DATA SHEET

Version Number: 6

Date Issued: 28/10/2004

IDENTIFICATION

Product Name: X-200

Other Names:

Description: Waterbased paint

Uses: Water borne acrylic waterproofing membrane

UN Number: Not Specified

Dangerous Goods Class: Not Restricted

Hazchem Code: Not Specified

Toxic Substances Schedule: Not Restricted

Packing Code: N.O.S.

Classification of Hazardous Nature:

Non Hazardous according to NZ Dangerous Goods and Toxic
Substance Regulations.

Physical Description/Properties

Appearance-Viscosity-Odour-pH: Viscous liquid, white/coloured. Mild ammoniacal odour. pH 7-10.

Melting or Freezing Point: 0°C (Variable)

Boiling Point: 100°C (Variable)

Vapour Pressure (mm Hg @ 25 C): Greater than 17 at 20°C

Vapour Density (Air=1): Greater than 1

Solubility in Water (g/L @20 C): Dilutable

Percent Volatile (by weight): 33

Specific Gravity (Water=1): 1.4

Evaporation Rate (Butyl Acetate=1): Less than 1

INGREDIENTS**CAS Reg. No.****Approx. Proportion****WES - TWA**

Polymer	Not Classified	Med 10-60%	None Established +
Titanium Dioxide*	13463-67-7	Med 10-60%	10 mg/m ³ +
Inorganic/Organic Pigments*	Mixture	Med 10-60%	None Established +
Water	7732-18-5	Med 10-60%	None Established +
Alcohol Solvents	Mixture	Low 0-10%	None Established +
Ammonia	7664-41-7	Trace	25 ppm +

* Proportions/Type vary with colour

+ NZ OSH (WES) 2002

HEALTH HAZARD INFORMATION**Health Effects:-**

Skin: Irritating to skin upon repeated or prolonged contact.

Eyes: Moderately irritating to eyes.

Inhaled: Vapour or mist is irritating to mucous membranes and respiratory system. Excessive inhalation can cause headache, nausea, dizziness, or asphyxiation.

Swallowed: Can be harmful if swallowed.

Long Term Hazard: None anticipated with this product.

First Aid:-

Skin: Wash affected area thoroughly with soap and water.

Eyes: Flush eyes immediately with plenty of water for at least 15 minutes and get medical attention.

Product Name: X-200

Inhaled: Provide fresh air; give oxygen or artificial respiration if breathing laboured.

Swallowed: If swallowed dilute by giving two glasses of water to drink. Consult Physician or New Zealand National Poisons Centre (Ph 0800 764 766) Australian National Poisons Centre (Ph 1800 131 126) IMMEDIATELY. Never give anything by mouth to an unconscious person.

Advice to Doctor: Treat symptomatically.

PRECAUTIONS FOR USE

Personal Protection:-

Skin: Protective clothing. Gloves of neoprene, nitrile rubber or PVC -Industrial weight lined gauntlet recommended

Eyes: Safety eyewear with splash guards or side shields to prevent eye contact c

Breathing: SPRAY: Half facepiece, class P1 particulate filter.

Other:

Ventilation: Sufficient ventilation, in volume and pattern, should be provided to keep air contaminant concentrations below WES - TWA limits.

SAFE HANDLING INFORMATION

Storage and Transport:-

Storage Maximum: 40°C. Store cool at constant temperature.

Temperature: Minimum: 1°C

Container Type and Material: Lacquer lined steel tins or polypropylene pails.

Incompatible Substances: Strong oxidizers, acids, alkalis.

Conditions to Avoid: Freezing, excessive heat and changes in temperature.

Hazardous Polymerisation: Will not occur.

Usual Decomposition Products Oxides of Carbon and Nitrogen.

Spills: Keep spectators away and avoid breathing vapours or dust. Floor may be slippery: use care to avoid falling. Dike and contain spill with inert materials (eg sand). Transfer liquid to containers for recovery or disposal and solid diking material to separate containers for disposal. Keep spills (and as much as possible cleaning runoffs) out of municipal sewers and open bodies of water.

Disposal: Incinerate the liquid and contaminated diking material at a permitted facility, or otherwise dispose of in accordance with all applicable regulations.

Fire/Explosion Hazard: Flash Point: >100°C

Auto Ignition Temperature: Not known

Upper Explosion Limit %: Not known

Lower Explosion Limit %: Not known

Extinguishing Media: Foam, Carbon Dioxide, Dry Chemical, Water.

Special Fire Fighting Procedures:

NOTE: Material can splatter above 100°C. Polymer film can burn.

Other Information:

Note: Titanium Dioxide, pigments and fillers when formulated as above, do not pose dust hazards unless sanding or grinding of the dry coating takes place. The WES (TWA) values are those for nuisance dusts. N.O.S. NOT OTHERWISE SPECIFIED

Contact Point: New Zealand Telephone 0800 737363 Australia Telephone 1800 738383 (24 hour)

It is Company Policy to maintain the most accurate and up to date information possible, and Resene Paints Limited aims to review these Data regularly. The information contained herein is based on data considered accurate and reliable to the best of our knowledge as of the date issued and subsequently made available from Resene Paints Limited. However, no warranty is expressed or implied regarding the accuracy of these Data or the results to be obtained from the use hereof. Persons using these Data are urged by Resene Paints Limited to satisfy themselves that these Data are the latest available from Resene Paints Limited and remain current and suitable for particular applications after intervening periods of time. Resene Paints Limited assumes no responsibility for personal injury or property damage to vendees, users, or third parties caused by the material. Such users or vendees assume all risks associated with the use of the material.

Resene ArmourZinc 120

zinc epoxy primer

Resene ArmourZinc 120 is a tough, abrasion resistant film that bonds strongly to steel, inorganic zinc and existing epoxy surfaces. Zinc content of the coating gives steel cathodic protection if the film is damaged. Rapid drying permits early handling of steel when Resene Armourcote 220 (see Data Sheet RA34) is used as a shop primer for new construction projects.

Typical uses

- Fertiliser plants
- Gas plants
- Hydro-electric installations
- Marine
- Oil refineries
- Petro-chemical plants
- Power plants
- Preconstruction or touch-up primer for inorganic zinc
- Pulp and paper mills
- Tanklining (when suitably topcoated) for mineral oils, aromatic/aliphatic solvents, vegetable oils

Physical properties

Vehicle type	Two component epoxy
Hardener	Polyamide
Pigmentation	Metallic zinc
Solvent	Aromatic/ketone/ether
Pot life	12 hours at 21°C; 18 hours at 10°C
Mix ratio	4:1 (by volume)
Finish	Matt
Colour	Grey/green
Dry time (minimum)	Touch: 30 minutes at 21°C; 30 minutes at 10°C Through: 30 minutes at 21°C; 1 hour at 10°C
Recoat time (minimum)	3 hours at 21°C; 5 hours at 10°C Overcoat with chlorinated rubbers, epoxies, urethanes, vinyls
Primer required	No
Theoretical coverage	6.75 sq. metres per litre
Volume solids	51%
Recommended DFT	75 microns per coat
Usual no. of coats	1 (wet on wet)
Abrasion resistance	Excellent
Chemical resistance	Satisfactory within pH range 6.0-10.5
Solvent resistance	Excellent
Durability	Excellent
Toxicity	Non toxic (dry film)
Thinning and clean up	Resene Thinner No.12
Pack size	4 litre composite

Performance

Performance and limitations

1. More tolerant of imperfect surface preparation than inorganic zinc silicates.
2. Will cure satisfactorily at low humidities and in windy conditions.
3. Suitable for repair of welded joints on zinc coated surfaces where abrasive blasting is precluded.
4. Fast topcoat potential.

Limitations

1. If air or surface temperatures exceed 35°C at application consult manufacturer for thinning recommendations.
2. Full curing, air and surface temperatures must be above 10°C.
3. Must not be allowed to come into contact with acid or alkaline solutions outside pH range indicated above.
4. Overcoating systems must be non-saponifiable.

Steel Fab chromate free fast dry shop primer

Surface preparation

Coating performance is, in general, proportional to the degree of surface preparation. Prior to painting, surface must be clean, dry and free from oil contaminants including salt deposits.

For the best results the following is recommended:

Steel

Degrease according to SSPC SP1 solvent cleaning. Remove all weld spatter and grind sharp edges and weld seams. Power or hand tool clean to SSPC SP2 or SSPC SP3 can be used where abrasive blast cleaning is not possible. Higher standards of surface preparation will significantly improve performance.

Residues and dust from old paint systems containing lead or chromate may be dangerous to the health of the operator and the environment. Ensure approved procedures are put in place to safeguard against this.

Application

Brush

Brush application suitable for small areas or touch-up.

Conventional spray

Use a JGA 502 gun with an 'E' fluid tip and needle, and 704, 765 or 78 air cap or equivalent.

Thinning

Resene Thinner No.5 - spray application.

Resene Thinner No.11 - brush application.

Safety precautions

Consult Safety Data Sheet for this product prior to use. Users should ensure that they are familiar with all aspects concerning safe application of this product. IF IN DOUBT, DO NOT USE THIS PRODUCT.

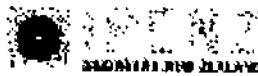
*Please ensure the current Data Sheet is consulted prior to specification or application of Resene products.
If the surface you propose to coat is not referred to by this Data Sheet, please contact Resene for clarification.*

In Australia
PO Box 785, Ashmore City, Queensland 4214
Call 1800 738 383, visit www.resene.com.au
or email advice@resene.com.au

Resene
the paint the professionals use

In New Zealand
PO Box 38242, Wellington Mail Centre, Lower Hutt 5045
Call 0800 RESENE (737 363), visit www.resene.co.nz
or email advice@resene.co.nz

Printed on environmentally responsible paper, which complies with the requirements of environmental management systems EMAS and ISO14001. Please recycle.



Building Code Clause(s)

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes for the use of this form are printed on the reverse side)

ISSUED BY: BASE CONSULTING ENGINEERS LTD
(Design Firm)

TO: MR. B. GARGILL
(Building Consent Authority)

TO BE SUPPLIED TO: KAPITI COAST DISTRICT COUNCIL
(Building Consent Authority)

IN RESPECT OF: GARGILL DWELLING & IMPLEMENT SHED
(Description of Building Work)

AT: 104 RAUKAWA ROAD, PEKAREKA
(Address)

..... LOT DP SO

We have been engaged by the owner/developer referred to above to provide STRUCTURAL DESIGN FOR OF
PILE FOUNDATIONS; BLOCK RETAINING WALL BEAMS & BRACING services in respect of the requ

Clause(s) B1.1M1 of the Building

☐ All or ☒ Part only (as specified in the attachment to this statement) of the proposed building work.

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

☒ Compliance Documents issued by Department of Building & Housing B1.1M1; AS/NZS: 1172
NZS: 3101; NZS: 4230
(Reference to relevant standards and codes)

☐ Alternative solution as per the attached schedule

The proposed building work covered by this producer statement is described on the drawings titled GARGILL
DWELLING and numbered 10001

together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions AS PER BUE REPORT DATED 16/07/10
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications
documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building C
I, PETER BOLTON am: ☒ CPeng 56179

(Name of Design Engineer)

☐ Reg Arch

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: BE CIVIL

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than
The Design Firm is a member of ACENZ ☐ YES ☒ NO

SIGNED BY PETER BOLTON ON BEHALF OF BASE CONSULTING ENGINEERS LTD
(Design Firm)

Date: 20/08/10 (signature)

Notes: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement
the Design Firm only. The total maximum amount of damages payable arising from this statement and all other matters
provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise including

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- ¹ Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003
- ² NZIA Standard Conditions of Contract SCC 2007 (1st edition)
- ³ Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)

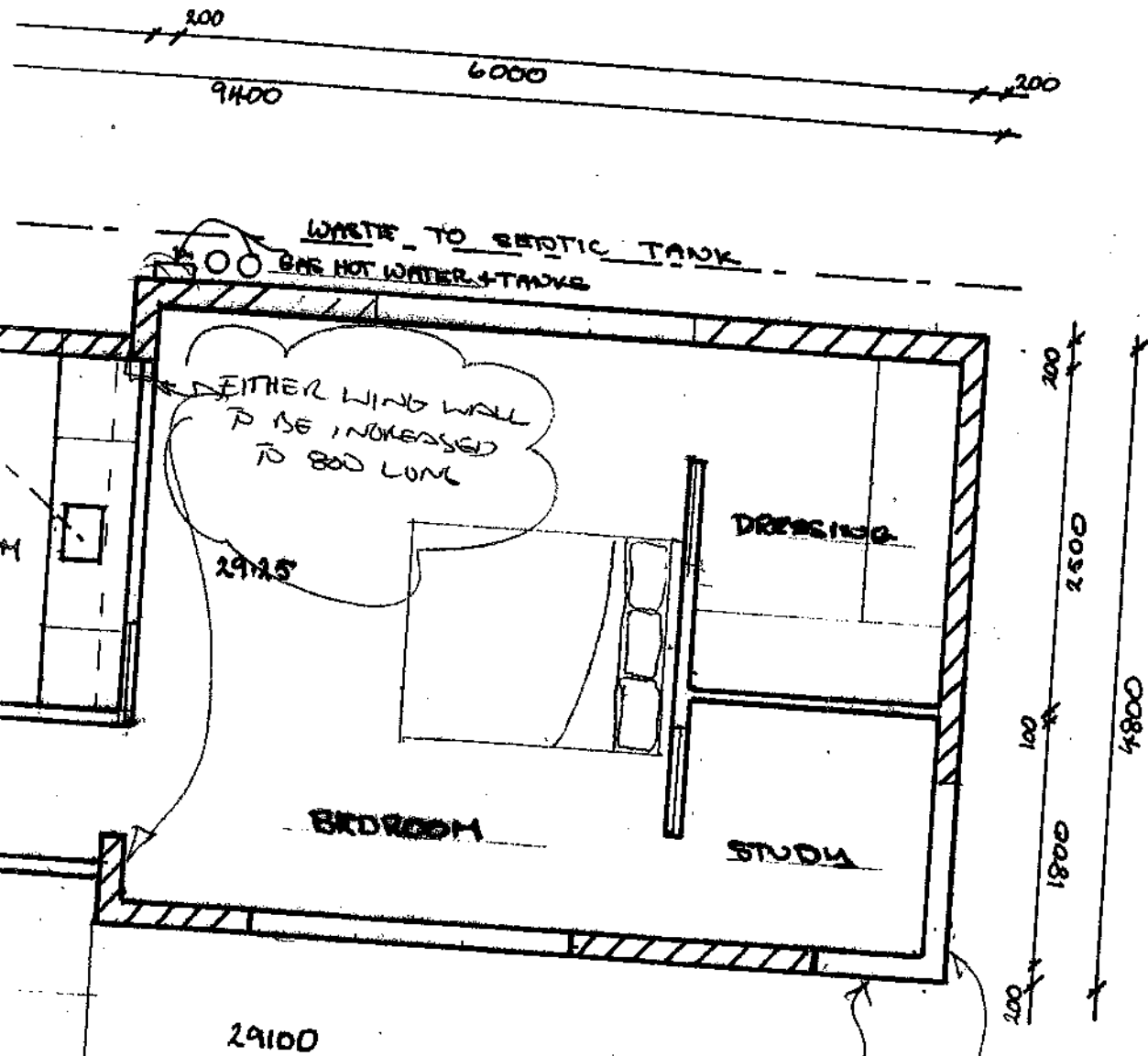
www.acenz.org.nz

www.ipenz.org.nz

www.nzia.co.nz



CALCUL DRAUGHTING
10 091
DRAWING NOTES
23/07/10
BASE CONSULTING
ENGINEERS



FLOOR PLAN 1:50

all steel not H.

BUILDING HEIGHT EXCLUSION ZONE 32.5

CANTILEVER WINDOW
LINTELS TO DETAIL
MD1 BOTH WAYS
LAP HORIZONTAL REQ
200 AROUND CORNERS

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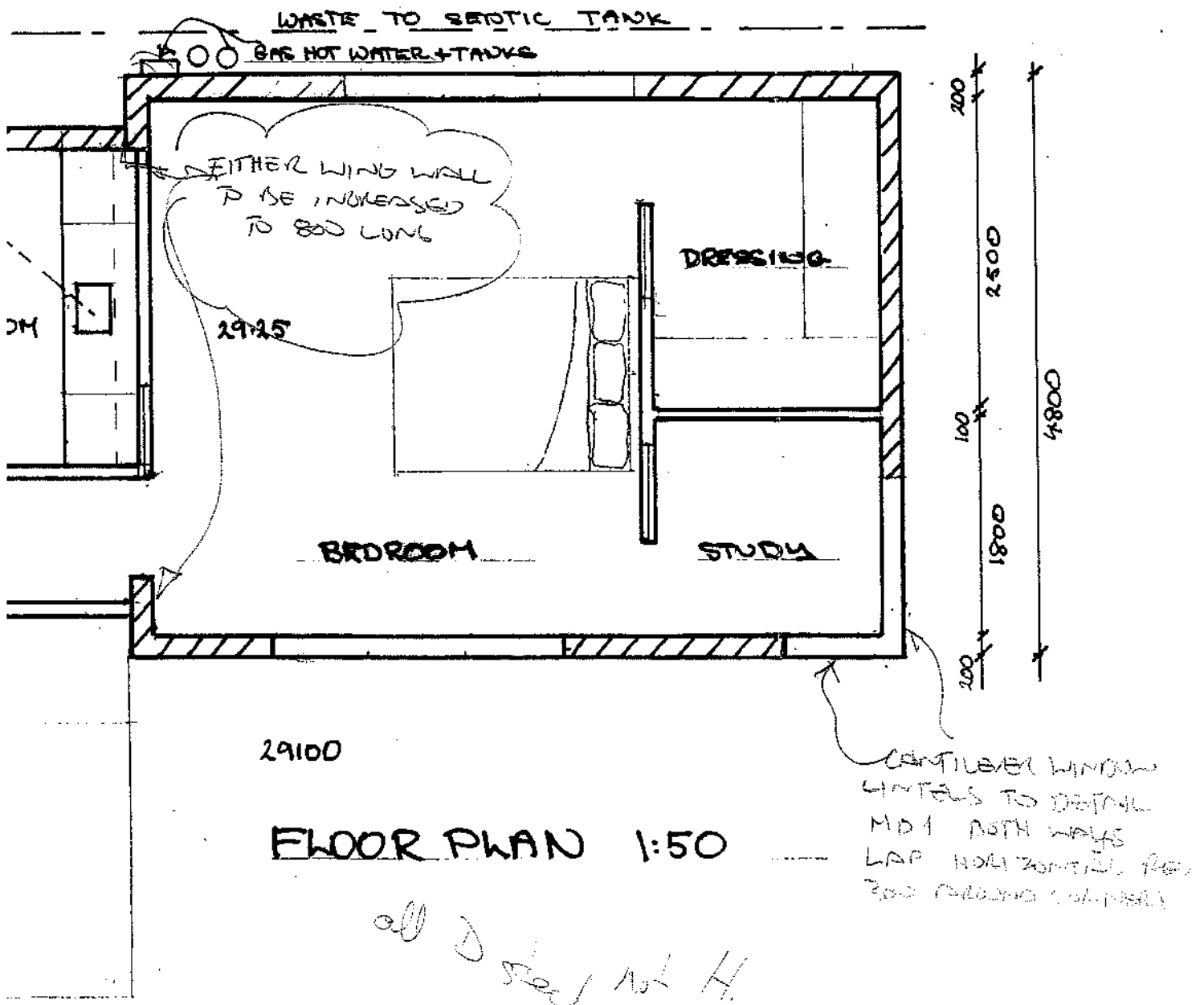
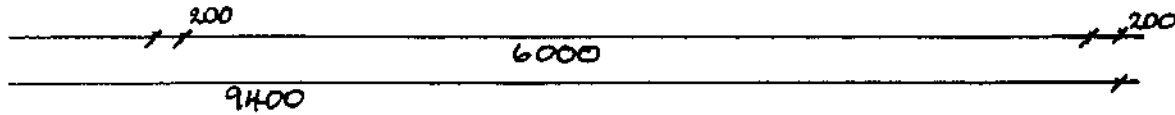
² NZIA Standard Conditions of Contract SCC 2007 (1st edition)

³ Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)

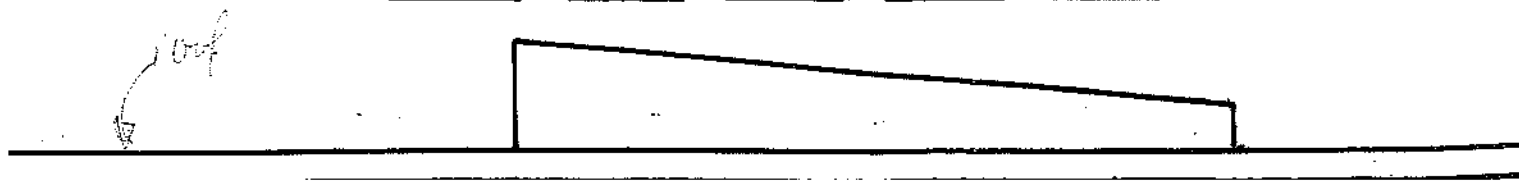
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www.ipenz.org.nz
www.nzia.co.nz



CARROLL Dwellings
 10 091
 DRAWING NOTES
 23/07/10
 BASE CONSULTING
 ENGINEERS



BUILDING HEIGHT EXCLUSION ZONE 32.5





Job CARILL Drawing and Implementation

By P Bolton

104 Raukawa Rd PEKAPEKA

Date 16/7/10

PREAMBLE

To provide the structural design for foundations given a foundation investigation revealed loose sand. From discussions with client, use driven timber piles.

Design to be in accordance with
AS/NZS 1170 Structural Design Actions
NZS 4230 Masonry Code
NZS 3101 Concrete Code

Loadings	Roof	o/s	dead	0.40 kPa
			live	0.25 kPa
	Walls	block	dead	4.47 kPa
	Floor	100 slab	dead	2.40 kPa
			live	1.50 kPa
		Workshop	live	2.50 kPa

Determine Pile Capacity ϕ_{Rn}

$$\phi_{Rn} = \eta \frac{W_h k}{s + c_h}$$

10 set
600 mm full
675 kg

$$= \frac{0.58 \times 675 \times 600 \times 9.81 \times 0.8}{13 \times 4 \times 1500}$$

$$= 35 \text{ kN}$$

Consider Floor Slab

$$1.26 + 1.58$$

$$W^* = 1.2(2.4) + 1.5(1.5) = 5.1 \text{ kN/m}$$

$$\text{Try } s = 4.8 - 2(0.3) = 4.2$$

Design Moment M^*

$$M^* = W l^2$$

$$= 5.1 \times 4.2^2$$

$$= 11.2 \text{ kNm} - \text{too high}$$

$$s = 4.0 \text{ m}$$



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$$\text{try } S = 6.0 - 3(0.3)/2$$

$$S = 2.6 \text{ m}$$

Design Moment M^*

$$M^* = 5.1 \times 2.6^2 / 8$$

$$= 4.1 \text{ kNm}$$

For bottom fibre in section R_{bx}

$$R_{bx} = \frac{M^*}{Z_{bx}}$$

$$Z_{bx} = bd^2 / 6$$

$$= 1667 \text{ cm}^3$$

$$= \frac{4.1 \text{ E6}}{1667 \text{ E3}}$$

$\leq 2.5 \text{ MPa}$ required

Try 125 slab

$$Z_{bx} = 2604 \text{ cm}^3$$

$$R_{bx} = \frac{4.1 \text{ E6}}{2604 \text{ E3}}$$

$\leq 1.6 \text{ MPa}$ accept

125 slab

Consider Central Beam

$$w_1 = 5.1 \times 6.0 / 2 + 12(0.3)^2 / 2$$

$$= 17.9 \text{ kN/m}$$

Maximum pile spacing S_m

$$S_m = \frac{4R_{bx}}{w_1}$$

$$= \frac{35}{17.9}$$

$$\leq 2.0 \text{ m}$$

Design Moment M^*

$$M^* = w_1 l^2 / 8$$

$$= 17.9 \times 2.0^2 / 8$$



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$$M^* = 9.0 \text{ kNm}$$

To 300 x 300 2-D12

$$\begin{aligned} \phi M_b &= A_s f_y (d - 0.5 a) \\ &= 0.85 \times 226 \times 300 (300 - 75 - 7.6) \\ &= 12.2 \text{ kNm} > M^* \quad \underline{OK} \end{aligned}$$

$$\begin{aligned} a &= \frac{A_s f_y}{0.85 f_c b} \\ &= \frac{226 \times 300}{0.85 \times 20 \times 300} \quad 212 \\ &= 13 \end{aligned}$$

Check Shear

$$\begin{aligned} V_1 &= \frac{V_u}{\phi_{hd}} \\ &= \frac{17.9 \text{ kN}}{0.85 \times 212 \times 300} \\ &= 0.33 \text{ MPa} \end{aligned}$$

$$\begin{aligned} V_{ck} &= \frac{V_u}{2} \\ &= \frac{17.9 \times 2.0}{2} \\ &= 17.9 \text{ kN} \end{aligned}$$

Shear carried by Concrete V_c

$$\begin{aligned} V_c &= (0.07 + 10\rho) \sqrt{f_c} \\ &= \left(0.07 + \frac{10 \times 226}{212 \times 300}\right) \sqrt{20} \\ &= 0.47 \text{ MPa} \quad \text{asspt} \end{aligned}$$

INT Beam
300 x 300
2-D12
p/s 0.20%
10 st

Consider external Beam

$$\begin{aligned} M^* &= 5.1 \times 4.8 \times \frac{1}{2} + 12(4.47) \times 2.7 + \left[1.2(0.4) + 1.5(0.25)\right] \times 4.8 \times \frac{1.5}{2} \\ &= 29 \text{ kNm} \end{aligned}$$

To 10 st, pile spring

$$\begin{aligned} S &= \phi \frac{P_u}{w} \\ &= \frac{35}{29} \\ &= 1.2 \text{ m} \quad \text{to close.} \end{aligned}$$

For 7m set /

$$\begin{aligned} \phi P_u &= 35 \times \frac{13}{9} \\ &= 51 \end{aligned}$$



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To 7 set

$$S_{max} = \frac{51}{29} \times 1.8m$$

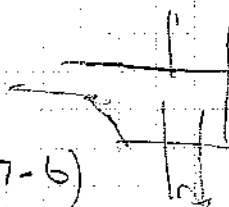
Design Moment M^*

$$\begin{aligned} M^* &= w s^2 \frac{1}{8} \\ &= 29 \times 1.8^2 \frac{1}{8} \\ &= 11.8 \text{ km} \end{aligned}$$

FG 354x300 W - 2 - D17

$$\phi M_n = A_s f_y (d - 0.5a)$$

$$\begin{aligned} &= 0.95 \times 226 \times 300 (350 - 75 - 7.6) \\ &= 15 \text{ km} \text{ ok} \end{aligned}$$



EST BEAM
350 Hx300 W
2-D17
pile @ 1500

CONSIDER BLOCK RETAINING WALL

Height retained $h = 1.6m$

backfill density $\rho = 19 \text{ kN/m}^3$ sand
surcharging $w = 18.5 \text{ kN/m}^3$
angle of Repose $\phi = 34^\circ$

Rankine Co-efficient of active earth pressure

$$k_a = \cos w \left(\frac{\cos w - \sqrt{\cos^2 w - \cos^2 \phi}}{\cos w + \sqrt{\cos^2 w - \cos^2 \phi}} \right)$$

$$k_a = 0.31$$

Wall Moment M_s

$$\begin{aligned} M_s &= k_a \rho g h^3 \frac{1}{6} \\ &= 0.31 \times 18.5 \times 1.6^3 \frac{1}{6} \\ &= 3.9 \text{ km.m} \end{aligned}$$

Try D12-400 c/c Vert



Job

By

Date

Moment Capacity ϕM_b

$$\phi M_b = A_s f_y (d - 0.5a)$$

$$= 0.85 \times 283 \times 300 \left(\frac{190}{2} - 4 - 6 \right) \times 0.6$$

$$= 8.7 \text{ kNm}$$

No good, use
D16-400V

$$a = \frac{A_s f_y}{0.85 f_c b}$$

$$D12, 283$$

$$a = \frac{283 \times 300}{0.85 \times 12000}$$

D16-400V

8

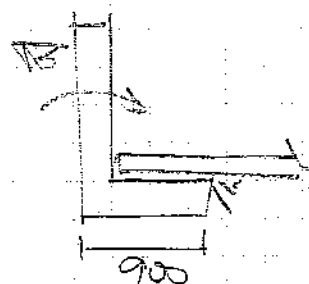
Consider Foundation

Overturning Moment M_o

$$M_o = k_a p_g (h + h_b)^3$$

$$= 0.31 \times 18.5 \times (1.6 + 0.3)^3$$

$$= 6.6 \text{ kNm}$$



Restoring Moment

$$W_w = 4.47 \times 2.6$$

$$W$$

$$x$$

$$W_x$$

$$W_f = 0.3 \times 0.9 \times 24$$

$$6.5$$

$$0.45$$

$$2.9$$

$$W_s = 0.1 \times 2.0 \times 24$$

$$4.8$$

$$1.0$$

$$4.8$$

$$\Sigma$$

$$22.9$$

$$17.0$$

$$0.9 \leq$$

$$20.6$$

$$15.3$$

Determine Bearing Capacity For

$$F_{br} = \frac{\Sigma 0.9 W}{2.2}$$

$$= \frac{20.6}{2 \times 0.45}$$

$$= 23 \text{ kPa}$$

$$e = M_L - M_o$$

$$\Sigma 0.9 W$$

$$= 15.3 - 6.1$$

$$20.6$$

$$= 0.45$$

Consider Pile Support

$$R_t = \frac{2}{3} W$$





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$$R_t = 7 \text{ kN}$$

for piles @ 2.0 m

$$R_p = 2 \times 7.0 = 14.0 \text{ kN} \quad \text{ok}$$

CONSIDER Black LINTELS

BL1 LIVING ROOM

$$S_{per} = 4.0 \text{ m}$$

$$W = 1.2(0.4) + 1.5(0.45) \times 2.2 + 1.2(4.47) \times 1.2$$

$$= 8.3 \text{ kN/m}$$

Design Moment M^x

$$M^x = 8.3 \times 4.0^2 / 8$$

$$= 16.6 \text{ kNm}$$

For 600 x 200 Lintel

Moment Capacity ϕM_b

$$\phi M_b = A_s f_y (d - 0.5a)$$

$$= 0.85 \times 201 \times 300 (600 - 60 - 15 - 8)$$

$$= 26 \text{ kNm} \quad \text{accept}$$

1 D16 btm

1 D12

1 D16

$$a = \frac{A_s f_y}{0.85 f'_c b}$$

$$= \frac{201 \times 300}{0.85 \times 12 \times 190}$$

$$= 30 \text{ mm}$$

Check Shear

$$V_i = \frac{V_u}{\phi_{shear}}$$

$$= \frac{16.6 \text{ kN}}{0.85 \times 517 \times 190}$$

$$= 0.20 \text{ MPa}$$

$$V_u = 8.3 \times 4.0 / 2$$

$$= 16.6 \text{ kN}$$

Shear carried by Masonry

$$V_m = 0.70 \text{ MPa}$$

Nominal stirrups

grade 40

LINTEL
D16 btm
D12 top

R6-200
links

Hg
900 x 300
piles
@ 2.0m
10 x 4



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CONSIDER BEDROOM LINTEL

BL2

span 2.4m

$$w^* = \{1.2(0.4) + 1.5(0.25)\} \times 4.8 \times 1.5 + 1.2(4.47) \times 1.6$$

$$= 7.7 \text{ kN/m}$$

Design Moment M^*

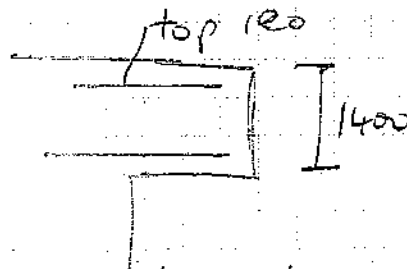
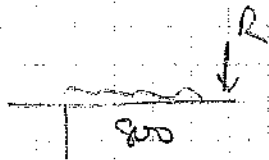
$$M^* = w l^2 / 8$$

$$= 7.7 \times 2.4^2 / 8$$

$$= 5.5 \text{ kNm} \quad \# 16 \text{ use same D16 } 600 \times 200$$

ALL LINTELS
D16

CONSIDER CANTILEVER LINTEL



$$w^* = \{1.2(0.4) + 1.5(0.25)\} \times 4.8 \times 1.5 + 1.2(4.47) \times (1.47)$$

$$= 9.9 \text{ kN/m}$$

$$R^* = 1.2(4.47) \times 1.4 \times 1.4$$

$$= 10.5 \text{ kN}$$

Design Moment M^*

$$M^* = w l^2 / 2 + R l$$

$$= 9.9 \times 0.8^2 / 2 + 9.9 \times 0.8$$

$$= 11.1 \text{ kNm}$$

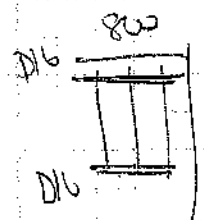
use same D16 top 600 x 200

Check shear

$$V_f = \frac{V_u}{\phi_{\text{shear}}}$$

$$V_u = w u l + R$$

$$= 9.9 \times 0.8 + 10.5$$





Job _____

By _____

Date _____

$$V_i = 18.4 \text{ kN}$$

$$0.85 \times 517 \times 190$$

$$\leq 0.22 \text{ MPa} \quad \text{OK}$$

CONSIDER IMMOVABLE FIXED DOOR LINTEL

$$L = 6.0 \text{ m}$$

$$W = [1.2(0.4) + 1.5(0.25)] \times 10.0 \times 1.15 + 1.2(0.3)$$

$$\leq 5.3 \text{ kN/m}$$

Design Moment M_x

$$M_x = \frac{W L^2}{8}$$

$$\leq 5.3 \times 6.0^2 / 8$$

$$\leq 23.7 \text{ kNm}$$

For 200 PFC

Moment Capacity ϕM_b

$$\phi M_b = \phi S_x \times M_s$$

$$\leq 1.13 \times 0.32 \times 60$$

$$\leq 22 \text{ kNm} \quad \text{ampl}$$

$$L_e = 1.09 L$$

$$\leq 6.5 \text{ m}$$

Deflection

- dead load only

$$\delta = \frac{5 W L^4}{384 E I}$$

$$\leq 5 \times 2.6 \times 6.0^4$$

$$384 \times 200 \times 19110$$

$$\leq 11 \text{ mm} \quad \text{OK}$$

$$W_d = 0.4 \times 5.0 \times 1.15 + 0.3$$

$$\leq 2.6 \text{ kN/m}$$

$$I = 19110 \text{ cm}^4$$

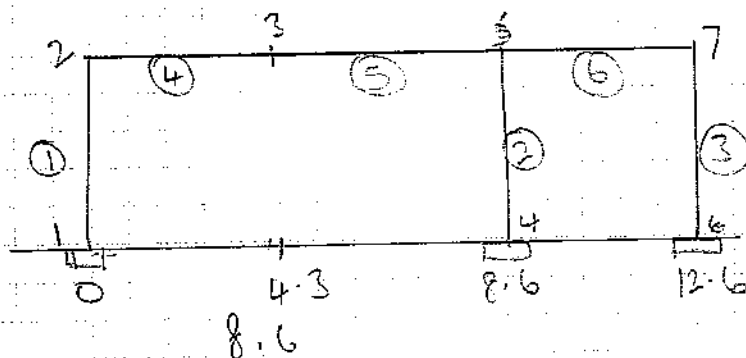
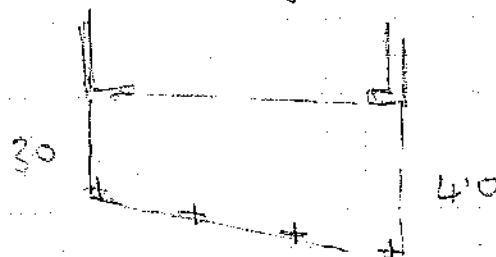
GAMMA
DOOR LINTEL
200 PFC
SPE GOOD
HARBOUR
OKE



Job

CONSIDER IMPLEMENT SHED CANOPY.

as foundations required to
be driven pile, use
beam/post as portal.



beam span 8.6m

$$1.26 + 1.5 \phi = 1.2 + 0.866 \times 2.0 + 0.3 = 2.0 \text{ kN/m}$$

$$M^* = 2.0 \times 8.6^2 / 8 = 18.5 \text{ kNm}$$

For 250 PFC 200 UB 30

$$l_e = 1.09 \times 8.6 = 9.4$$

$$\phi M_d = 0.70 \times 1.13 \times 90$$

$$\alpha_c = 0.24$$

$$= 24.4 \text{ kNm}$$

$$200 \text{ UB } 25 = 18 \text{ kNm} < 24.4$$

Use 200 UB 25 - 90 x 8 PFC

Wind loading

$$V_s = V_z M_h M_{z2} M_{z4}$$

$$= 45 \times 0.91 \times 1.16$$

$$= 47.5 \text{ m/s}$$

$$V_z = 45$$

$$M_h = 0.91 \text{ cat 2}$$

$$M_{z2} = 1.16$$

$$P = 0.5 \rho V_s^2 C_{df}$$

$$= 1.35 \text{ kPa} \text{ PFC}$$



Job

By

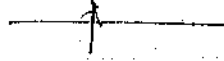
Date

$$g_m = 0.2, -0.3 - 0.6 \left(\frac{h_g}{L_c} \right)$$

$$= -0.3 - 0.6 \times 0.5$$

$$= -0.6$$

$$h_w = 3.5m$$



$$C_{h_g} =$$

$$h_{g_n} = 0.9$$

$$h_{g/L_c} = \frac{2.0}{4.0} = 0.5$$

LOADING

Dead

$$w_u - w_b = 0.4 \times 3.5 + 0.3 = 1.7 \text{ kN/m}$$

live

$$w_u - w_b = 0.25 \times 3.5 = 0.9 \text{ kN/m}$$

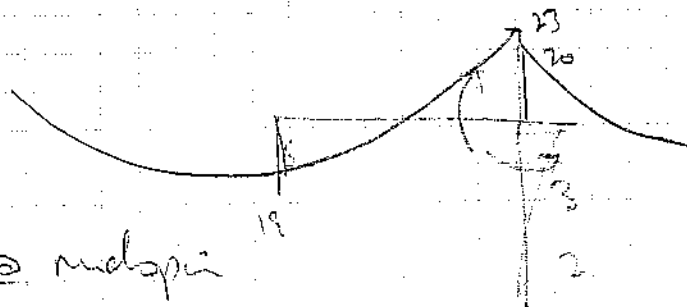
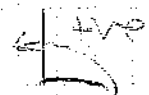
wind

$$w_u - w_b = 0.6 \times 1.35 \times 3.5 = 2.8 \text{ kN/m}$$

Impact

$$R_2 = 1.0 \text{ kN}$$

From Printout 1.26 + 1.50



$$M^* = 18 \text{ kN} @ \text{midspan}$$

Moment Capacity ϕM_s

$$\phi M_s = 18 \text{ kNm}$$

$$L_c = \frac{3}{4} \times 8.6 \times 1.09$$

$$= 0.1$$

90 x 5 SWS posts

Beam
200 x 25
+ continuous
connectors
overpost

S T R U C T U R E I N P U T D A T A -----

Description : CANOPY PORTAL
 Client : CARGILL
 Comments :
 Time : 4:21 pm
 Date : Monday 19 July 2010
 File Name : CARGILL.DAT
 Num of Nodes : 7
 Num of Members : 6
 Num of Memb Props: 2
 Max Node Diff : 2
 Solution time : 0.9 sec
 LOADING DATA

Load Case	Load Title	Node Load	Memb UDLs
1	DEAD	0	3
2	LIVE	0	3
3	WIND	0	3
4	SEIS	1	0
5	****	0	0
6	****	0	0
7	****	0	0
8	****	0	0
9	****	0	0
10	****	0	0

* NODAL DATA

XCoord: +ve to right[m], YCoord: +ve Upward[m]
 Xrestr, Yrestr, Zrestr... 1:Node Restrained, 0:Node Un-Restrained

* MEMBER DATA

EndFixity.. 1:Fixed-Fixed, 2:Fixed-Pinned, 3:Pinned-Fixed, 4:Pinned-Pinned

* MEMBER PROPERTIES

Elasticity: Member Elasticity[KN/m2], XArea: Member Cross Section Area[m2]
 Inertia: Member Moment of Inertia[m4], SectMod: Member Section Modulus[m3]

* NODAL LOADS

XLoad:+ve to Right[KN], YLoad:+ve Upwards[KN], ZMoment:+ve AntiClockwise[KNm]

* MEMBER UDLs

UDLs are +ve Upwards when viewed with LNode on the left
 Direction : 0: Gravity/Vertical, 1: Normal/Perpendicular

* DEFLECTIONS AND SUPPORT REACTIONS

XDefln:+ve to Right[m], YDefln:+ve Upwards[m], ZRotn:+ve AntiClockwise[Rad]
 XReact: +ve to Right, YReact: +ve Upwards, ZReact: +ve AntiClockwise

* MEMBER FORCES AND MOMENTS

Axial Ld, Shear, and Moment are the forces applied BY THE NODE TO THE MEMBER
 Axial: +ve to Right[KN], Shear: +ve for Clockwise sense of rotn in member[KN]
 Moment:+ve AntiClockwise about Node [KNm]

* MEMBER STRESSES

Axial: +ve for Compression in member [MPa] = AxialForce/XArea [MPa]
 Shear: +ve for +ve Shear Force = ShearForce/XArea [MPa] - IS INDICATIVE ONLY
 Bending: Bending Stress always shown +ve = BendingMoment/SectModulus [MPa]

S T R U C T U R E I N P U T D A T A -----

STRUCTURE DATA

NODAL DATA

Node	Xcoord	Ycoord	Xrestr	Yrestr	Zrestr
1	0.000	0.000	1	1	0
2	0.000	2.400	0	0	0
3	4.300	2.400	0	0	0
4	8.600	0.000	1	1	0
5	8.600	2.400	0	0	0
6	12.600	0.000	1	1	0
7	12.600	2.400	0	0	0

MEMBER DATA

Member	LHNode	RHNode	PropRef	EndFixity	Length
1	1	2	1	1	2.400
2	4	5	1	1	2.400
3	6	7	1	1	2.400
4	2	3	2	1	4.300
5	3	5	2	1	4.300
6	5	7	2	1	4.000

PROPERTY DATA

Ref	Elasticity	XArea	Inertia	Sect-Mod	Description
1	2.000E+08	1.580E-03	1.820E-06	4.090E-05	89x89x4.9-SHS-XY
2	2.000E+08	3.230E-03	2.360E-05	2.320E-04	200UB25-STEEL-UB

S T R U C T U R E I N P U T D A T A

LOAD Case: 1 Title: DEAD

MEMBER UDLs				
Num	Member	St-UDL	Fin-UDL	Direction
1	4	-1.700	-1.700	1
2	5	-1.700	-1.700	1
3	6	-1.700	-1.700	1

S T R U C T U R E I N P U T D A T A

LOAD Case: 2 Title: LIVE

MEMBER UDLs				
Num	Member	St-UDL	Fin-UDL	Direction
1	4	-0.900	-0.900	1
2	5	-0.900	-0.900	1
3	6	-0.900	-0.900	1

S T R U C T U R E I N P U T D A T A

LOAD Case: 3 Title: WIND

MEMBER UDLs				
Num	Member	St-UDL	Fin-UDL	Direction
1	4	2.800	2.800	1
2	5	2.800	2.800	1
3	6	2.800	2.800	1

S T R U C T U R E I N P U T D A T A

LOAD Case: 4 Title: SEIS

NODAL LOADS

Num	Node	XLoad	YLoad	ZMoment
1	2	1.000	0.000	0.000

S T R U C T U R E O U T P U T D A T A -----

LOAD COMBINATION 1 -----

Number: 1 2
 Title: DEAD + LIVE
 Factor: 1.20 1.50

NODAL DEFLECTIONS & SUPPORT REACTIONS

Node	X-Defln	Y-Defln	Z-Rotn	X-React	Y-React	Z-React
1	0.000	0.000	0.001	1.437	12.291	0.000
2	0.006	-0.000	-0.010	0.000	0.000	0.000
3	0.006	-0.025	0.001	0.000	0.000	0.000
4	0.000	0.000	-0.005	-1.192	28.558	0.000
5	0.006	-0.000	0.004	0.000	0.000	0.000
6	0.000	0.000	-0.003	-0.245	1.865	0.000
7	0.006	-0.000	-0.001	0.000	0.000	0.000

MEMBER AXIAL LOADS, SHEARS, & MOMENTS

Memb	Node	Axial	Shear	Moment	Node	Axial	Shear	Moment
1	1	12.291	-1.437	0.000	2	-12.291	1.437	-3.448
2	4	28.558	1.192	0.000	5	-28.558	-1.192	2.861
3	6	1.865	0.245	0.000	7	-1.865	-0.245	0.587
4	2	1.437	12.291	3.448	3	-1.437	2.286	18.062
5	3	1.437	-2.286	-18.062	5	-1.437	16.863	-23.108
6	5	0.245	11.695	20.248	7	-0.245	1.865	-0.587

MEMBER STRESS AXIAL, SHEAR, & BENDING

Memb	Node	AxialStr	ShearStr	BendStr	Node	AxialStr	ShearStr	BendStr
1	1	7.779	-0.909	0.000	2	7.779	-0.909	84.309
2	4	18.075	0.755	0.000	5	18.075	0.755	69.956
3	6	1.180	0.155	0.000	7	1.180	0.155	14.353
4	2	0.445	3.805	14.863	3	0.445	-0.708	77.853
5	3	0.445	-0.708	77.853	5	0.445	-5.221	99.605
6	5	0.076	3.621	87.276	7	0.076	-0.577	2.530

S T R U C T U R E O U T P U T D A T A

LOAD COMBINATION 1

Number: 1 2
Title: DEAD + LIVE
Factor: 1.20 1.50

EQUILIBRIUM SUMMARY

	Horizontal	Vertical

Applied Loads	0.000	-42.714
Support Reactions	0.000	42.714

S T R U C T U R E O U T P U T D A T A -----

LOAD COMBINATION 2 -----

Number: 1 3
 Title: DEAD + WIND
 Factor: 0.90 1.00

NODAL DEFLECTIONS & SUPPORT REACTIONS

Node	X-Defln	Y-Defln	Z-Rotn	X-React	Y-React	Z-React
1	0.000	0.000	-0.001	-0.538	-4.605	0.000
2	-0.002	0.000	0.004	0.000	0.000	0.000
3	-0.002	0.009	-0.001	0.000	0.000	0.000
4	0.000	0.000	0.002	0.447	-10.699	0.000
5	-0.002	0.000	-0.001	0.000	0.000	0.000
6	0.000	0.000	0.001	0.092	-0.699	0.000
7	-0.002	0.000	0.000	0.000	0.000	0.000

MEMBER AXIAL LOADS, SHEARS, & MOMENTS

Memb	Node	Axial	Shear	Moment	Node	Axial	Shear	Moment
1	1	-4.605	0.538	0.000	2	4.605	-0.538	1.292
2	4	-10.699	-0.447	-0.000	5	10.699	0.447	-1.072
3	6	-0.699	-0.092	-0.000	7	0.699	0.092	-0.220
4	2	-0.538	-4.605	-1.292	3	0.538	-0.856	-6.766
5	3	-0.538	0.856	6.766	5	0.538	-6.317	8.658
6	5	-0.092	-4.381	-7.585	7	0.092	-0.699	0.220

MEMBER STRESS AXIAL, SHEAR, & BENDING

Memb	Node	AxialStr	ShearStr	BendStr	Node	AxialStr	ShearStr	BendStr
1	1	-2.914	0.341	0.000	2	-2.914	0.341	31.585
2	4	-6.772	-0.283	0.000	5	-6.772	-0.283	26.210
3	6	-0.442	-0.058	0.000	7	-0.442	-0.058	5.377
4	2	-0.167	-1.426	5.568	3	-0.167	0.265	29.164
5	3	-0.167	0.265	29.164	5	-0.167	1.956	37.318
6	5	-0.028	-1.356	32.696	7	-0.028	0.216	0.948

S T R U C T U R E O U T P U T D A T A

LOAD COMBINATION 2

Number: 1 3
Title: DEAD + WIND
Factor: 0.90 1.00

EQUILIBRIUM SUMMARY

	Horizontal	Vertical

Applied Loads	0.000	16.002
Support Reactions	-0.000	-16.002

S T R U C T U R E O U T P U T D A T A -----

LOAD COMBINATION 3 -----

Number: 1 4
 Title: DEAD + SEIS
 Factor: 1.00 1.00

NODAL DEFLECTIONS & SUPPORT REACTIONS

Node	X-Defln	Y-Defln	Z-Rotn	X-React	Y-React	Z-React
1	0.000	0.000	-0.002	0.416	6.032	0.000
2	0.007	-0.000	-0.005	0.000	0.000	0.000
3	0.007	-0.013	0.001	0.000	0.000	0.000
4	0.000	0.000	-0.006	-0.959	14.135	0.000
5	0.007	-0.000	0.002	0.000	0.000	0.000
6	0.000	0.000	-0.004	-0.457	1.253	0.000
7	0.007	-0.000	-0.001	0.000	0.000	0.000

MEMBER AXIAL LOADS, SHEARS, & MOMENTS

Memb	Node	Axial	Shear	Moment	Node	Axial	Shear	Moment
1	1	6.032	-0.416	0.000	2	-6.032	0.416	-0.998
2	4	14.135	0.959	0.000	5	-14.135	-0.959	2.302
3	6	1.253	0.457	0.000	7	-1.253	-0.457	1.097
4	2	1.416	6.032	0.998	3	-1.416	1.278	9.224
5	3	1.416	-1.278	-9.224	5	-1.416	8.588	-11.986
6	5	0.457	5.547	9.686	7	-0.457	1.253	-1.097

MEMBER STRESS AXIAL, SHEAR, & BENDING

Memb	Node	AxialStr	ShearStr	BendStr	Node	AxialStr	ShearStr	BendStr
1	1	3.818	-0.263	0.000	2	3.818	-0.263	24.409
2	4	8.946	0.607	0.000	5	8.946	0.607	56.277
3	6	0.793	0.289	0.000	7	0.793	0.289	26.811
4	2	0.438	1.868	4.303	3	0.438	-0.396	39.758
5	3	0.438	-0.396	39.758	5	0.438	-2.659	51.666
6	5	0.141	1.717	41.748	7	0.141	-0.388	4.727

S T R U C T U R E O U T P U T D A T A

LOAD COMBINATION 3

Number: 1 4
Title: DEAD + SEIS
Factor: 1.00 1.00

EQUILIBRIUM SUMMARY

	Horizontal	Vertical

Applied Loads	1.000	-21.420
Support Reactions	-1.000	21.420



Job

By

Date

Consider Dwelling BRACING

To NBS 4229

Determine Bracing Demand

Single Storey - Area $80m^2$
roof lightweight

Zone A

20 series block - 28 bu/m

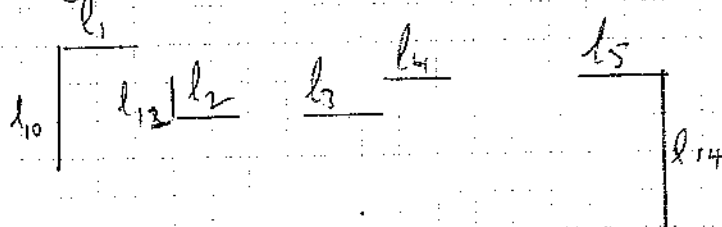
solid full $\times 1.4$

Demand = $28 \times 1.4 \times 80 = 3140$ EW

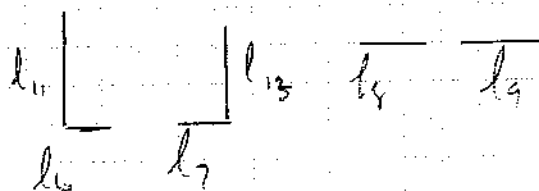
Demand
3140.

Determine Bracing Provided

Across \downarrow



Along \rightarrow



BRACING along

Wall	length	Reqd	bracing
f1	1.6	2.0	515
f2	1.2	2.0	325
f3	1.2	2.0	325
f4	1.8	2.0	590
f5	2.2	2.0	840
f6	0.8	1.0	340
f7	0.8	1.0	340
f8	1.2	1.6	390
f9	1.8	0.6	1220

30% = $0.3 \times 4545 = 1360$ bu



Job

By

Date

BRACING across

Wall	length	Left	bracing
f10	1.8	2.0	590
f11	2.0	2.0	735
f12	0.8	2.0	185
f13	2.4	2.0	1005
f14	3.2	0.6	1325

3840 bu

30%
60%

1150 bu
2300 bu

Consider Distribution

Total bracing in both directions adequate

1. System as Bracing lines

maximum spacing of lines = 7.6m

Zone A
single story - solid fill
20 series

Table 8.3

Add
800 blocks

- add wall 800 long between Bed/bath

2 Option as Structural Diaphragm

- for 1 diaphragm
60% each external wall = 0.6×3140
= 1880 bu

Wall East = both = $590 + 735$ = 1325 bu

+ 1880 - cannot use diaphragm

must use bracing line system

Quality
bracing OK

- add wall
800 long

N



Job

By

Date

CONSIDER IMPLEMENT SHED BRACING

Single Storey.

Zone A.

20 series. - solid fill

Area = $13.0 \times 6.0 \times 1.10$ s $86 m^2$

Bracing Demand

BU = $86 \times 20 \times 1.4$

= 2402 EW.

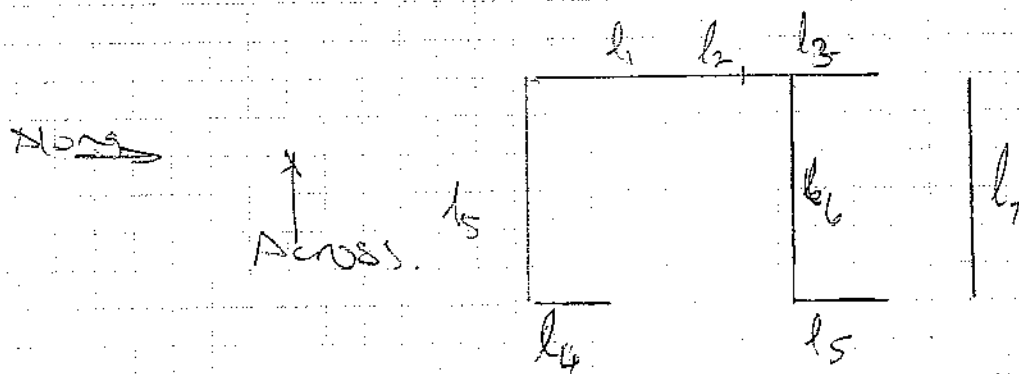
BU = 2400

EW

Determine Bracing Provided

30% = 720

60% = 1440



BRACING ALONG

Wall	length	ht	bu
l_1	6.0	3.0	3180
l_2	2.0	3.0	545
l_3	2.4	0.8	2010
l_4	1.2	2.0	325
l_5	2.0	2.0	735
			<hr/> 6795

Rear Wall on

Front Wall = $3185 + 735$ < 1060
 $\neq 1440$ (60%)

must use bracing line system



Job Implement Shed

By

Date

BRACING ACROSS

Wall	length	Hgt	bu
ls	6.0	3.0	3180
lb	4.8	2.0	2930
lt	6.0	3.0	3180
			OK

bracing across OK
- back wall retaining OK

IMPLEMENT
SHED
BRACING
OK BOTH
WAYS

VERTICAL BEAM AMENDMENT
- as block linked

$$R_L = (1.2(0.4) + 1.5(0.25)) \left(\frac{6.0}{2} \times \frac{8.6}{2} \right) \quad R_R$$

↓

$$= 11.0 \text{ kN}$$

$$w = 1.2(0.19) 23.6 \times 1.0$$

$$= 5.4 \text{ kN/m}$$

Design Moment M^x

$$M^x = w l^2 / 8 + R_L l / 4$$

$$= 11.0 \times 6.0^2 / 8 + 5.4 \times 6.0^2 / 4$$

$$= 41 \text{ kNm}$$

For 600 x 200 Linked

216 btr

moment Capacity ϕM_b

$\phi M_b = 26 \text{ kNm}$ - no good

Try 2 216 $A_s = 402$

$$a = \frac{402 \times 300}{0.85 \times 12 \times 190} = 62$$

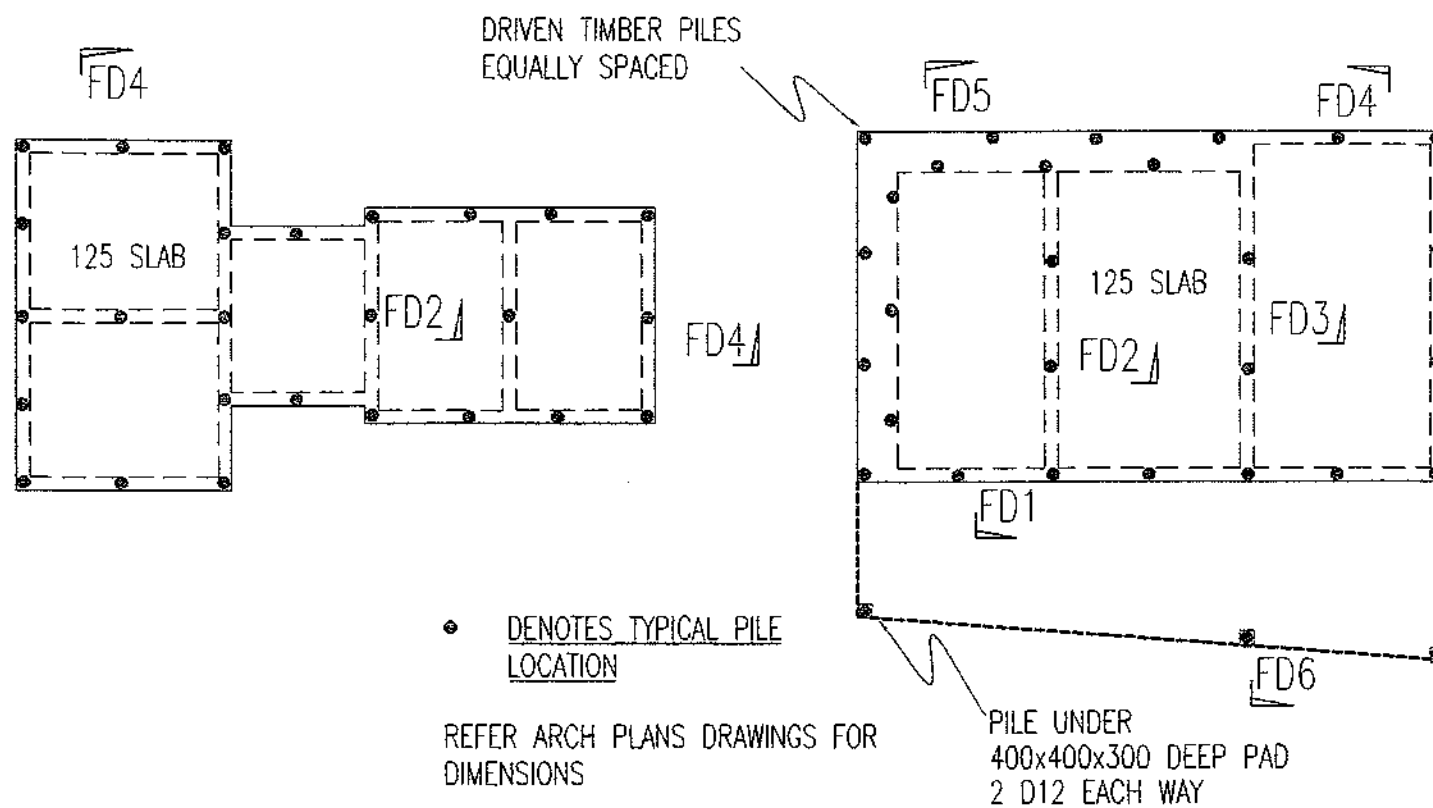
$$\phi M_b = A_s f_y (d - 0.5 a)$$

$$= 0.85 \times 402 \times 300 (600 - 60 - 31 - 8)$$

= 111.1 kNm

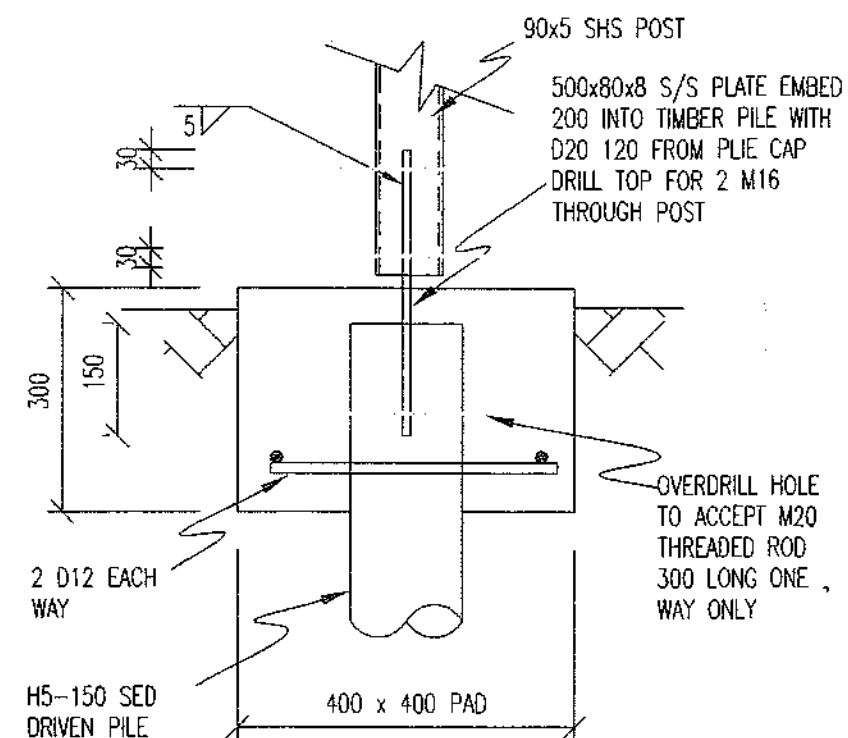


IMPLEMENT
SHED LIMIT
Sp - 6000
2 216
600 x 190

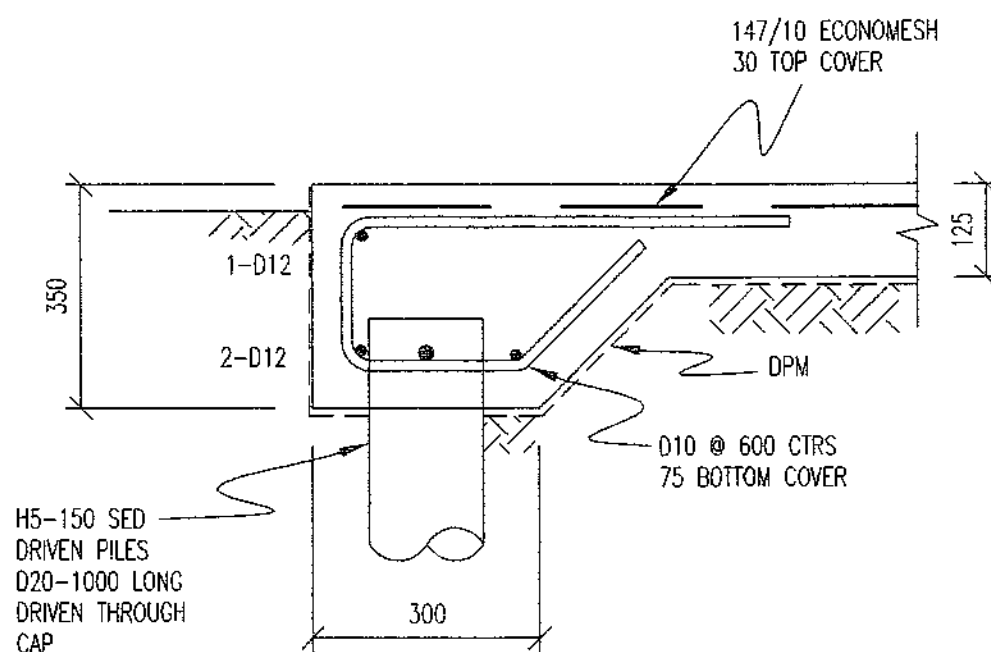


FOUNDATION PLAN

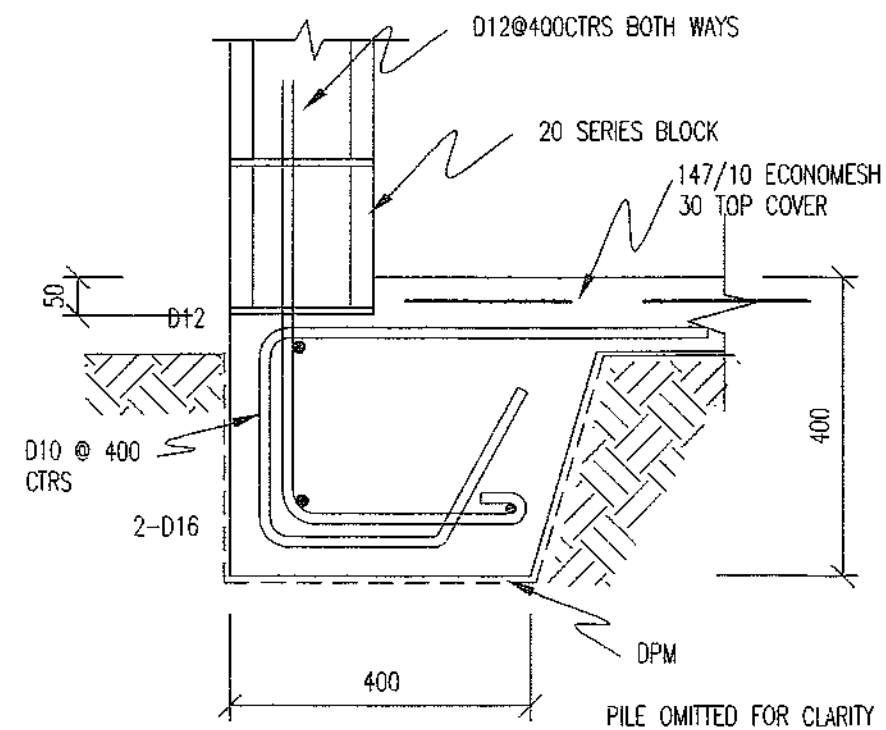
NOT TO SCALE



FD6



FD1



FD4

RETAINING NOT GREATER THAN 600mm

No.	AMENDMENT	NAME	DATE

NOTES GENERAL

PROVIDE MINIMUM 24 HOURS NOTICE FOR ALL INSPECTIONS BY ENGINEER

A PS4 WILL NOT BE ISSUED IF INSPECTIONS HAVE NOT BEEN UNDERTAKEN BY BASE CONSULTING ENGINEERS

MASONRY NOTES

ALL BLOCKWORK TO BE GRADE B MASONRY
ALL CELLS FILLED WITH 20 MPA GROUT WITH CAVEY
PROVIDE CONSTRUCTION JOINTS AT 6 METRES MAX
TO DETAIL AS PER NZSS 4229 FIG 13.2

MINIMUM LAP TOP BE
H12 800
H16 1000

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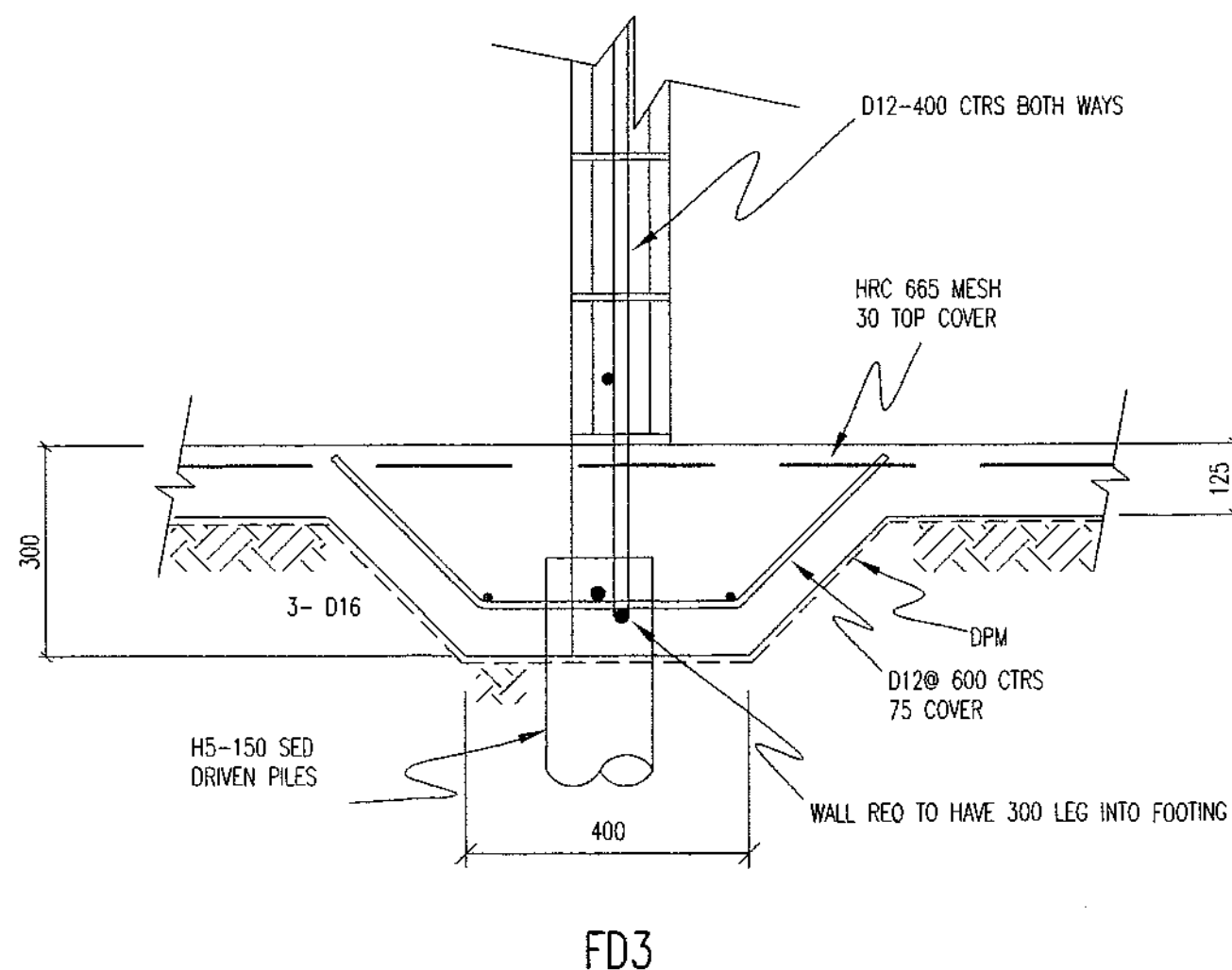
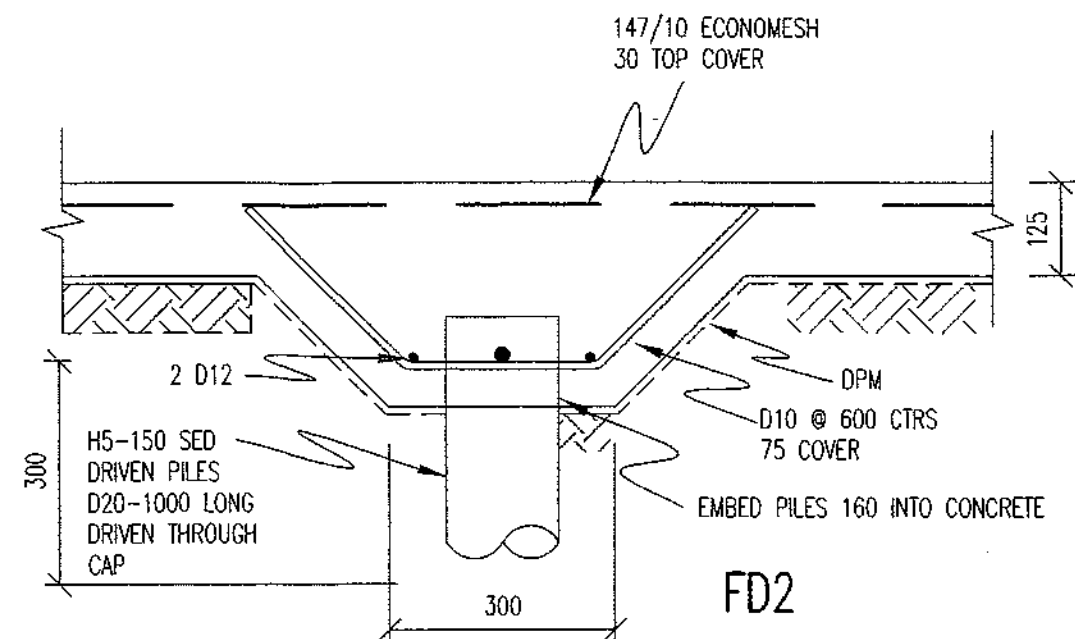
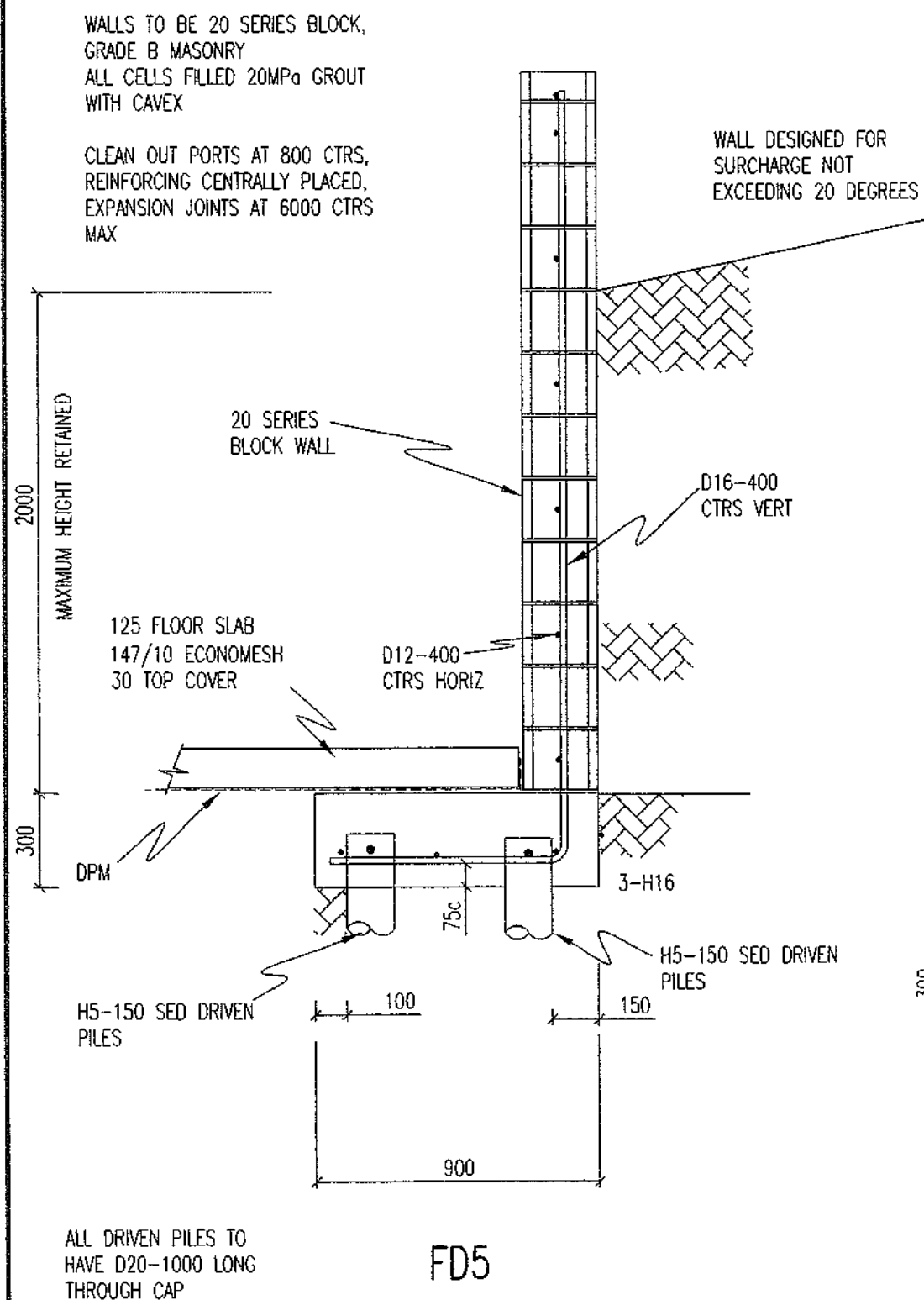
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Paraparaumu 04-297 0088
Fax 06-367 0058
Mobile 027 44 44 080

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CARGILL DWELLING
AND IMPLEMENT SHED
104 RAUKAWA ROAD
PEKAPEKA

SCALE
AS SHOWN

	NAME	DATE	DRAWING NUMBER
FIELDWORK	PB	06/07/10	10 091 SS1
DESIGNED	PB	16/07/10	
DRAWN	PB	21/07/10	
CHECKED	PB	26/07/10	
			SHEET 1 OF 3 SHEETS



No.	AMENDMENT	NAME	DATE
A			

NOTES: CONCRETE-DRIVEN PILES

PILES TO BE H5 150 SED DRIVEN WITH A 480kg HAMMER FALLING 1000mm FOR THE FOLLOWING SETS
7mm UNDER BLOCK WALLS
10mm ELSEWHERE

RECORD ALL PILE SETS AND LENGTHS AND SUBMIT COPY TO KCDC

PLACE D20-1000 LONG THROUGH PILE CAP

DO NOT TRIM PILES TO LESS THAN 120mm WIDTH


REINFORCING:
D DENOTES GRADE 300 DEFORMED
H DENOTES GRADE 500 DEFORMED

MINIMUM COVER 50mm EXCEPT WHERE SHOWN OTHERWISE, ENSURE 50mm SIDE COVER TO REQ. WIDEN FOOTING OR CRANK H12 AS REQUIRED

CONCRETE STRENGTH TO BE 25MPa AT 28 DAYS. VIBRATE ALL CONCRETE WHEN IN PLACE. ADD NO WATER ON SITE. CURE SLAB BY PONDING FOR 7 DAYS MINIMUM. SAWCUT TO ARCHITECTURAL DRAWINGS

FOR CORNER PILES, D20 1000 LOG TO EXTEND IN ONE DIRECTION ONLY LOCATIONS AS SHOWN ON BRACING PLAN

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STRUCTURAL DETAILS

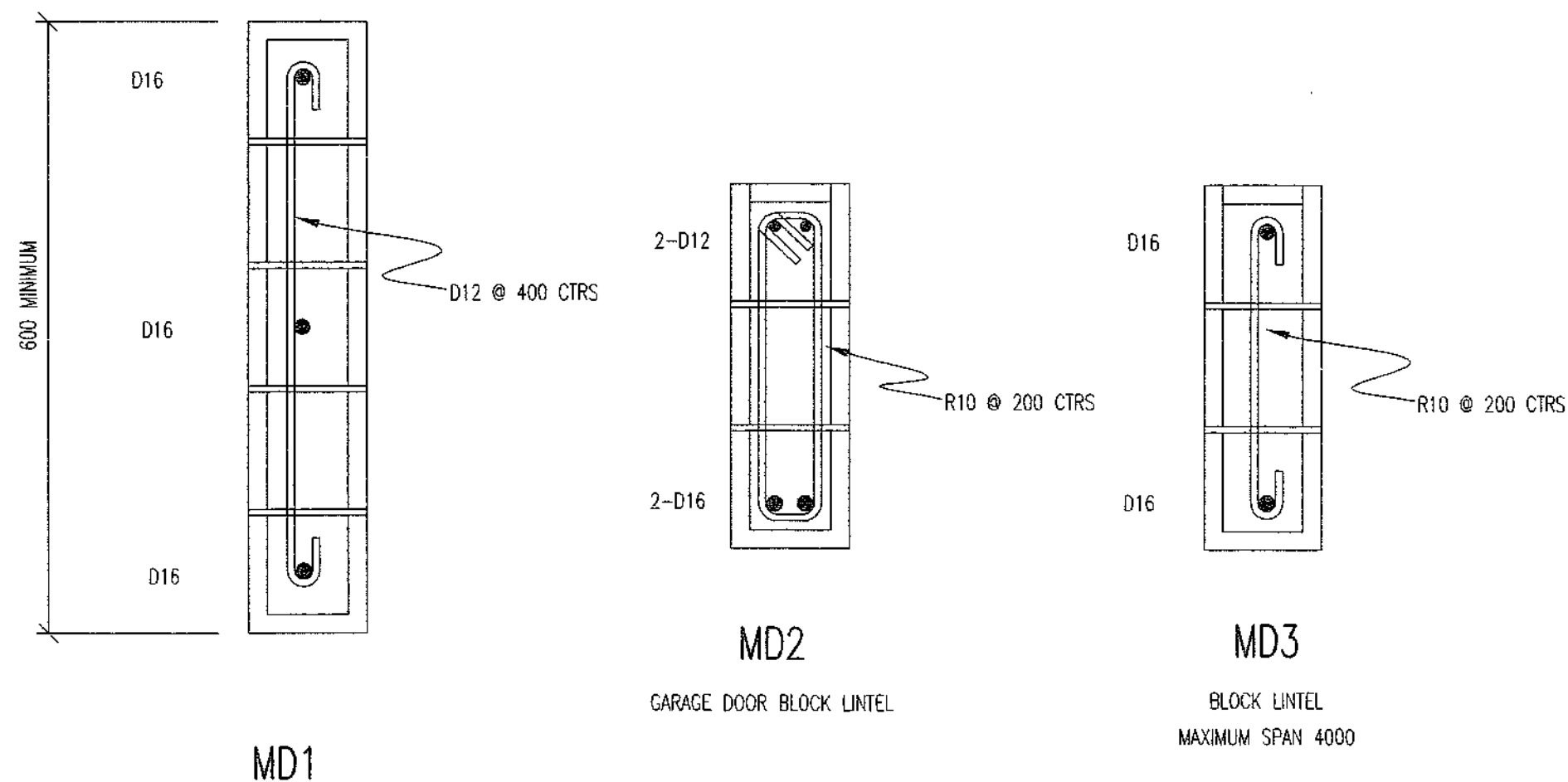
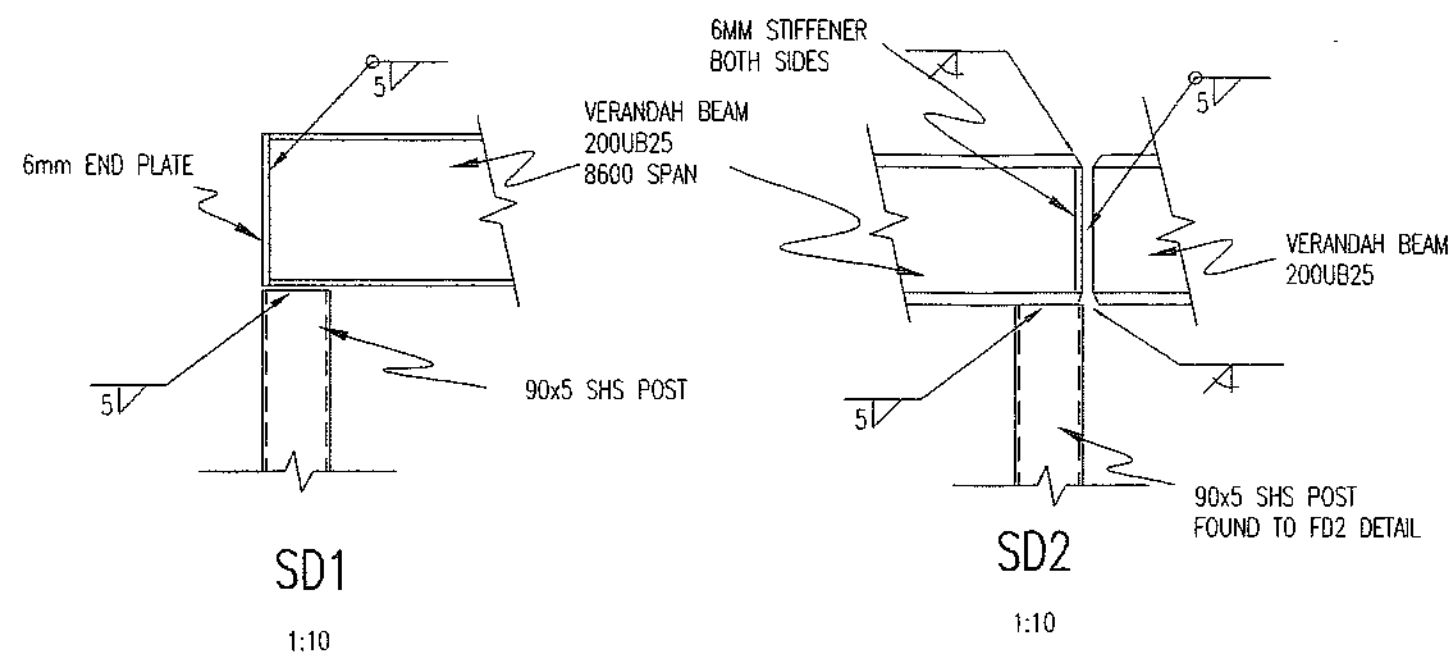
CARGILL DWELLING
AND IMPLEMENT SHED
104 RAUKAWA ROAD
PEKAPEKA

SCALE
AS SHOWN

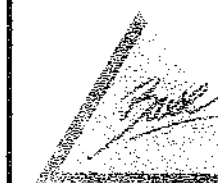
	NAME	DATE	DRAWING NUMBER
FIELDWORK	PB	06/07/10	10 091 SS2
DESIGNED	PB	16/07/10	
DRAWN	PB	21/07/10	
CHECKED	PB	26/07/10	

SHEET 2 OF 3 SHEETS

No.	AMENDMENT	NAME	DATE



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CARGILL DWELLING
AND IMPLEMENT SHED
104 RAUKAWA ROAD
PEKAPEKA

SCALE
AS SHOWN

	NAME	DATE	DRAWING NUMBER
FIELDWORK		06/07/10	10 091 SS3
DESIGNED	PB	16/07/10	
DRAWN	PB	21/07/10	
CHECKED	PB	26/07/10	
			SHEET 3 OF 3 SHEETS

Close

Print

Timberflame Compact (IBF, 2004) - Specification

[click to enlarge](#)

DESCRIPTION

Inbuilt radiant/convector, glass fronted, ceramic log space heater with forced convection and natural draft flue system which can be flued directly into a sealed chimney or fitted with a Rinnai approved flue system.

GAS TYPE - NG or LPG.

SUITABILITY

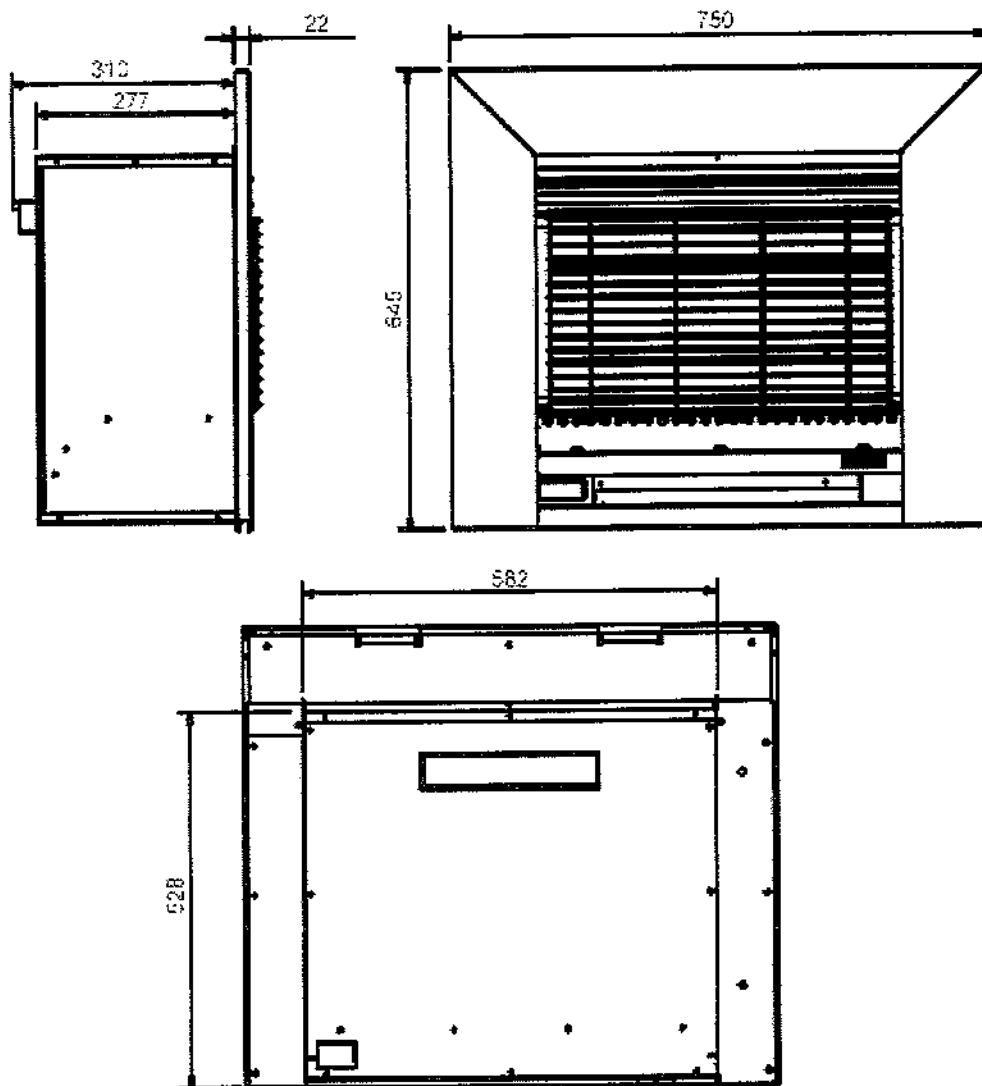
Domestic heating appliance. Ideal for living rooms and open plan areas.

SPECIFICATION SUMMARY

- Dimensions: H-645mm, W-750mm, D-277mm
- Input: 25MJ/hr
- Output: High-5.0kW, Low-1.6kW
- Efficiency: 73%

Burner	Ember bed and flame burner NG-0.92kPa (high), LPG-2.3kPa (high)		
Combustion System	Multiport burner (ceramic logs) with a naturally aspirated burner		
Data Plate	Bottom panel, front right hand side		
Fan Type	Tangential 2 speed, rating 28 Watts		
Flue	Type - conventional B vent flexible liner, sealed masonry fireplace Terminal - 43mm x 245mm rear discharge (spigot) Minimum vertical rise - before any bends, Rinnai recommend 1.2m or one length of flue		
Gas Control	Push button combination control valve		
Gas Connection	½" BSP male flare union		
Gas Input Rate	NG	LPG	
	Pilot/Front	7.7 MJ/hr	9 MJ/hr
	Medium	14.2 MJ/hr	15.8 MJ/hr
	High	25 MJ/hr	25 MJ/hr
Ignition System	Electronic spark		
Noise Level	45 dB(A)		
Power	80 W		

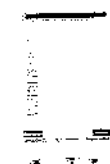
kg



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[Close](#)[Print](#)

Infinity XR24 Ext (REU-V2426WG) - Specification



click to enlarge

DESCRIPTION

Temperature controlled continuous flow gas hot water system for external domestic applications.

GAS TYPE - NG or LPG.

SUITABILITY - For homes with up to two bathrooms.

SPECIFICATION SUMMARY

- Colour: Euro White
- Dimensions: H-530mm, W-350mm, D-170mm
- Hot Water Capacity: 2.4 to 26 litres per min
- Nominal Water Capacity: 24 litres per min at 25°C rise (1440 L/h)
- Factory Preset Temperature: 55°C
- Input: 188 MJ/h or 52kW (max)
- Output: 42kW
- Efficiency: 81%

Connections	Gas supply	R $\frac{3}{4}$ 20A (right)
	Cold water inlet	R $\frac{3}{4}$ 20A (centre)
	Hot water outlet	R $\frac{3}{4}$ 20A (left)
Exhaust System	Forced flue	
Ignition System	Direct electronic ignition	
Injector Size	NG (mm)	1.00, 1.55
	LPG (mm)	0.70, 1.05
Line Pressure (Min)	NG 1.13kPa	LPG 2.75kPa
Line Pressure (Max)	3.5kPa (maximum standing pressure under abnormal intermittent conditions is 5.0kPa).	
	In the case of commercial metering (i.e. 35-37kPa coming in), there may be a requirement to regulate the incoming line pressure down.	

Table 7: Metal flashings – general dimensions

Paragraphs 4.6, 4.6.1.1 a), 4.6.1.2 b), 4.6.1.3 a), b), 4.6.1.4, 4.6.1.5 b), 4.6.1.7 a), b), 5.1 a), c), d), 6.4 c), 7.4.4, 8.3.8, 9.1.10.4, 9.1.10.5, 9.1.10.6 and 9.4.5.3 b) Figures 7, 9, 10, 36, 41-48, 54, 55, 61, 92, 97 and 101

Type	Description	All ⁽¹⁾	Situation 1 ⁽²⁾ minimum mm	Situation 2 ⁽²⁾ minimum mm	Figure reference (as example)
Aprons: general	Transverse flashing over roofing		130 ⁽⁴⁾	200 ⁽⁴⁾	Figure 7 (X values)
	Parallel flashing over roofing		Two crests, finish in next trough – Paragraph 4.6.1.1 b)		Figure 48 (Y values)
Ridges/ hips	Transverse flashing over roofing		Refer Aprons: general		Figure 46 (X values)
Changes in roof pitches	Upper lap under roofing	250 mm min.			Figure 44 (X values)
	Transverse flashing over roofing		Refer Aprons: general		
Barges	Overlap to barge board		50 ⁽⁵⁾	70 ⁽⁶⁾	Figure 47 (Z values)
Cappings	Overlaps to cladding		50 ⁽⁵⁾	70 ⁽⁶⁾	Figure 10 (Z values)
	Slope to top: parapet	5°			
Roof or deck to wall	Housing – balustrade ⁽⁷⁾	5°			
	Overlaps to roofing		Refer Aprons: general		Figure 7 (X or Y values)
Windows	Lap under cladding above	75 mm min.			
	Clearance below cladding	35 mm min.			
	Total upstand	110 mm min.			
	Window flange clearance for direct fixed claddings	5 mm			Figure 81
Sills	Cover to window flange	10 mm ⁽⁸⁾			
	Sill flashing slope ⁽³⁾	5°			
Heads	Head flashing slope	15°			
	Lap under cladding above	35 mm min.			
	Anti-capillary gap to cladding	5 mm			
	Total upstand	40 mm min.			
Corners	Corner flashings ⁽¹⁾	50 mm x 50 mm minimum			Figure 79
Inter-storey junctions	Junction flashing: slope	15°			Figure 70
	Lap over cladding below ⁽¹⁾	35 mm min. ⁽²⁾			
	Lap under cladding above	35 mm min.			
	Clearance under cladding	5 mm			
NOTES:	Total upstand	40 mm min.			
	(1) Unless otherwise dimensioned in details.				
	(2) Situation 1: In low, medium or high wind zones, where roof pitch is 10° or greater (X or Z values).				
	(3) Situation 2: For all roof pitches in very high wind zones.				
	For all wind zones where roof pitch is less than 10° (X or Z values).				
	(4) Excluding any soft edge or turn-down to roofing.				
	(5) For buildings other than housing, slope shall be as per F4/AS1.				
	(6) Where applicable, unless shown otherwise in details – for windows requiring sill flashings.				
	Sill flashings must extend past the condensation channel.				
	(7) Excluding drip edge. The aim is for at least 10 mm, but this may be reduced if necessary to account for on-site tolerances – to give an absolute minimum of 8 mm.				
	(8) Excluding drip edge.				

Amend 2
Jul 2005

Amend 2
Jul 2005

8.5 Membrane Roofs and Decks

8.5.1 Limitations

This Acceptable Solution is limited to *membranes* composed of butyl or *EPDM* installed over plywood substrates for:

- a) Roofs with a minimum fall of 1.5° (1:40),
- b) *Decks* with:
 - i) a minimum fall of 1° (1:60),
 - ii) a maximum area of 40 m²,
 - iii) no steps in level within *deck* area except into gutters,
 - iv) no integral roof gardens, and
 - v) no downpipe direct discharge to *deck*,

Amend 2
Jul 2005

COMMENT:

Discharging gutters directly onto *decks* increases the chances of water entry into sensitive areas.

Direct discharge may be allowed into gutters calculated to have sufficient water-carrying capacity, but this is outside the scope of this Acceptable Solution.

- c) Internal gutters with a minimum fall of 1 in 100, with no seams in the gutters closer than 1 m to an outlet, and

COMMENT:

Seams should be avoided in gutters where possible. Where they cannot be avoided they should be positioned at a high point or a change in plane to reduce the risks of ponding on the seam. Seams in gutters are particularly difficult to form at outlets through *enclosed balustrade* walls, and the risk of failure is high. Failure of a seam can result in damage to underlying walls.

- d) *Decks* with removable raised surfaces to give level access as shown in Figure 17A.

The application of directly-applied wearing or decorative surfaces to *membranes* is not covered in this Acceptable Solution.

COMMENT:

EPDM and butyl rubber *membranes* are subject to damage when on trafficable roof-decks. A suitable wearing surface will help reduce such damage.

8.5.2 General

Amend 2
Jul 2005

COMMENT:

It is recommended that installation of membrane *cladding* be by trained installers, approved by the manufacturer or the NZ agent (in the case of imported membrane).

Amend 2
Jul 2005

8.5.3 Plywood substrates

Plywood shall be:

- a) A minimum of 17 mm complying with AS/NZS 2269,
- b) At least CD Grade Structural plywood with the sanded C face upwards, and
- c) H3 with treatment type compatible with *membrane* and adhesives used, and kiln dried after treatment.

Amend 2
Jul 2005

COMMENT:

The compatibility of LOSP-treated plywood must be checked with *membrane* suppliers.

If using plywood containing copper-based preservatives, check the compatibility of adhesives and *membranes* with copper with the product manufacturers.

8.5.4 Butyl and EPDM

Butyl rubber and *EPDM* rubber used for *membrane* roofing or *decks* shall:

- a) Be a minimum thickness of:
 - i) 1 mm for roofing, or
 - ii) 1.5 mm for decks, and
- b) Comply with the following parts of Table 1 in ASTM D6134:
 - i) tensile strength,
 - ii) elongation,
 - iii) water absorption,
 - iv) water vapour permeance, and
 - v) heat aging followed by:
 - a. tensile strength
 - b. elongation, and
- c) Have adhesives, primers and seam tapes that:
 - i) comply with BRANZ EM 5, and
 - ii) are part of a complete system approved by the manufacturer or supplier of the *membrane*.

Amend 2
Jul 2005

8.5.5 Installation

8.5.5.1 Plywood

Substrates must be dry when *membranes* are applied. The plywood and the timber substructure shall have a maximum moisture content of 20% when a *membrane* is adhered.

COMMENT:

This will generally require substrates to be covered to prevent rain wetting, or to be pre-primed to avoid moisture uptake.

Manufacturers' recommendations should be consulted, as some require a lower moisture content in order to validate guarantees.

Plywood substrates shall be fixed according to the following requirements:

- a) Panels shall be laid with staggered joints (brick bond),
- b) The edge of sheets shall be supported with *dwangs* or *framing*, unless a structurally tested tongue-in-groove edge provides equivalent support,
- c) The maximum span shall be 400 mm,
- d) Plywood shall be laid with the face grain at right angles to the supports,
- e) A 20 mm triangular fillet shall be used at the base of any 90° upstand,
- f) External edges shall be chamfered with a minimum radius of 5 mm, and
- g) Plywood shall be fixed:
 - i) with 10 g x 50 mm stainless steel countersunk head screws,
 - ii) with 3 mm gaps between all sheets,
 - iii) at 150 mm centres on edges, and
 - iv) 200 mm in the body of the sheets.

Amend 2
Jul 2005

COMMENT:

Closed-in construction spaces under *membrane* roofs and *decks* shall have adequate ventilation to prevent the accumulation of moisture under the *membrane*. There should be a minimum gap of 20 mm between the underside of the substrate and any insulation.

For roof or *deck* areas over 40 m², roof vents will be required. Roof vents are not covered by this Acceptable Solution.

8.5.5.2 Butyl and EPDM

Seam tapes shall be used on all joints of:

- a) Roofs or *decks* with falls less than 5° (1:12),
- b) Gutters or where water could pond,
- c) Penetrations through the *membrane* where butyl or EPDM *flashing* is required,
- d) EPDM *membrane*, and
- e) Butyl *membranes* that contain EPDM.

COMMENT:

Coloured butyl *membranes* contain EPDM, which makes them more difficult to adhere properly.

Seams should be aligned parallel to the fall of the *deck* to minimise ponding. The use of joints in butyl or EPDM should be avoided in gutters. Where this is not possible, the plywood should be rebated to minimise the effect of the seam.

Where a penetration is made through the *membrane* subsequent to laying, the *fleshing* should be installed by the applicator of the *membrane* system.

All joints in the plywood and junctions of plywood with other materials shall have 25 mm polyethylene release tape applied before application of the *membrane*.

8.5.6 Roof and deck drainage

Roofs and *decks* shall be constructed to provide falls as shown in Figure 56.

Roofs and *decks* shall be constructed so that:

- a) The highest point of the roof or *deck* is a minimum of 100 mm below an adjoining floor as shown in Figure 62,
- b) *Membrane* upstands extend to a minimum level of 50 mm above the floor level at all walls or *parapets* as shown in Figure 62,

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COMMENT:

This will lead to a minimum total *membrane* upstand of 150 mm which, if the clearance of the *cladding* from the *deck* or roof surface is at the minimum of 35 mm, gives an overlap of 115 mm.

- c) Water discharges either:
 - i) directly into roof outlets with a minimum diameter of 75 mm as shown in Figure 64, or
 - ii) via *scupper* openings, into a rainwater head, or a gutter with a minimum width of 300 mm as shown in Figure 63,
- d) Where the discharge is through a *parapet* or *enclosed balustrade*, the *scupper* opening shall have a minimum clear opening of 200 mm wide and 75 mm high, with a lip as shown in Figure 63,
- e) External corner upstands in the *membrane* around the *scupper* opening are formed as shown in Figure 57, and

COMMENT:

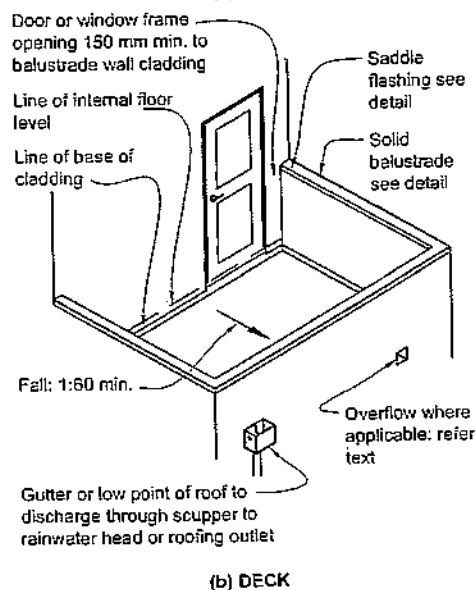
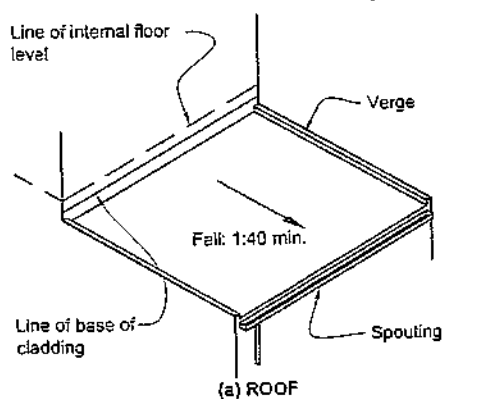
Refer to E1/AS1 for specific drainage requirements, as minimum sizes for outlets and gutters may be higher than shown in this Acceptable Solution.

- f) When an internal outlet is used, allowance for additional run-off shall be provided by:
- an overflow in addition to the outlet, or
 - an extra outlet, with both outlets sized to take the full required capacity.

When an overflow is provided in addition to the outlet, a lip to the overflow shall be formed as shown in Figure 63.

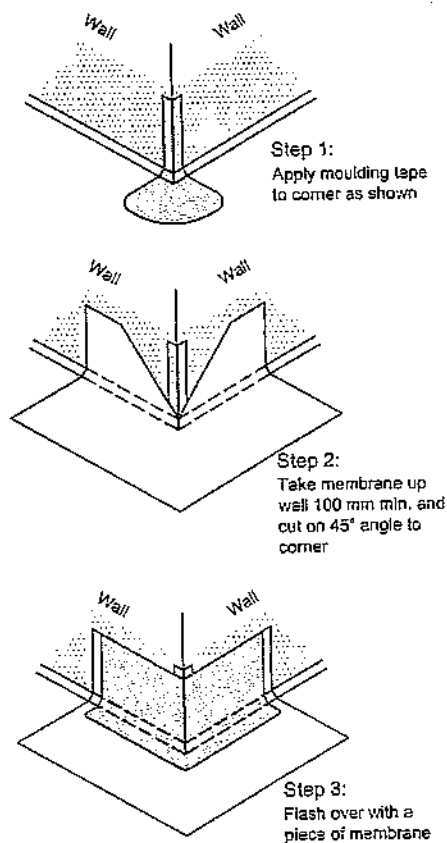
Figure 56: Falls in membrane roofs and decks
Paragraphs 8.5.6 and 8.5.6 a)

NOTE: (1) Refer Figure 62 for thresholds and clearances.
(2) Junction saddle flashing – refer Figure 13.



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Figure 57: External corner in upstand
Paragraphs 8.5.6 a) and 8.5.8 a)
Figures 59 and 63



8.5.7 Control joints

All *control joints* in the substrate shall be accommodated in the *membrane* roof design.

The design of *control joints* for *membrane* roofing is subject to *specific design* and is outside the scope of this Acceptable Solution.

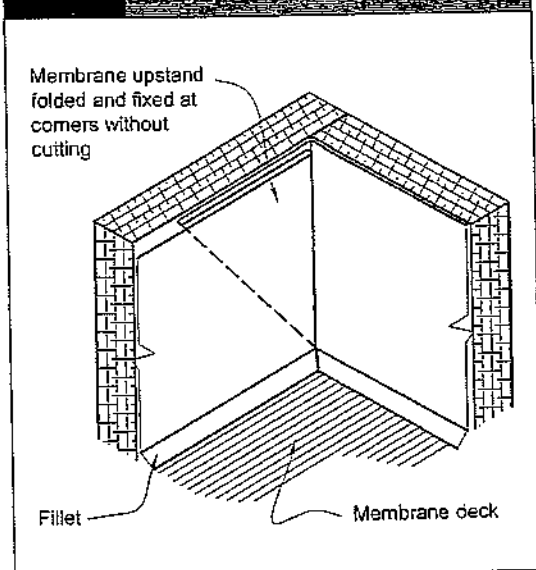
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8.5.8 Junctions

All junctions of roof or deck to walls, *parapets* and *enclosed balustrades* shall be made *weathertight* using the following appropriate details:

- Figure 57: External corner in upstands,
- Figure 58: Internal corner in upstands,
- Figure 61: Verges and eaves,

Figure 58: Internal corner in upstand
Paragraph 8.5.8.b) Figure 62



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- d) Figure 62: Junctions of *decks* and walls, and
e) Figure 63: *Scupper* discharge from a roof to a rainwater head and the weatherproofing of the opening.

8.5.8.1 Junctions with walls

Junctions of *membrane decks* or walls shall be formed as shown in Figure 62.

Clearances in Figure 62 are shown to the *membrane surface*. Where there is an additional material applied over the *membrane*, all required clearances shall apply to the highest level of the upper wearing surface, where this is also the draining surface.

The bottom of the wall *cladding* above the *deck* or roof surface shall be sealed prior to fixing.

COMMENT:

Adding wearing surfaces such as tiles over the *membrane* will effectively reduce clearances, and should be allowed for when setting *membrane* levels.

8.5.9 Penetrations

Penetrations through *membrane* roofs and *decks* shall be as shown in Figure 59 and Figure 60.

Figure 59: Roofing penetration in membrane
Paragraphs 8.5.8 and 8.5.9

NOTE: (1) For maximum penetration size of 1200 mm x 1200 mm.

(2) External corners to be formed as shown in Figure 57.

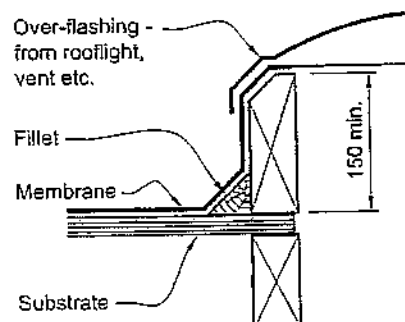


Figure 60: Pipe penetration in membrane
Paragraph 8.5.9

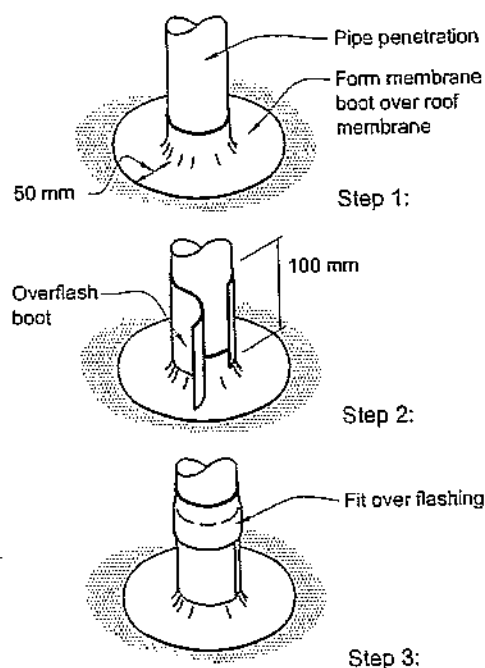
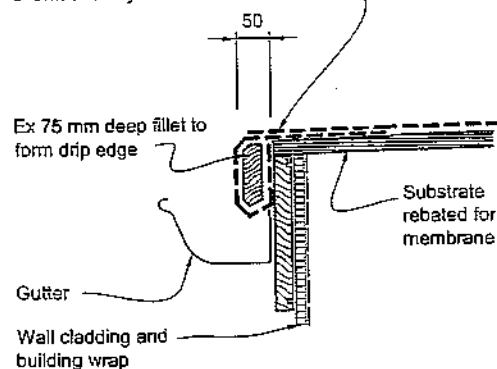


Figure 61: Verges in membrane
Paragraph 8.5.8(c)

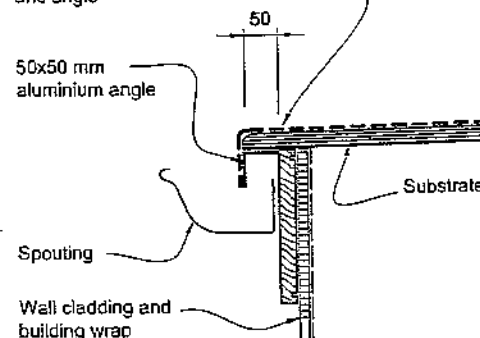
NOTE: Z = variable according to wind zone – refer Table 7.

Membrane fixed under timber fillet and then folded round and overflashed by roof membrane

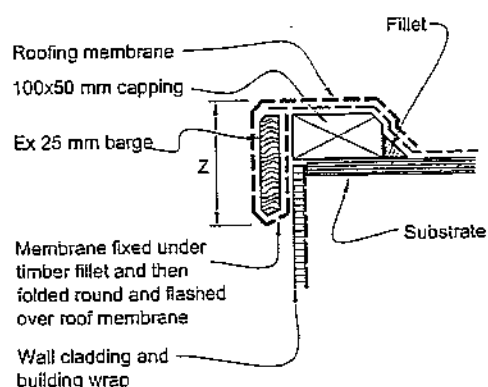


(a) EAVE

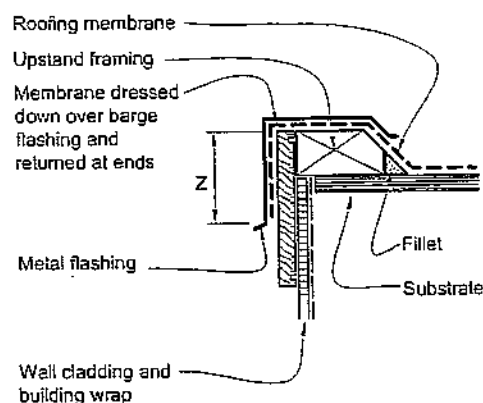
Membrane dressed over substrate and angle



(c) EAVE



(b) VERGE



(d) VERGE

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8.5.9.1 Handrails

Fixing of posts for *handrails* into *membrane* roofs or *decks* is not covered by this Acceptable Solution.

COMMENT:

Any fixing of posts into *membrane* roofs or *decks* will require *specific design*.

The fixing of posts into tiles over a *membrane* is particularly risky, and should be avoided.

8.5.10 Gutters

Deck gutters and internal outlets shall be *constructed* as shown in Figure 64.

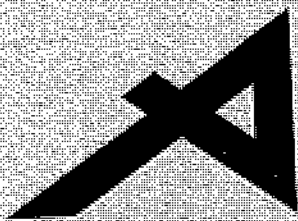
COMMENT:

Internal outlets should have a dome-type cover to reduce risk of blockage, except where this could constitute a pedestrian hazard.

When an overflow is provided for roofs or *enclosed decks* as per Paragraph 8.5.6 f) i), the overflow shall have a cross-sectional area equal to 1.5 times the cross-sectional area of the calculated discharge downpipe.

Any plywood adjacent to *deck* gutters shall be treated to H3.1, and protected from water splash.

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BRANZ Appraised
Appraisal No. 436 [2005]

BRANZ Appraisals
Technical Assessments of products
for building and construction

BRANZ
APPRAISAL
CERTIFICATE
No. 436 (2005)

BUTYNOL®
ROOFING
MEMBRANE

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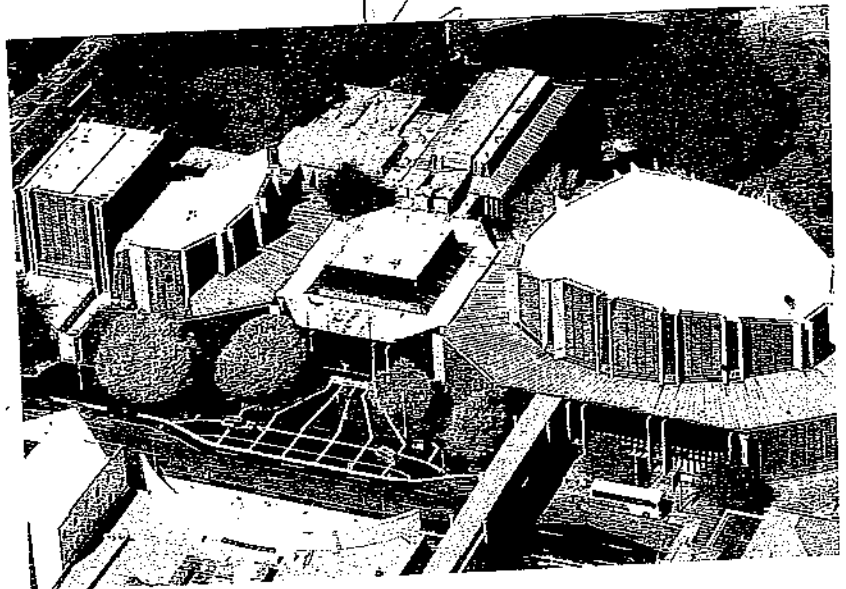
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00005

1.1 Butynol® Roofing Membrane is a synthetic rubber waterproofing membrane designed to be used on roofs and decks.

1.2 The product is supplied as single-ply, flexible synthetic rubber sheet in roll form. The product is installed as a single layer system.



Current View of Christchurch Town Hall.
1 mm Butynol® Roof Membrane laid 1972.

2.1 Butynol® Roofing Membrane has been appraised for use as waterproof membrane for buildings within the following scope:

- scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- with timber supporting structures designed and constructed in accordance with NZBC; and,
- with nominally flat or pitched roofs constructed to drain water to gutters and outlets complying with NZBC; and,
- with substrates of plywood sheet; and,
- with decks that have a maximum size of 40m².

2.2 Butynol® Roofing Membrane has also been appraised for use as waterproof membrane for external reinforced concrete and plywood roofs, pedestrian decks balconies for buildings within the following scope:

- up to 3 storeys with a maximum height from ground to eaves of 10m and with a plan area limited only by seismic and structural control joints; and,
- with the reinforced concrete structure designed and constructed in accordance with NZBC; and,
- with timber supporting structures designed and constructed in accordance with NZBC; and,
- with nominally flat, curved or pitched roofs constructed to drain water to gutters drain outlets complying with NZBC.

2.3 This Appraisal is limited to roofs, decks and balconies within the following scope:

- constructed to suitable falls (Refer Paragraph 13.1 – 13.9); and,
- with no steps within the deck level, no integral roof gardens and no down discharging directly onto the deck.

2.4 The design and construction of the substrate and movement and control is specific to each building, and therefore the responsibility of the building designer building contractor and is outside the scope of this Certificate.

2.5 The membrane must be installed by Ardex NZ Ltd approved applicators.

New Zealand Building Code (NZBC)

1.1 In the opinion of BRANZ, Butynol® Roof Membrane, if assigned, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years. Butynol® Roof Membrane meets this requirement. See Paragraph 9.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and 2.3.2. Roofs, Decks and balconies incorporating Butynol® Roof Membrane meets these requirements. See Paragraphs 2.1 – 12.9.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Butynol® Roof Membrane meets this requirement and will not present a health hazard to people.

1.2 This Certificate appraises an Acceptable Solution in terms of New Zealand Building Code compliance and the product complies with NZBC Acceptable Solution E2/AS1 Paragraph 3.5. This product is also appraised as an Alternative Solution as outlined in Paragraph 2.2

4.1 Materials supplied by Ardex NZ Ltd are as follows:

Butynol® Membranes

- All membranes are single-ply, flexible synthetic rubber membranes. They are supplied in rolls nominally 1.4 metres wide by 17.9 metres long. Each roll is packed in polythene wrapper trademarked 'Butynol®' with thickness identified. Gauges available are 1.0, 1.5 and 2.25mm in black and 1.5mm in six colours.

Adhesive WA98

- A specially formulated solvent-based adhesive for all Butynol® applications. Supplied in 1, 4 and 20 litre containers.

Seam Primer

- A water resistant primer adhesive, used with seam tape for general lap bonding.

Seam Tape

- Uncured cold gum tape used for general lap bonding and laps likely to be subject to periodic ponding. Supplied in 50mm x 30.5 metre rolls.

Flashing Tape

- A malleable tape for moulding gussets, pipe flashings and awkward situations. Supplied in widths of 50-100mm x 5 metres long.

Butynol Sealant

- A specially designed and formulated sealant for sealing Butynol® flashings into chases. Supplied in 375mm tubes.

Handling and Storage

5.1 Handling and storage of all materials whether on or off site is under the control of the Ardex NZ Ltd trained installers. Dry storage must be provided for all products and the rolls of membrane must be stored in an upright position.

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

General

7.1 Butynol® Roofing Membrane is for use on roofs, decks and balconies where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.

7.2 The 1.0mm thickness product is designed for use on roofs and gutters, and will accommodate light traffic; the 1.5mm is for walk out decks and high maintenance areas; and the 2.25mm is a heavy duty product that is custom made on request.

7.3 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membrane. Refer to BRANZ publication "Good Practice Guide to Membrane Roofing".

7.4 Timber framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of NZS 4203. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and that all sheet edges are fully supported.

Building to NZBC Acceptable Solution E2/AS1

7.5 NZBC Acceptable Solution E2/AS1 limits the size of decks to 40 m² as covered by the scope of this Appraisal. Butynol® Roofing Membrane is suitable for use on decks larger than 40 m². These decks are the subject of specific design and are outside the scope of this Appraisal.

Substrates

Plywood

8.1 Plywood must be treated to H3 (CCA treated). LOSP treated plywood must not be used. Plywood must comply with NZBC Acceptable Solution E2/AS1 Paragraph 8.5.3 and 8.5.5. Where specific design is used (i.e. outside the scope of E2/AS1), the plywood thickness and fixing size may increase and centres may decrease to meet specific wind loadings.

Concrete

8.2 Concrete substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101.

Durability

Serviceable Life

9.1 Butynol® Roofing Membrane when subjected to normal conditions of environment and with proper maintenance can expect to have a serviceable life of at least 20 years.

Maintenance

- 10.1 No maintenance of the membrane is normally required provided significant substrate movement does not occur.
- 10.2 In the event of damage to the membrane, the membrane must be repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively.

Outbreak of Fire

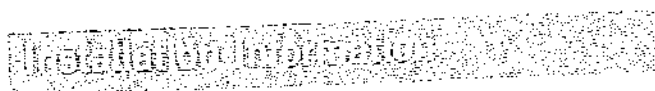
- 11.1 The membrane must be protected from heat sources such as flues and chimneys in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

External Moisture

- 12.1 Roofs, decks and balconies must be designed and constructed to shed precipitated moisture. They must also take account of snowfalls in snow prone areas. A means of meeting code compliance with NZBC Clause E2.3.1 is given by the Technical Literature which matches details in NZBC Acceptable Solution E2/AS1.
- 12.2 When installed in accordance with this Certificate and the Technical Literature, Butynol® Roofing Membrane will prevent the penetration of water and will therefore meet code compliance with Clause E2.3.2. The membrane is impervious to water and will give a weathertight roof, roof deck or balcony.
- 12.3 The minimum fall to roofs is 1 in 40 and to decks, balconies and gutters are 1 in 60. All falls must slope to an outlet. Inadequate falls will allow moisture to collect and increase the risk of deterioration of the membrane.
- 12.4 Butynol® Roofing Membrane is impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with Clause E2.3.6.
- 12.5 Roof, deck and balcony falls must be built into the substrate and not created with mortar screeds applied over the membrane.
- 12.6 Allowance for deflection and settlement of the substrate must be made in the design of the deck or balcony to ensure falls are maintained and no ponding of water can occur.
- 12.7 Drainage flanges must be used for any outlet and must be fitted with a grate or cage to reduce potential sources of blockages. An overflow must be provided where the deck or balcony does not drain to an external gutter or spouting.
- 12.8 Penetrations and upstands of the membrane must be raised above the level of any possible flooding caused by blockage of deck and balcony drainage.
- 12.9 The design of details not covered by the Technical Literature is subject to specific weathertightness design and is outside the scope of this certificate.

Water Supplies

- 13.1 Butynol® Roofing Membrane is suitable for roofs used for the collection of water supplies in compliance with the provisions of NZBC G12.3.1. Water collection systems are the subject of specific design and are outside the scope of this Certificate.



Installation Skill Level Requirement

- 14.1 Installation of the membrane must be completed by trained applicators, approved by Ardex NZ Ltd.

- 14.2 Installation of substrates must be completed by tradespersons with an understanding of roof, deck and balcony construction, in accordance with instructions given within the Ardex NZ Ltd Technical Literature and this Certificate.

Preparation of Substrates

- 15.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents. All surface defects must be filled to achieve an even and uniform surface.
- 15.2 Concrete substrates can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 424. The relative humidity of the concrete must be 75% or less before membrane application.
- 15.3 The moisture content of a timber substructure must be a maximum of 20% and plywood sheet must be dry at time of membrane application. This will generally require plywood sheets to be covered until just before the membrane is laid, to prevent rain wetting.
- 15.4 Substrates must be primed with a 50/50 solution of WA98 and adhesive solvent and left to dry before membrane is installed.

Membrane Installation

- 16.1 The membrane must be installed in accordance with the Technical Literature.
- 16.2 Plywood joints must be taped with 25mm wide PV pressure sensitive tape.
- 16.3 The membrane must be unrolled without tension on the prepared substrate and allowed to 'relax' for at least 2 minutes prior to installation.
- 16.4 Adhesive must be applied to both the membrane and the substrate, one half at a time. When the adhesive is tack dry, the sheet is rolled onto the substrate. The process is then repeated for the other half of the sheet. Joints in substrate with a pitch of 5° or less, all coloured membranes irrespective of pitch, all guttering and areas subjected to periodic ponding require lap bonding using Ardex seam tape. Joints in substrate with a pitch above 5° can be sealed using WA98 adhesive. This applies to the black Butynol® only.

Inspections

- 17.1 The Technical Literature must be referred to during the inspection of membrane installations by Building Consent Authorities and Territorial Authorities.
- 17.2 Critical areas of inspection for waterproofing system are:
- Construction of substrates, including crack control and installation of bond breakers and movement control joints
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the manufacturer's instructions.

Health and Safety

- 18.1 Safe use and handling procedures for the membrane system is provided in the Technical Literature. The products must be used in conjunction with the relevant Materials Safety Data Sheet for each membrane.

following is a summary of the technical investigations carried out:

sts

- 1 Tests have been carried out on the membrane by Materials and Quality Consultancy. This testing covered specific gravity, shore hardness, tensile strength, modulus of elongation, elongation at break, tensile and elongation retention after heat aging, tear strength, ozone resistance and water absorption as detailed in NZBC Acceptable Solution /AS1 Paragraph 8.5.4(b). Results and test methods have been reviewed by BRANZ and found to be satisfactory.
- 2 Water vapour permeability tests have been undertaken by BRANZ in accordance with ASTM E96.
- 3 Tests have been carried out on the membrane to assess its suitability for use with potable water supplies. This testing showed the product was satisfactory.
- 4 The adhesives, primers and seam tapes used with Butynol[®] Roofing Membrane met the intended performance requirements of NZBC Acceptable Solution E2/AS1 Paragraph 8.5.4(c). *Note: At the time of this Certificate's issue BRANZ EM5 as outlined Paragraph 8.5.4(c)(i) was not published.*

ther Investigations

- 1 An assessment was made of the durability of the Butynol[®] Roofing Membrane by BRANZ technical experts using NZBC B2/VM1 History of Use.
- 2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

quality

- 1.1 The manufacture of the Butynol[®] Roofing membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. The membrane manufacturer is the subject of AS/NZS ISO 9001 Certificate by Telarc Limited, Registration No. 621.
- 1.2 The quality of manufacture of the product is the responsibility of Ardex NZ Ltd.
- 1.4 The quality of supply of the product to the market is the responsibility of Ardex NZ Ltd.
- 1.5 Quality on site is the responsibility of the Ardex NZ Ltd approved applicators.
- 1.6 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Ardex NZ Ltd and this Certificate.

Sources of Information

- AS/NZS 2269:1994 Plywood – Structural
- ASTM E 96-02 Water vapour transmission of materials in sheet form, American Society of Testing Materials, Philadelphia, 1992.
- NZS 3101: 1995 The design of concrete structures.
- NZS 3604: 1999 Timber framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.
- Membrane Roofing Good Practice Guide, BRANZ, November 1999



In the opinion of BRANZ, Butynol[®] Roofing Membrane is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate. The Appraisal Certificate is issued only to the Certificate Holder, Ardex NZ Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - 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. The Certificate Holder:
 - 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 Appraisal Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation 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 the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P. Robertson
Chief Executive

Date of issue: 11 July 2005

4311M METALCRAFT PROFILED ROOFING – T-Rib

The following branded section has been prepared by Construction Information Ltd (Masterspec) in conjunction with the product manufacturer. The downloading and/or use of this section are subject to the following terms and conditions:

- Users of this section shall rely solely on their professional judgment and skill in determining the appropriateness of using or referring to this section and to satisfy themselves as to the accuracy of the data it contains.
- Users acknowledge that neither Construction Information Limited nor the manufacturer of the products and systems described in the text are in any way liable in respect of any particular use or application of the material provided.

Masterspec sections must be customised to suit the project being specified, by removing irrelevant information and adding project-specific information and selections.

1. GENERAL

This section relates to the supply and fixing of Metalcraft profiled roofing complete with accessories.

Modify or extend the above description to suit the project being specified.

Related work

1.1 RELATED SECTIONS

Refer to ~ for ~.

Include cross references to other sections where these contain related work.

This section does not include for rainwater gutters, spoutings and pipework. Some flashing work is also often covered elsewhere.

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

AS/NZS 1170.2 Structural design actions - Wind actions

AS 3566 Self-drilling screws for the building and construction industries

NZS 3604 Timber framed buildings

NZMRM NZ Metal roof and wall cladding - Code of practice

Documents listed above and cited in the clauses that follow are part of this specification.

However, this specification takes precedence in the event of it being at variance with the cited document.

Delete from the DOCUMENTS clause any document not cited. List any additional cited documents.

RELATED DOCUMENTS

Refer to the following related documents when preparing this section:

NZBC E2/AS1 External moisture, 8.0 Roof claddings

AS 1397 Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
AS/NZS 2728 Prefinished/pre-painted sheet metal products for interior/exterior
building applications - performance requirements
NZS 3403 Hot-dip galvanized corrugated steel sheet for building purposes
BS EN 2070 Aluminium and aluminium alloy wrought products. Technical
specification. Sheet, strip formed profiles and plate.

BRANZ BU 488 Coil-coated metal claddings
BRANZ BU 318 Care of coil-coated metal claddings
BRANZ BU 358 Crest fixing of profiled metal roofing
BRANZ BU 393 Powder-actuated and mechanically powered fasteners
BRANZ BU 408 Roofs on exposed sites
BRANZ BU 465 Domestic flashing installation
BRANZ BU 466 Timber-frame parapets, balustrades and columns
BRANZ BU 467 Principles of flashing design
BRANZ publication Selecting roof claddings

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are available on the website or by contacting Metalcraft Industries Ltd.

For technical assistance contact Metalcraft Roofing
Web: www.metalcraftroofing.co.nz

Metalcraft area office details are available through the website.

1.4 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:
BMT Base metal thickness NZMRM New Zealand Metal Roofing Manufacturers Inc

Refer general section INTERPRETATION & DEFINITIONS for abbreviations used throughout the specification.

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.6 QUALIFICATIONS

Roofers are to be Metalcraft Approved Installers, or experienced, competent roofers familiar with Metalcraft products.

1.7 MAINTENANCE INSTRUCTIONS

Provide one bound copy of all relevant Metalcraft Roofing maintenance information on completion of the roofing work.

Warranties

1.8 MANUFACTURER'S WARRANTY

Warrant this work under normal environmental and use conditions against:
15 years Failure of coating adhesion (manufacturer's standard warranty)
15 years Weatherproofing failure caused by material penetration as a result of

corrosion (manufacturer's standard warranty)
5 years Weatherproofing failure caused by substandard workmanship

From: Date of completion of installation

Refer to the general section WARRANTIES for additional requirements.

*Check with Metalcraft for the appropriate warranty terms and conditions.
Check general section WARRANTIES for the date of commencement of warranties;
which is normally practical completion of the contract. Refer to the chosen conditions
of contract as it may also contain information on warranties and guarantees.*

Performance

Note that in using the next clause you are setting a standard of performance for the contractor to meet. Specifiers should therefore consider adding some means of confirming (say by testing or certification) that the performance criteria will be or have been met. Specification of a Metalcraft Approved Installer in QUALIFICATIONS will ensure that performance criteria are met.

1.9 FIXINGS, WIND

Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604, or by wind loads given by AS/NZS 1170 Part 2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply. Confirm with Metalcraft the fastener type and fixing pattern for the load capacity required.

Modify this clause depending on whether NZS 3604, or AS/NZS 1170.2 are being used as a design basis for the project.

Confirm with Metalcraft the fastener type and location to achieve the load capacity required.

1.10 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof.

1.11 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets.

Refer to later EXECUTION clause on co-operating with others on the installation of elements which penetrate or adjoin the roofing system; including walls and parapets, skylights, sundry elements fixed through the roofing surface, service pipework, etc.

2. PRODUCTS

Select the product that suits the brief and use the PRODUCTS and EXECUTION clauses that follow to suit the product selected.

Materials - General

2.1 WIRE NETTING

Refer to WRAPS, UNDERLAYS AND DPC for wire mesh.

2.2 SAFETY MESH

Refer to WRAPS, UNDERLAYS AND DPC for safety mesh.

Consult Metalcraft for advice on when safety mesh is required. Can be supplied plastic covered. Delete this clause if safety mesh is not required.

2.3 UNDERLAY

Refer to WRAPS, UNDERLAYS AND DPC for underlays.

2.4 METALCRAFT ROOFING

Refer to SELECTIONS for type.

2.5 TRANSLUCENT ROOFING

Topglass® Ice Clear White Tint, Opalescent and Opaque UV Smart reinforced Polyester roof sheeting as manufactured by Alsynite NZ Ltd to comply with AS/NZS 4256.3 JASANZ Certification Licence No 2349.

The sheeting to be manufactured to conform to the nominated roofing and cladding profile.

2.6 FLASHINGS GENERALLY

Formable grade 0.55 mm BMT for galvanized, Zinalume® and pre-coated steel, and 0.90 mm BMT for aluminium to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

Revise the clause wording to suit the specified roofing. Soft Edge Aluminium is recommended as suitable for corrugated profile only; Flashguard can be used on all profiles below 33 mm.

2.7 FLASHINGS TO VERGE, RIDGE AND HIP

Supplied by Metalcraft to match or to suit the roofing.

Grade G300 steel is used for flashings and cappings. If specifying Zinalume® sheet use only compatible materials for soft edgings - soft pure aluminium, 0.45 mm thick, or Flashguard.

Components

2.8 FASTENERS GENERALLY

Minimum Class 4 durability and not less than the roofing material being fixed. Screw fasteners to be head stamped identifying the manufacturer and class.

2.9 FIXING SCREWS

To AS 3566. Screws appropriate to the roofing material and the supporting structure, and wind load as required by Metalcraft, and with a durability not less than the material fixed.

Length of fixing will depend on the height of the selected profile. Number of fasteners and use of washers will depend on the wind loads. Check Metalcraft requirements.

Where thermal movement might exceed 10 mm prepare a separate clause specifying profiled washers and oversized holes as required by Metalcraft and consider detailing a step in the roofing (check details with Metalcraft).

2.10 RIVETS

Sealed aluminium, minimum diameter 4.8 mm.
Refer to Metalcraft requirements.

Accessories

2.11 SEALANT

Neutral curing silicone or polymer sealant as required by Metalcraft and used as directed.

2.12 CLOSURE STRIPS

Polyurethane profiled closed cell foam strips to fit the sheet profile.

Brand: Ecofoam

Profile: T-Rib

3. EXECUTION

Conditions

3.1 INSPECTION

Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could damage the roofing.

3.2 STORAGE

Take delivery of and accept packs of roofing dry and undamaged on delivery. Reject all damaged material. Store on a level firm base clear of the ground, with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

3.3 HANDLING

Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other or other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

3.4 SEPARATION

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials. Do not use unpainted lead sheet in contact with or allow water run-off onto galvanized steel or Zinalume®.

Application

The following execution clauses are written specifically to suit profiled, pre-coated galvanized steel, or Zincalume®.

3.5 SET-OUT & LAYING

Carefully set out to allow cover flashings of equal width at the ends of the building. Lay sheets with side laps away from the prevailing wind ensuring ends of sheets are true to line. Check during fixing to eliminate creep or spread and use string lines along purlin centres to keep fastenings in line.

3.6 FORMING

Form stop-ends and downturns to Metalcraft recommendations.

3.7 END LAPS

End laps are not recommended, except where specifically detailed to Metalcraft requirements.

If end laps cannot be avoided, check detail with Metalcraft.

3.8 THERMAL MOVEMENT

Roof fixing and jointing to conform to Metalcraft requirements for thermal movement.

3.9 FIXING GENERALLY

Install and fix in accordance with the Metalcraft Roofing and Cladding Systems Manual and the NZMRM NZ Metal roof and wall cladding - Code of practice and to Metalcraft required fixing patterns and details for each area of the building roofing. Use only screws as required by Metalcraft. Paint colour matched fixings and accessories before installation.

Especially with residential work, nail fixing is still favoured by some installers. Check with Metalcraft before specifying.

3.10 FIX UNDERLAY, NETTING AND MESH

Refer to WRAPS, UNDERLAYS AND DPC for the installation of underlays, wire netting and safety mesh.

Modify to suit.

3.11 FIX INSULATION

Refer to INSULATION for the installation of thermal and acoustic insulation.

Modify to suit.

3.12 MARKING AND CUTTING

Cut only by shearing tools. Do not use black lead pencils for marking Zincalume®, Colorsteel® products.

3.13 FIX SHEETS

Fix sheets in place using the fastening system required by Metalcraft for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

3.14 FIX TRANSLUCENT ROOFING

Installation to be carried out in accordance with the requirements of AS/NZS 1562.3: 1994, NZ Roofing Code of Practice and Alsynite NZ Ltd Technical catalogue.

3.15 FLASH

Flash roof to parapets, walls and penetrations to detail in Metalcraft installation manual and to the NZMRM NZ Metal roof & wall cladding - Code of practice and Metalcraft requirements. Cut accurately and fix using sealant and rivets to detail and to Metalcraft requirements to form a weatherproof cover. Ensure flashings are designed and installed to avoid water ponding.

3.16 FIX RIDGES AND HIPS

Cut accurately and fix using primary fasteners to the purlins. Join using neutral curing silicone or polymer sealant and sealed rivets to detail and to the NZMRM NZ Metal roof and wall cladding - Code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.17 FIX VERGE AND CAP FLASHINGS

Cut accurately and fix using primary fasteners to the purlins. Join using neutral curing silicone or polymer sealant and sealed rivets to detail and to the NZMRM NZ Metal roof and wall cladding - Code of practice. Ensure flashings are designed and installed to avoid water ponding.

Add further description of associated flashings and overflashings to penetrations, parapets, roof-mounted equipment and similar installations, either here or in other sections, as appropriate to the project.

3.18 PENETRATIONS

Flash and overflash all penetrations through the roof.

Expand this very general clause to better describe the various types and forms of penetrations needing to be flashed.

3.19 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

Completion

3.20 REPLACE

Replace damaged or marked elements.

3.21 LEAVE

Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

3.22 REMOVE

Remove all trade rubbish, swarf and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

4. SELECTIONS

Select the product that suits the brief and use and EXECUTION clauses that follow to suit the product selected.

Materials - roofing products

There is also a range of finish choices offering different warranty levels. Select from the following finishes for steel depending on personal preference and environmental considerations based on AS/NZS 2728.

Unpainted galvanized steel (zinc coated steel, Z450) receives no warranty in any environment category.

Mild (ISO category 1-2) Moderate (ISO cat. 2) Marine (ISO cat. 3) Industrial (ISO cat. 3-4)

Unpainted Zinalume® (zinc/aluminium coated steel, AZ150)

Colorsteel® Endura™ (Zinalume® substrate)

Colorsteel® Maxx™ (Zinalume® substrate)

Severe marine (ISO category 4)

Colorsteel® Endura™ (Zinalume® substrate)

Colorsteel® Maxx™ (Zinalume® substrate)

Very severe (ISO category 5)

Colorsteel® Maxx™ (Zinalume® substrate)

Refer to Colorsteel® / colour chart.

Refer to Metalcraft installation manual for appropriate choice of profile and base material to suit the load/span requirements.

4.1 METALCRAFT ASYMMETRICAL RIB PROFILE ROOFING

Profile:	T-Rib
Base material:	Steel
BMT:	~ mm
Coating system:	~
Colour:	~

*T-Rib profile. Nominal rib height 29mm. Screw fixed through ribs.
BMT: 0.40 mm or 0.55 mm.*

Coating system: Zinalume®, Galvsteel™, Colorsteel® Endura™, Colorsteel® Maxx™

For moderate and marine environments choose either Colorsteel® Endura™, Colorsteel® Maxx™ or unpainted Zinalume.



ENDURA™ PRODUCT DESCRIPTION

The COLORSTEEL® ENDURA™ paint system consists of a ZINCALUME® steel substrate to which a pre-painted finish system is applied. The system is designed to provide protection against corrosion in areas where moderate to severe environmental conditions are experienced. COLORSTEEL® ENDURA™ product is suitable for a wide range of roll-formed roof and wall claddings, rainwater accessories and general

Copper or brass pipes must not be allowed to discharge onto COLORSTEEL® pre-painted steel products or be allowed to come into contact with them. The use of other materials in proximity to COLORSTEEL® pre-painted steel products must be in accordance with the New Zealand Steel Specifiers and Builders Guide. Mixing of brands of pre-painted material on the same building is not recommended by New Zealand Steel Limited.

The reaction between ZINCALUME® steel and lead flashings will degrade the ZINCALUME® steel material. Soft zinc or aluminium flashings should be used. Marking with lead pencils is not advised, and sealing washers should be low carbon non-conducting. Refer to the New Zealand Steel Installers Guide under the 'Marking, Cutting and Drilling' section.



APPEARANCE

COLORSTEEL® ENDURA™ products are available in a range of colours. The backer coat is AZ Backer.

IDENTIFICATION

COLORSTEEL® ENDURA™ product is identified by a brand applied to the reverse surface, indicating product type and date of manufacture.



INSTALLATION

Installation details for COLORSTEEL® ENDURA™ product are contained in the New Zealand Steel Installers Guide.

FIXINGS:

- Aluminium and factory painted fixings are acceptable.
- Stainless steel, Monel or other copper alloy fixings must not be used.
- Lead-head nails must not be used.
- Fixings that meet AS3566 class 3 and 4 are acceptable.

SEALING AND JOINING:

- Use only neutral-cure silicone rubber sealants.
- Do not use abrasive cutting wheels.
- Do not weld, braze or solder.

Touch up Paints should not be used, as air drying paints have different weathering characteristics to the COLORSTEEL® pre-painted steel coating.

Clean up - all debris (particularly from roofing installation) must be removed from COLORSTEEL® ENDURA™ product surfaces at the end of each day's work. Take care not to damage the coating when removing sharp fixing debris.

Gutter Protection - Any gutter protection or leaf guard system, (or any other product), that traps water between the roof and product surfaces, thus restricting the coated steel's ability to dry, is not recommended and will invalidate the roof warranty.

EXTERNAL MOISTURE

COLORSTEEL® ENDURA™ roof cladding must be installed at a minimum of 3° or over the minimum pitch given for the profile by the manufacturer, whichever is greater. Factors likely to affect the resistance of COLORSTEEL® ENDURA™ pre-painted steel to external moisture include the quality of the installation, the severity of the climate, roof configuration, material profile

and the design and execution of junctions between similar materials and other elements.

SPREAD OF FIRE

COLORSTEEL® ENDURA™ pre-painted steel comprises a combustible surface adhered to a noncombustible substrate. Used on roofs, it meets the requirements of NZBC C3/AS1 in all purpose groups. Refer to C3/AS1 Section 4.0 External Walls and Roofs which covers vertical and horizontal spread of fire.

HAZARDOUS BUILDING MATERIALS

The use of roofing and wall claddings manufactured from COLORSTEEL® ENDURA™ pre-painted steel in accordance with New Zealand Steel's instructions will meet the nonhazardous performance requirements of NZBC F2.3.1.

HANDLING AND STORAGE

If COLORSTEEL® pre-painted steel products are to be stored for any time prior to forming or installation, they must be stored in dry, well ventilated conditions. Storage which allows water, (including condensation) to be trapped between the sheets may damage the coating beyond repair. COLORSTEEL® ENDURA™ products must be handled carefully during transport, fabrication and fixing to avoid damaging the surface.

AVAILABILITY

COLORSTEEL® ENDURA™ pre-painted steel is available ex stock from most roofing distributors in a range of colours. Where a colour is not available, delivery is normally within 1-4 weeks, depending on the location of the distributor.

SERVICEABLE LIFE

The COLORSTEEL® ENDURA™ coating can be repaired to extend its serviceable life. Contact New Zealand Steel for recommendations on overpainting weathered COLORSTEEL® products.

DRINKING WATER

Rainwater collected from roofs clad with products made from GALVSTEEL™, ZINCALUME® steel and COLORSTEEL® pre-painted steel, will comply with the provisions of NZBC G12.3.1, provided the water is not contaminated from other sources.

The first 25mm of rainfall from a newly installed roof must be discarded before drinking water collection starts.

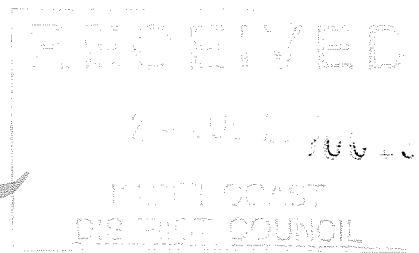
Where a paint or paint system is applied to the roof, its suitability for the collection of drinking water must be established.

ACCREDITATIONS

The New Zealand Steel paintline is accredited to ISO9001.



BC 100637



**SEWAGE TREATMENT AND EFFLUENT SYSTEM
IS TO BE
SUPERVISED AND CERTIFIED BY THE DESIGNING
PERSON. A COPY OF CERTIFICATION IS TO BE
FORWARDED TO COUNCIL.**

20 July 2010

Building Consent Authority
Kapiti Coast District Council
Private Bag
PARAPARAUMU

***Quantum Sewage Treatment System for Paetawa Trust
104 Raukawa Road***

The clients are proposing to erect a building for use as a temporary dwelling.

We have designed a system which can be used on a temporary basis. The proposed tank supplied and installed will be a two stage settlement tank (septic) which can be incorporated into a full secondary treatment system at such time as the dwelling is constructed. A pump-dosed irrigation system will be installed at that stage also.

The owners wish to install [on a temporary basis] a gravity-fed leach-drain system which will be abandoned at the stage a dripline irrigation system is installed later.

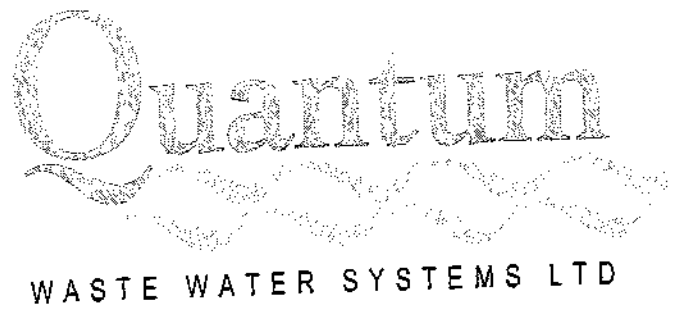
We propose a simple excavated trench approximately 0.9 metre in width and formed with 18 metres of ReIn drain to provide a suitable soakaway volume.

We are proposing this as an interim solution.

Yours faithfully
Quantum Waste Water Systems Ltd.

A handwritten signature in black ink, appearing to read "Steve Stradling".

Steve Stradling



PAETAWA TRUST
W CARGILL

104 RAUKAWA ROAD
PEKAPEKA

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PROPOSED WASTEWATER TREATMENT SYSTEM INSTALLATION

To be read in conjunction with site plan and in accordance with :

AS/NZS 1547: 2000 On-site Domestic – Wastewater Management

AS/NZS 1546.3

Guidelines for On-Site Sewage Systems – Wgtn Region : Dec 2000

On -Site Information and Evaluation

1.1 Location details

Owner	Paetawa Trust
Address	104 Raukawa Road Pekapeka
Legal Description	Lot 6 DP 362593
Local Authority	Kapiti Coast District Council
Land Information	Area = 2. 0104 Ha
Date of site visit	

1.2 Site Characteristics

Slope	Undulating dune site
Groundcover	Pasture
Aspect	Rural site
Rainfall	62mm/ hr for an event having a duration of 1 hour and a 10% probability of occurring annually. [source NIWA Met Data]
Prevailing wind direction	Westerly
Topographical features	Shelter belts , Trees , Shade factors - Not applicable
Site Stability	There are no known stability issues affecting this site
Other factors	None known

1.3 Hydrology

Estimated depth of the seasonal water table	Winter	2 metres
	Summer	3 metres
Potential storm water short circuit paths	None	
Flooding potential	Low level risk	
Any other limiting factors	None	

1.4 Soil Investigation

Profile

0 - 200mm	SANDY LOAM
200 - 600mm	SAND – yellow/brown

[reference NZS 1547: table 4.1.1]
Drainage Class

Soil Category	Estimated	Soil Texture	Drainage Class
1		Gravels and sands	Rapidly drained
2	<input checked="" type="checkbox"/>	Sandy loams	Well drained
3		Loams (percolation value 60mm/hr)	Moderately well drained
4		Clay loams (percolation value 40mm/hr)	Imperfectly drained
5		Light clays	Poorly drained
6		Medium – heavy clays	Very poorly drained
7		Thick heavy clays	Specific geotech design

1.5 Dispersal System Area Requirements

Maximum daily volume of wastewater to be discharged

Number of Bedrooms	1
Design Occupancy {persons}	2
Water Supply	30,000 litre Rainwater tank
Total Wastewater Produced @ 150 Litres/person/day	300 litres
Water saving devices	YES – ½ flush WC's
Design loading rate [DLR]	20 mm /day

See AS/NZS 1547 table 4.2A1 for trench systems

$$\begin{aligned}
 \text{Size of disposal area L (m)} &= \frac{\text{daily design flow}}{\text{DLR} \times \text{width}} \\
 &= \frac{300}{20 \times 0.9} \text{ m} = 16.66 \text{ metres}
 \end{aligned}$$

1.6 Requirements for dispersal area

Adjacent system	More than 50 metres
Known performance factors	N/a
Distance from site boundaries	will be at least 10 metres from any boundary
Reserve area	sufficient land area available if required
Fenced to exclude farm animals.	

1.7 Proposed System

Septic Tank - Quantum septic tank with a 5,000 litre capacity, constructed in re-inforced mono-cast concrete including concrete access lid with outlet filter.

Field - This will comprise approximately 18 metres of *Rein Drain* - 12 lengths – laid to level grade over an excavated trench, wrapped in geotextile and backfilled with reject metal and topped with original sand cover.

1.8 Site Evaluator

Name	Stephen Paul Stradling	
Qualifications	Grad Dip.PHI[Royal Soc. Health,London] Dip. Environmental Health Engineering	MNZIEH
Company	Quantum Waste Water Systems Limited 279 Oxford Street, Levin 5510 Website – www.quantumtanks.co.nz	
Contact details	Phone 06 368 8490 Fax 06 368 8496 0800 555 750 Mobile 027 4999 670 Email : steve@quantumtanks.co.nz	

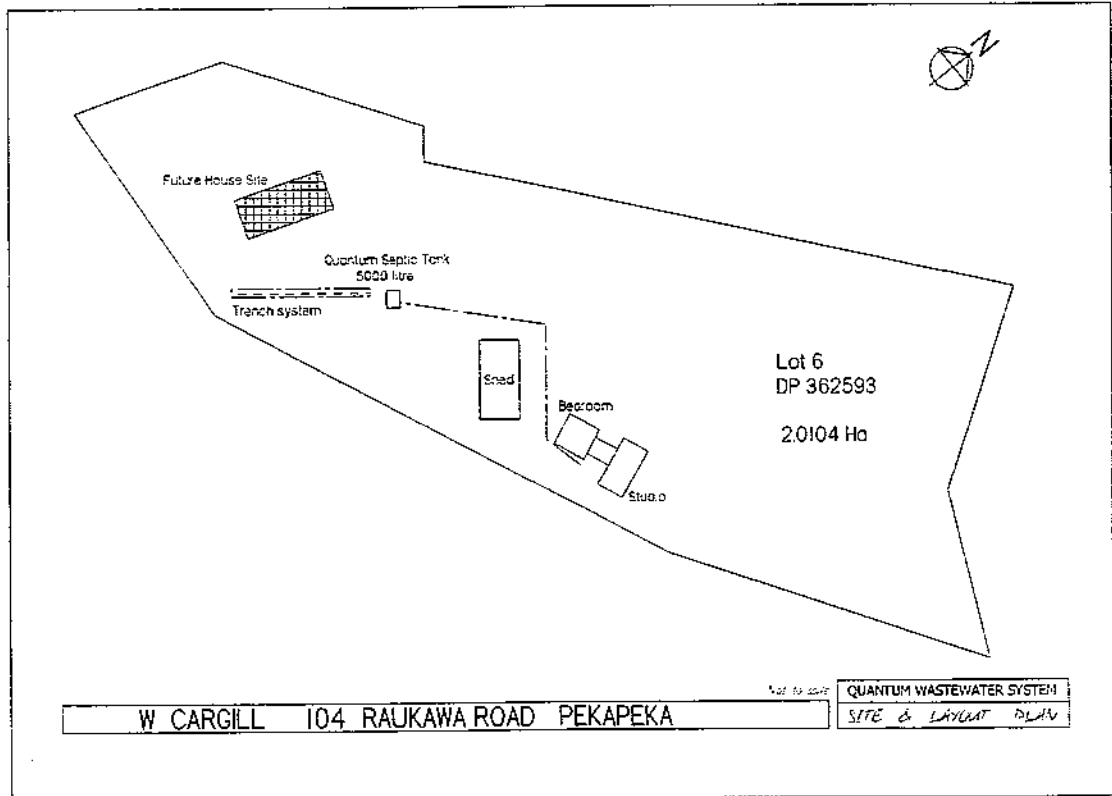
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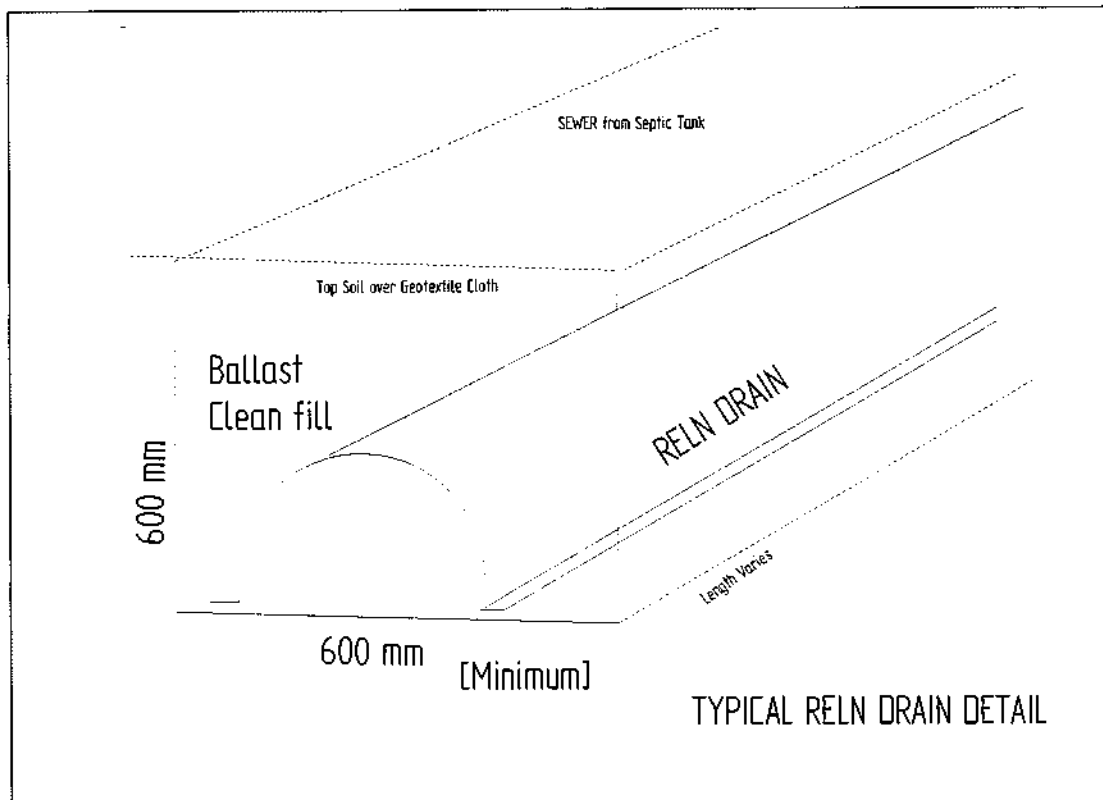
Steve Stradling

Date : 20/07/10

Sketch Plan

- Showing layout in relation to buildings and boundaries





SPECIFICATION

of work to be done and materials to be used in carrying
out the works shown on the accompanying drawings

**Stage one Bedroom, Studio,
Bathroom & Workshop**

**104 Raukawa Road
Peka Peka**

Paetawa Trust No1

Job Number: 11/06/10

Date: 11/06/10

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2210 PREPARATION AND GROUNDWORK

1. GENERAL

This section relates to the clearance, excavation and backfilling of the site area in preparation for:

- footings and floor slabs
- backfilling behind basement retaining walls

1.4 ARCHAEOLOGICAL DISCOVERY

If fossils, antiquities and other items of value are found refer to the general section CONSTRUCTION for actions to be taken with archaeological discovery.

2. PRODUCTS

2.1 EXCAVATED CLEAN FILL

Clean, free of contamination, mineral soil from other formations in the excavation which may be selected and approved as suitable for filling by having grading and moisture content properties that will allow recompaction to 95% of maximum density.

2.4 SAND FILL

Clean sand of such grading in particle size to achieve mechanical compaction to 90% maximum density.

3. EXECUTION

3.2 EXCAVATION GENERALLY

Carry out excavation, using plant suitable for the purpose, to the guidelines set by the OSH publication: Approved code of practice for safety in excavation and shafts for foundations.

3.3 BURNING OF MATERIALS

Burning of materials is not permitted on site.

3.4 PROTECT EXISTING WORK

Protect from damage existing buildings, structures, roads, paving and services nominated on the drawings as being retained.

3.5

3.7 SURFACE PREPARATION

Comply with NZS 3604, section 3.5, Site preparation. Remove all turf, vegetation, trees, topsoil, stumps, uncontrolled fill and rubbish from the area to be built on.

3.8

3.9 STOCKPILE TOPSOIL

Stockpile excavated topsoil on site where directed. Keep separate from other excavated materials. Spread and level where directed before completion of the works.

3.11 GENERAL EXCAVATION

Trim ground to required profiles, batters, falls and levels. Remove loose material. Protect cut faces from collapse. Keep excavations free from water.

3.13 FOUNDATION EXCAVATION

Take foundation excavations to depths shown. Keep trenches plumb and straight, bottoms level and free of soft spots, stepped as detailed and clean and free of water.

- 3.14 **INADEQUATE BEARING**
If bearing is not to NZS 3604, 3.1.2 and 3.1.3, then excavate further and backfill with material as follows. Confirm any changes with the territorial authority.
Below slabs on grade: Hardfill compacted in 150mm layers
Below footings: 10 MPa concrete
Service trenches: Hardfill compacted in 150mm layers
- If excavation exceeds the required depths, backfill and compact to the correct level with material as listed.
- 3.15 **STANDARD OF COMPACTION**
Place fill in layers of not more than 150mm and compact to achieve 95% of maximum dry density. For granular fill material, the fill shall be compacted to 80% of saturated dry density.
- 3.16 **GRANULAR BASE FOR SLABS**
To conform to NZS 3604, section 7.5.3, Granular base. Consolidate with a vibrating roller. Blind the surface with 20mm of coarse sand or sand/cement and roll ready to receive a damp-proof membrane.
- 3.17 **GENERAL BACKFILLING**
Obtain written confirmation from the owner before using any excavated material.
Compact approved backfilling in 150mm layers with the last 200mm in clean topsoil, lightly compacted and neatly finished off.
- 3.18 **RETAINING WALLS**
Backfill behind retaining walls with free draining granular material and compact in 200mm layers. Ensure any tanking membranes, drain coil and damp-proofing are not damaged.
- 3.19 **SURPLUS MATERIAL**
Remove surplus and excavated material from the site.

3321F FIRTH CONCRETE MASONRY

1. GENERAL

This section relates to the laying, reinforcing and grouting of **Firth** hollow concrete masonry for observation type A or B specific design masonry using ready-mix grout for the following types:

- **Firth** hollow block masonry

1.3 MANUFACTURER'S DOCUMENTS

Firth Industries documents relating to work in this section are:
Firth Masonry Homes Construction Manual

Firth Hollow Masonry Document

Copies of the above documents are available from **Firth** Industries

Email: info@firth.co.nz

Web: www.firth.co.nz

Telephone: 0800 800 576

Facsimile: 0800 800 530

Further information is available by phoning 0800 800 576.

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified **Firth** hollow concrete masonry or associated products.

1.5 QUALIFICATIONS

Blocklayers to be experienced competent workers familiar with the required **Firth** type of block laying and be registered with the New Zealand Masonry Trades Registration Board as a Registered Structural Mason.

1.6 CONSTRUCTION OBSERVATION BY ENGINEER

Where required as a condition of the building consent, advise the engineer when inspections are required.

Obtain the producer statements required from the engineer relating to the masonry construction and keep with the building consent documentation.

1.7 QUALITY RECORDS

Keep accurate records relating to strength and quality of materials used in the construction, and make the information available to the Building Consent Authority inspector on request.

1.8 SELECTED MASONRY

Refer to the drawings for areas of masonry, which require select quality blocks to both sides

1.9 CERTIFICATION - SEALERS FOR MASONRY

The sealer applicator is to certify that the sealer application is in accordance with the design and manufacturer's specification. Provide certification to the Contract Administrator.

2.1 MASONRY

Firth masonry blocks to AS/NZS 4455.1 with true and unblemished surfaces and arrises. Use appropriate masonry for intermittently filled construction where vertical reinforcement is placed prior to laying of masonry

2.5 **REINFORCEMENT**

To AS/NZS 4671, deformed mild steel except for ties in plain round mild steel.

Accessories

2.7 **MORTAR**

Dricon Trade Mortar to NZS 4210: 2.2 Mortar. Refer to SELECTIONS for colour.

2.10 **FINE AGGREGATE GROUT**

Firth Certified ready-mixed blockfill to NZS 4210: 2.3 Grout and NZS 3104.

Strength: 17.5 MPa

Aggregate: 4.75mm to 6mm maximum

2.11

Aggregate: 7mm

3. **EXECUTION**

Conditions

3.1 **COMPLIANCE**

Comply with NZS 4210.

3.2 **TOLERANCES**

Construct within the tolerances set out in NZS 4210: clause 2.6.5, Tolerances and clause 2.7, Laying the units, unless specified otherwise on the drawings or in this specification. Lay blocks with jointing of consistent thickness throughout.

Lay masonry to an even, plane surface with no deviation exceeding 3mm in 3 metres on any surface in view in the finished work.

3.3 **CHECK BASE**

Check that the base concrete on which masonry is being built is true to line and level, to ensure that work can be taken up true and plumb with 10mm thick bed and perpendicular joints. If more than 20mm thickness of mortar bed is needed to correct inaccuracies obtain written direction on remedial action.

3.4 **CONSTRUCTION JOINTS**

Ensure the structural integration of all masonry with adjacent concrete work by providing well roughened, retarded construction joints at all junctions.

All construction joints between grout and concrete and between grout and grout similar to Type B as described in NZS 3109, clause 5.6.3, prepared using an approved retarder, except that the roughness at fine grout surfaces may be ± 1.5 mm above and below the average level. Use a "double strength" retarder if necessary to suit the high cement content of the grout.

Vertical joints between masonry and concrete to achieve full structural integration across the joints. Allow to construct concrete work first with prepared vertical construction joints at block junctions the same as for horizontal construction joints. Lay masonry so that all courses have open ends abutting the existing concrete work.

3.5 **COVER**

All cover shall be in accordance with NZS 3109: 3.8 Cover and 3.9 Tolerances for reinforcement.

- 3.6 **STARTER POSITIONS**
Check the location of starter reinforcement before block laying commences, or by a dry trial lay up of the first course. Do not attempt to correct misplacement by cranking bars. Where misplacement exceeds the location tolerance obtain written directions before proceeding further.
- 3.7 **MOISTURE CONTENT**
Ensure that blocks are air-dry prior to laying. If necessary to reduce excess absorption of water from the mortar, some dampening of the surface is permissible but no surface water may be present at the time of placing mortar.
- 3.8 **PROTECTION**
Keep fair face block walls clean of mortar droppings, grout splashes, or stains of any kind as the work proceeds and before any droppings set and protected from weathering prior to sealing to avoid instances of efflorescence and staining.
- 3.9 **WEATHER PRECAUTIONS**
When extreme temperatures prevail, either below 4°C or above 27°C, make adjustments to construction as listed in NZS 4210: clause 2.18, Cold weather construction, and clause 2.19, Hot weather construction. Do not use expansive grout for filling in temperatures below 5°C.

Application

- 3.11 **BONDING PATTERN**
Unless specifically shown or described otherwise in SELECTIONS/drawings, lay masonry in stretcher bond with full masonry bonding at intersections
- 3.12 **OPEN-ENDED DEPRESSED WEB MASONRY**
Use open-ended depressed web masonry throughout all courses in fully grouted walls.
- 3.13 **CUTTING**
Cut using a masonry saw to provide clean, accurate cuts.
- 3.16 **BOTTOM COURSE**
For fully grouted walls use inverted open-end depressed web bond beam masonry for the first course, to permit clean-out of grout space at the base.
- 3.22 **CLEAN OUT HOLES**
Use special clean-out masonry or saw off a 100mm x 200mm high section of face shell at the base of all cells containing reinforcement, to form clean out and inspection holes.
- 3.23 **GROUT SPACE**
Ensure that grouting cells at reinforcement locations are continuously clear by removal of projecting mortar.
- 3.24 **TIE REINFORCING STEEL**
Tie vertical reinforcing steel to starter bars. Lay and tie horizontal bars as the work proceeds.
- 3.25 **REINFORCEMENT LAPS**
Laps 40 diameters, except as noted otherwise on the drawings.
- 3.26 **BRACING**
Provide temporary lateral bracing to the wall where necessary to ensure stability and until final supporting construction is in place.
- 3.27 **NON EXPOSED MASONRY**
To be laid to the same tolerances as fair face masonry. Joints to be tooled and struck off flush.

- 3.28 **TOOLED JOINTS**
Finish joints on exposed masonry by tooling to produce a neat, slightly concave joint. Do not use raked joints on exterior walls. Mortar joints around openings to be flush. Refer to the drawings for details.
- 3.29 **CONTROL JOINTS**
Refer to NZS 4210: clause 2.10, Methods of controlling wall movements, generally and to clause 2.10.2, Vertical control joints, for location; not more than 6 metres apart.
- Debond reinforcement passing through control joints 150mm each side for single walls and 300mm one side for 2 walls. Rake out and prime adhesion faces of vertical control joints between masonry and between masonry and concrete as required by the sealant manufacturer. Use masking tape to avoid over-run of sealant onto the block face. Provide a backing strip to limit sealant depth to 10mm, and insert sealant, all to the manufacturer's requirements.
- Grouting of bond beams at control joint locations to be discontinuous unless specifically noted otherwise.
- Application - grouting**
- 3.30 **INSPECTION**
Inspect clean-out holes prior to grouting. Ensure that cells are clean and reinforcement is correctly placed. Mortar back the clean-out hole shell. If holes are covered in the completed work, boxing across the face may replace the shell infill. Brace hole infills to prevent blowouts during grouting.
- Notify when work is ready for inspection.
- 3.31 **EXTENT OF GROUTING**
Only those cells with reinforcing or where fixing devices occur shall be filled with grout. EsiBloc™ mortarless masonry to be solid filled, with EsiBloc Fill™.
- 3.34 **GROUTING, LOW LIFT**
Fill masonry walls to NZS 4210: clause 2.14, The low lift grouting method, up to a maximum height of 1200mm. Consolidate by rodding and then prepare a construction joint to NZS 4210: clause 2.16, Horizontal construction joints, before repeating the sequence.
- 3.35 **LIMIT RATE**
Limit rate of pour to avoid hydrostatic blowouts.
- Application - ancillary work**
- 3.36 **HOLES AND CUT MASONRY**
Provide all necessary holes, pockets and chases. Cut blocks when non-standard shapes are required. When cut masonry units are used, ensure vertical joints in adjacent courses are no closer than 100mm. Subsequent cutting away of masonry to form holes is not permitted.
- 3.37 **BUILT IN ELEMENTS**
As the work proceeds, mortar in place elements such as sills, copings, lintels, and steps.
- 3.38 **BUILT IN FIXINGS**
Build in all necessary plugs, bolts, ties, metal flashings, dowels, fastenings and fixings required by this and other work sections. Co-operate with others to meet this requirement. Fixings only permitted into filled cells.
- 3.39 **ELECTRICAL WORK**
Ensure that provision for and fitting of boxes, conduit and pre-wiring are made and done as the work proceeds under the direction of the electrician.

- 3.40 SEALANT
Apply appropriate sealant where required to the manufacturer's specifications.
- 3.41 WEATHERPROOFING AROUND OPENINGS
Refer to architectural drawings for weatherproofing details around openings.
- Completion**
- 3.43 PROGRESSIVE CLEANING
Clean off mortar splashes and grout spills as they occur.
- 3.44 FINAL CLEANING
At completion, clean down block work, remove efflorescence and remove waste materials from adjoining surfaces and floors.
- 3.45 REPLACE
Replace damaged, cracked or marked elements.
- 3.46 REMOVE
Remove debris, unused materials and elements from the site.

4. SELECTIONS

- 4.1 MASONRY UNITS
Brand: **Firth**
Series: 200
Bonding pattern: Stretcher bond
- 4.5 MORTAR
Type/colour: Dricon Trade Mortar colour grey
- 4.7 FIRTH MASONRY BLOCKFILL
Type: **Firth ~**
Strength: 17.5MPa
Aggregate: 7mm

3411M METALCRAFT PURLINS

1. GENERAL

This section relates to the fabrication, erection and finishing of the **Metalcraft Structural MSS Purlin**, cold formed, galvanized steel purlin and girt system

1.3 MANUFACTURER'S DOCUMENTS

Metalcraft Structural Technical Manual and Load Tables

Copies of the above literature are available from **Metalcraft Structural**
Web: <http://www.metalcraftstructural.co.nz/>

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.6 CO-ORDINATION

Refer to architectural, drawings to ensure details and fixings required are provided for in the structural steel work.

1.7 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication.

Performance

1.8 QUALITY ASSURANCE

Maintain quality assurance programmes to AS/NZS ISO 9001 for both fabrication and erection as necessary to ensure that work is performed in accordance with this specification and the qualifying requirements of the contract documents.

1.9 DURABILITY

Metalcraft Structural MSS purlins, girts and bracing systems comply with NZBC B2 Durability, providing the products are kept free from moisture.

2. PRODUCTS

Materials

2.1 MSS PURLINS AND GIRTS

Metalcraft Structural MSS roll formed purlins and girts, pre-punched for installation of bracing channels and for connection to the purlin cleats. Manufactured from G500 <1.5mm, G450 > 1.5mm base metal, and Z275 galvanized steel to AS 1397. Size for the various locations as scheduled / as detailed on the drawings.

Components

2.6 BOLTS, NUTS AND WASHERS

Grade 4.6 bolts to comply with AS 1111. Grade 4.6 nuts to comply with AS 1112. Grade 8.8 bolts, nuts and washers (high strength structural quality only) to comply with AS/NZS 1252. Hot-dip galvanized to AS/NZS 4680, bolts, nuts and washers forming a permanent part of a structure subject to a protective coating. Alternatively electro-galvanize to AS 1897. Sizes to engineering details.

3. EXECUTION

Conditions

- 3.1 **GENERALLY**
Construct to NZS 3404.1, section 14, Fabrication and section 15, Erection. Identify steel to NZS 3404. To AS/NZS 4600 Cold formed steel structures and NZBC B1 Structures
- 3.2 **DEFECTS**
Discard material showing visual defects affecting its structural integrity and/or appearance.
- 3.3 **DELIVERY, STORAGE AND HANDLING**
Care should be taken to keep components dry in transit. Store on a level firm base, clear of the ground, protected from weather, contamination and damage and away from current work areas. Prevent water and condensation from being trapped between adjacent surfaces.
- Protect edges and surfaces from damage and ensure that section shape is not damaged during handling, storage or installation.
- 3.4 **ERECTION GENERALLY**
Carry out the erection of MSS purlins, girts or associated bracing to the requirements of AS 3828. Comply with NZBC F5 1: Construction and demolition hazards, NZS 3404 and the OSH publication: Guidelines for the provision of facilities and general safety in the construction industry.
- 3.5 **NO GAS CUTTING OR WELDING**
Gas cutting of holes or welding of MSS purlins and girts is not permitted. Use of abrasive disc blades is not recommended. For cutting use a hacksaw or snips.
- 3.6 **NO PREMATURE LOADING**
Correctly position and complete bracing and connections to primary structure before any loads are applied.

Do not rely on bracing to perform structurally during craneage or pre-assembly. Provide additional temporary bracing as required.

Application

- 3.7 **BOLTING**
Bolting to NZS 3404: section 14.3.6.
- 3.8 **INSTALLATION OF MSS PURLINS**
Install and bolt into position as detailed on the drawings.

Completion

- 3.13 **LEAVE**
Leave work to the standard required by following procedures.
- 3.14 **REMOVE**
Remove all debris, unused materials and elements from the site.

4. SELECTIONS

- 4.1 **MSS PURLINS**
Size: MSS ~

3820 CARPENTRY

1. GENERAL

This section relates to the supply and erection of light timber framing, floors, flooring underlays and insulation.

1.5 DIMENSIONS

All timber sizes except for battens are actual minimum dried sizes.

2. PRODUCTS

2.1 TIMBER FRAMING, TREATED

Species, grade and in service moisture content to NZS 3602 and treatment to NZS 3640. Either mechanically stress graded to AS/NZS 1748, or visual grading to NZS 3631.

2.8 PLYWOOD

Structural plywood to AS/NZS 2269.0 for bracing, bracketing, sarking and floors.

2.10 HARDWOOD SPACED BOARDING FOR EXTERIOR DECKS

Plantation-grown hardwood. Dressed four sides and with arrises removed.

2.12 NAILS

Type to NZS 3604, section 4: Durability, and of the size and number for each particular types of joint as laid down in the nailing schedules of NZS 3604, sections 6-10.

2.13 BOLTS AND SCREWS

Bolts and screws of engineering and/or coach type complete with washers, to the requirements of NZS 3604, section 4: Durability, and of the number and form required for each particular junction to NZS 3604, sections 6-10.

2.14 NAIL PLATES

Comply with the requirements of NZS 3604, section 4: Durability, and of the number and form required for each particular junction to NZS 3604, sections 6-10. Plates to the plate manufacturer's design for the particular locations as shown on the drawings.

2.15 CONNECTORS

Comply with the requirements of NZS 3604, section 4: Durability, and of the number and form required for each particular junction to NZS 3604, sections 6-10. Connectors and structural brackets to the connector manufacturer's design for particular locations shown on drawings.

2.16 CORROSION RISKS

Use stainless steel fixings, connectors, etc in all zones, with the timber treatments CuAz (Preservative code 58) and ACQ (Preservative code 90).

2.17 DPC

Refer to WRAPS UNDERLAYS AND DPC section

3. EXECUTION

3.1 EXECUTION GENERALLY

To NZS 3603 and NZS 3604 except as varied in this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

3.2 SEPARATION

Separate all timber framing timbers from concrete, masonry and brick by: -
- a full length bituminous damp-proof membrane overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space

- 3.3 **ATTENDANCE**
Provide and fix blocks, nogs, openings and other items as required by other trades.
- 3.4 **MOISTURE CONTENT**
Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings for framing to which linings are attached.
Framing at erection: 24% maximum
Framing at enclosure: 20% maximum
Framing at lining: 16% maximum
- 3.5 **SET-OUT**
Set out framing in accordance with the requirements of NZS 3604 and as required to support sheet linings and claddings.
- 3.8 **FRAMING WALLS**
Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to NZS 3604, section 8, Walls.
- 3.9 **FRAMING ROOFS**
Frame to required loading and bracing complete with purlins. Design and fit roof trusses complete with anchorage. All fabricated and fastened to NZS 3604, section 9, Posts and 10, Roof framing.
- 3.10 **FRAMING CEILINGS**
Frame to required loading and bracing complete with runners and battens set out to support ceiling lining. All fabricated and fastened to NZS 3604, section 13, Ceilings. Trim for openings in to NZS 3604 section 13.3, Openings in ceilings
- 3.11 **INSTALLING, UNDERLAYS**
Refer to WRAPS UNDERLAYS AND DPC section
- 3.12 **INSTALLING DECK UNDERLAY**
Lay and secure in accordance with the Building Code.
- 3.19 **LAYING TIMBER SPACED BOARDING FOR EXTERIOR DECKS**
Confirm the grooved side of the boards are face down. Avoid excessively short or long lengths, drill for all fixings, stagger end joints and space boards a maximum of 2mm apart in general conditions, or maximum 3mm apart if boards are likely to swell after fixing. Fix using annular grooved stainless joist head nails, heads driven flush with the board surface.
- 3.21 **DPC TO TIMBER**
Refer to WRAPS UNDERLAYS AND DPC section

4. SELECTIONS

4.1

4.4 ROOF FRAMING

Member	Species	Grade	Treatment
Rafters:	Radiata pine	~	H3.2
Trusses:	Radiata pine		H3.2
Purlins:	Radiata pine		H3.2
Ceiling joists:	Radiata pine		H3.2
Skillion roof framing (<10°):	Radiata pine		H3.2
Enclosed flat roof framing:	Radiata pine		H3.2

4.5

4.6 EXTERIOR EXPOSED TIMBERS

Member	Species	Grade	Treatment
Posts:	Radiata pine	~	H3.2
Joists:	Radiata pine	~	H3.2
Hardwood decking:	~	~	

4.7	EXTERIOR FINISHING TIMBERS			
	Member	Species	Grade	Treatment
	Fascia/barge/cover boards:	Radiata pine	Dressing	H3.1
	Exterior trim:	Radiata pine	Dressing	H3.1
4.11	INTERIOR FRAMING			
	Member	Species	Grade	Treatment
	Non structural walls:	Radiata pine	~msg6	H3.2
	Structural and braced walls:	Radiata pine	~msg8	H3.2
4.12				
4.14	PLYWOOD			
	Member	Brand/type		Treatment
	Plywood sarking:	~		H3 CCA
4.15	INTERIOR FINISHING TIMBERS			
	Member	Species	Grade	
	Skirtings:	Radiata pine	Dressing	

4311D DIMOND PROFILED METAL ROOFING

1. GENERAL

This section relates to the supply and fixing of **Dimond** profiled roofing complete with accessories

1.2 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

BMT	Base metal thickness
MRM	New Zealand Metal Roofing Manufacturers Inc
MS	Modified silicone

Documents

1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:

Dimond Roofing and Cladding Systems Manual, September 2001 (web based with updates)

Copies of the above literature are available from:

Web: www.dimond.co.nz
Telephone: 0800 DIMOND (0800 346 663)

Warranties

1.5 WARRANTY - INSTALLER/APPLICATOR

Warrant this work under normal environmental and use conditions against weatherproofing failure.

Period: 5 years from the date of completion of the roof
Form: Roofing installers standard form

Include a copy of the **Dimond** maintenance requirements with the warranty.
Refer to the general section WARRANTIES - INSTALLER/APPLICATOR for additional requirements.

Provide one bound copy of all relevant **Dimond** maintenance information on completion of the roofing work.

1.6 WARRANTY - MANUFACTURER/SUPPLIER

Warrant this work under normal environmental and use conditions against materials failure.

15 years For failure of coating adhesion
15 years For weatherproofing by material penetration
Form: **Dimond** standard form

Requirements

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.8 QUALIFICATIONS

Roofers to be Dimond Certified Commercial Installer, or experienced, competent roofers familiar with **Dimond** products.

Carry out work with experienced, competent installers familiar with the products being used and with appropriate qualifications such as the National Certificate in Metal Roofing and Cladding.

Performance

- 1.9 **FIXINGS, WIND**
Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604 and the wind loads on various wall areas as given by AS/NZS 1170.2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply.
- 1.10 **CO-ORDINATE**
Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof. Ensure that all necessary members are positioned so that flashings can be fastened at both edges through the roof profile or cladding to the primary structure.
- 1.11 **PERFORMANCE**
Accept responsibility for the weather-tight performance of the completed roofing system, including penetrations through the roof and junctions with walls and parapets.

2. PRODUCTS

Materials

- 2.1 **WIRE NETTING**
Galvanized hexagonal 75mm mesh from 1mm diameter steel wire to AS/NZS 4534.
- 2.3 **UNDERLAY**
Breather type kraft paper laminates to NZS 2295.
- 2.11 **FLASHINGS GENERALLY**
Formable grade 0.55 BMT pre-painted steel to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.
- 2.12 **FLASHINGS TO VERGE, RIDGE**
Supplied by the roofing manufacturer to match or to suit the roofing.

Components

- 2.13 **FASTENERS GENERALLY**
Minimum Class 4 durability and not less than the roofing material being fixed. Screw fasteners to be head stamped identifying the manufacturer and class.
- 2.15 **FIXING SCREWS**
To AS 3566. Screws appropriate to the roofing material and the supporting structure, as required by the roofing manufacturer and with a minimum Class 4 durability and not less than the material being fixed.
- 2.16 **RIVETS**
Sealed aluminium, minimum diameter 4mm.

Accessories

- 2.17 **SEALANT**
Neutral curing MS sealant or polymer sealant as required by the roofing manufacturer and used as directed.
- 2.18 **CLOSURE STRIPS**
Non-bituminous compressible, profiled foam strips to fit the sheet profile.
- 2.19 **LAP SEALING TAPE**
Closed cell self adhesive nitrile tape.

Conditions

Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could damage the roofing.

Take delivery of and accept packs of roofing undamaged on delivery. Reject all damaged material. Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets. If sheet packs become wet, fillet or cross stack to allow air movement between sheets.

Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials

Application

Fix wire netting where specified, drawn tight and nailed or screwed to purlins with edges butted and twitched together to form a complete net.

Fit and lap roofing underlay/foil over the netting/mesh. Lay underlay/foil horizontally or vertically with a 150mm side lap, oversailing the spouting and/or gutters by 20mm.

Carefully set out with consideration of the position of side laps to take account of the prevailing wind and line of sight. Ensure all sheets are square and oversailing the gutter true to line. Check during fixing to eliminate creep or spread and string lines along purlin centres to keep fastenings in line.

Install and fix in accordance with the NZMRM NZ Metal roof and wall cladding - Code of practice recommendations, and to the roofing manufacturer's required fixing patterns and details for each area of the building roofing. Use only screws as required by the roofing manufacturer. Paint colour matched fixings and accessories before installation.

Cut only by shearing tools. Do not use black lead pencils for marking aluminium/zinc coated products.

Fix sheets in place using the fastening system required by the roofing manufacturer for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

Form stop-ends at the upper end of sheets. Form downturns at the gutter line where the roof pitch is less than 8 degrees. Form using the required tools.

Flash roof to parapets, walls and penetrations to detail. Flashings to be installed on timber framing with a moisture content of less than 25%. Where no detail is provided

flash to NZ Metal roof and wall cladding - Code of practice recommendations and the roofing manufacturer's requirements. Cut accurately and fix using sealant and rivets to detail and to the roofing manufacturer's requirements to form a weatherproof cover. For highly visible flashings, plan joints/junction to take account of the aesthetic requirements.

- 3.17 **SEPARATION**
Separate metal sheeting from CCA treated timber with building paper or other suitable isolation material.

- 3.18 **USE OF SEALANTS**
Select and use sealants only as recommended by the roofing manufacturer. Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces.

- 3.19 **FLASHING PENETRATIONS**
Flash all penetrations through the roof. Fit pipe flashings with a proprietary collar flashing, with other penetrations flashed as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.

Completion

- 3.20 **REPLACE**
Replace damaged or marked elements.

- 3.21 **LEAVE**
Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

- 3.22 **REMOVE**
Remove trade rubbish and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

4. SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

- 4.1 **WIRE NETTING/SAFETY MESH**

Roofing

- 4.5

- 4.7 **DIMOND ASYMMETRICAL RIB PROFILE ROOFING**
Profile: Styleline
BMT/material: 0.55mm steel

- 2.1 BUTYNOL RUBBER SHEET
Single ply membrane compounded from butyl.
Thickness: 1.0 mm

Components

- 2.2 BUTYNOL SEAM TAPE
Ardex uncured butyl cold gum seam tape.
- 2.3 BUTYNOL SEALANT
Ardex sealant.
- 2.4 BUTYNOL FLASHING TAPE
Ardex flashing tape.
- 2.5 ARDEX DETAIL TAPE
Ardex semi-cured silicone backed detail/finishing tape.
- 2.6 ARDEX ADHESIVES AND SOLVENTS
Ardex adhesives and solvents.
- 2.7 EDGE TRIM
Metal or timber to Ardex details to suit the specific location.

Accessories

- 2.8 ROOFING ACCESSORIES
Ardex, roof outlets, overflows, scuppers and rainwater heads.

3. EXECUTION

Conditions

- 3.1 GENERALLY
All work and materials to the Ardex waterproofing membranes manual.
- 3.2 STORAGE
Take delivery of Ardex Butynol branded rolls, undamaged and allow for site handling facilities where required. Store membranes and accessory materials under conditions that ensure no deterioration or damage.
- 3.3 WEATHER
Apply coverings in a dry atmospheric condition and only when the air temperature is 6°C and above.

Application - preparation

- 3.4 PRELIMINARY WORK
Ensure that preliminary work, including formation of falls, flashing rebates, grooves, ducts, provision of battens and fillets and fixing of vents and outlets to levels, is complete and properly constructed to enable the system to work as intended. This work and the substrate to be smooth, clean and dry.
- 3.5 ACCEPTANCE OF SUBSTRATE
Confirm that the substrate, including fillets, sumps, outlets and projections, will ensure work of the required standard.
- 3.7 PLYWOOD SUBSTRATE
Plywood to be a minimum of 17mm thick and complying with AS/NZS 2269, minimum CD structural grade with the sanded C side upwards. Hazard Class H3 with waterborne CCA treatment and kiln dried after treatment. Lay with staggered joints (brick bond) with all

edges of the sheets fully supported or with tongue and groove jointing. Provide 20mm timber fillets at the base of all upstands and chamfer all external edges with a minimum radius of 5mm. Fix with 10 gauge x 50mm stainless steel countersunk head screws, with a 3mm gap between all sheets. Fix at 150mm centres on edges and 200mm in the body of the sheets. Do not use probe meters to test moisture content.

Plywood and the timber substructure to have a maximum moisture content of 20% when the membrane is adhered.

Application - laying Butynol

3.8 GENERAL

Tape plywood joints using 25mm Ardex approved self-adhesive tape. Run out sheets and allow to relax for 20 minutes before laying. Do not stretch sheets or tapes in laying.

3.9 APPLY ADHESIVE

Apply adhesive to the substrate and the Butynol rubber sheeting by brush, spray, or roller at a spreading rate of not less than 2.5 square metres per litre. Leave to tack dry before bonding the two surfaces together.

3.10 LAY SHEETS

Lay sheets across the roof slope and lap long edges to full width of selvage, 50mm minimum. Smooth down and roll to remove entrapped air. Adhesive bond and seal to the membrane manufacturer's requirements and roll or rub down as the work proceeds.

3.11 BONDING LAPS

Bond all laps to Ardex requirements. Where the roof slope is less than 5 degrees, where coloured membranes are used, where ponding can occur and in all gutters, use special lap bonding incorporating Ardex seam tape and seam primer.

3.12 MINOR MOVEMENT JOINTS

Lay sheets across joint but leave unbonded on both sides.

Unbonded width: 25mm minimum

All joints to be taped using Ardex approved self adhesive tape.

3.13 INSPECT

Inspect and test joints on completion.

3.14 PENETRATIONS

Form and finish upstands, downturns, penetrations, sumps and vents to conform with Ardex details and NZBC E2/AS1.

3.15 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:

- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

Finishing

3.17 FOOT TRAFFIC

Foot traffic is to be limited during and after laying.

3.19 ACCEPTANCE

Sign off on completed areas. The main contractor to protect and maintain roofing until completion of the contract works.

3.20 SUBSEQUENT WORK

Make good any damage by later work. Making good to take the form of inserting a new whole or part infill sheet to maintain the appearance of the covering as originally laid.

Completion

- 3.21 **CLEAN UP**
Clean up as the work proceeds.
- 3.22 **LEAVE**
Leave work to the standard required by following procedures.
- 3.23 **REMOVE**
Remove debris, unused materials and elements from the site.

4. SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

- 4.1 **BUTYNOL RUBBER SHEET**
 - Location: Flat Roof
 - Brand/type: Ardex Butynol
 - Thickness: 1.0 mm
 - Colour: ~

5113G GIB® PLASTERBOARD LININGS

1. GENERAL

This section relates to the supply, fixing and jointing of GIB® plasterboard linings and accessories to timber and steel framed walls and ceilings to form:

- standard systems
- superior finish quality systems
- bracing systems
- wet area systems

1.1 RELATED SECTIONS

Refer to GIB® PLASTERBOARD FIRE & SOUND LININGS for performance wall linings

1.2 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

AWCINZ Association of Wall and Ceiling Industries New Zealand

Documents

1.3 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
NZS 3604	Timber framed buildings
	BRANZ technical paper P21: A wall bracing test and evaluation procedure

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents which refer to work in this section are:

GIB® Site Guide (May 2006)

GIB Ultraliner® Plus lining system (February 2006)

GIB Aqualiner® Wet Area Systems (March 2007)

GIB-Cove®

GIB® UltraFlex high impact corner mould

BRANZ Appraisal 324 - GIB Ultraliner® Plus Lining Systems

BRANZ Appraisal 427 - GIB Aqualiner® Wet Area Systems

BRANZ Appraisal 97/008 - Standard 10 and 13mm GIB® plasterboard

Copies of the above literature are available at

Web: www.gib.co.nz

Telephone: 0800 100 442

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® plasterboard, associated GIB® products or GIB® accessories.

1.6 INSTALLER WORK SKILLS AND QUALIFICATIONS

GIB® plasterboard fixers and plasterers to be experienced competent workers, familiar with GIB® plasterboard lining systems installation and finishing techniques. Submit evidence of experience on request. For example:

- National Certificate of Interior Systems; or
- Certified Business member of AWCINZ.

Performance

1.7 INSPECTIONS AND ACCEPTANCE

Allow for inspection of the finished plasterboard surface:

- before applying sealer and
 - before applying finish coatings or decorative papers,
- so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

2. PRODUCTS

Materials

2.1 GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to AS/NZS 2588. Refer to SELECTIONS for location, type, thickness and finish.

GIB® Standard plasterboard

GIB® Wideline plasterboard

GIB Ultraline® and/or GIB® Ultraline PLUS high quality surface plasterboard

GIB Braceline® & GIB® Noiseline dual purpose wall bracing & noise control plasterboard

GIB Aqualine® wet area plasterboard

Components

2.4 SCREWS

GIB® Grabber® drywall screws.

2.5 NAILS

GIB® Nails (gold passivated).

Size: 30mm, 40mm

2.6 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

2.8 TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims

GIB® UltraFlex high impact corner mould.

Accessories

2.9 ADHESIVE

Timber frame and/or steel frame:

GIBFix® One ultra low VOC water based wallboard adhesive

GIBFix® All-Bond solvent based wallboard adhesive

2.10 JOINTING COMPOUND

Bedding compound: GIB Tradeset®, GIB Lite Blue®, GIB(r) MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®

Finishing compound: GIB ProMix® All Purpose GIB ProMix® Lite, GIB® U-Mix, GIB Plus 4®, GIB® Topcoat

Cove: GIB-Cove® Bond

2.11 JOINTING TAPE

GIB® paper jointing tape.

- 2.13 GAP FILLER
GIB® Gap Filler ultra low VOC multi-purpose acrylic flexible filler
- 2.14 MOULD RESISTANT SEALANT
GIB® Aquaseal ultra low VOC mould resistant water based silicone sealant

3. EXECUTION

Conditions

- 3.1 STORAGE
Store GIB® plasterboard sheets and accessories in dry conditions stored indoors out of direct sunlight in neat flat stacks on either an impervious plastic sheet or clear of the floor with no sagging and avoiding damage to ends, edges and surfaces. Reject damaged material. Refer to GIB® Site Guide.
- 3.2 LEVELS OF PLASTERBOARD FINISH
Provide the selected plasterboard surfaces to the pre decorative levels of finish specified in AS/NZS 2589.
- 3.3 CONFIRM LEVELS OF PLASTERBOARD FINISH ACCEPTANCE
Before commencing work, agree in writing upon the surface finish assessment procedure towards ensuring that the quality of finish expectations are reasonable and are subsequently obtained and acceptable.

Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the specified plasterboard Level of Finish has been achieved.

"Levels of plasterboard finish" is a tool for specifying the required quality of finish when installing and flush stopping GIB® plasterboard **prior** to the application of a range of decorative finishes under various lighting conditions. Refer to **AS/NZS 2589**.

- 3.4 SUBSTRATE
Do not commence work until the substrate is plumb, level and to the standard required by the sheet manufacturer's requirements. Refer to GIB® Site Guide.
- 3.5 TIMBER FRAME MOISTURE CONTENT
Maximum allowable moisture content to AS/NZS 2589 for timber framing at lining: 18% or less for plasterboard linings. Refer to NZBC E2/AS1 and GIB® Site Guide.
- 3.7 PROTECTION
Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide.

Application

- 3.9 LINING WALLS AND CEILINGS GENERALLY
Form to GIB® Site Guide. Ensure bulk insulation thickness shall not exceed that of the wall framing.
- 3.10 BOARD ORIENTATION
Minimise joints by careful sheet layout using the largest sheet sizes possible, and generally fixing horizontally. Where part sheets are required for various stud heights they should be positioned so the cut sheet is as low as possible to keep joints below eye level.
- 3.12 FORM WET AREA SYSTEMS
Form to GIB Aqualine® Wet Area Systems.

- 3.15 **INSTALL COVES**
Install to GIB-Cove® literature using GIB-Cove® Bond.
- 3.16 **INSTALL TAPE-ON TRIMS**
Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.

Finishing

- 3.17 **FINISHING GENERALLY**
To GIB® Site Guide and AS/NZS 2589.

Completion

- 3.18 **REPLACE**
Replace damaged sheets or elements.
- 3.19 **CLEAN DOWN**
Clean down completed surfaces to remove irregularities and finally sand down with fine paper to the sheet manufacturer's requirements, to leave completely smooth and clean.
- 3.20 **REMOVE**
Remove debris, unused materials and elements from the site.
- 3.21 **LEAVE**
Leave work to the standard required by following procedures.

4. SELECTIONS

Plasterboard

4.1	STANDARD SYSTEMS WALLS		
	Location	Plasterboard type / Lining requirements	Thickness Finish Level
	Bedrm/dressing /study/lounge	GIB® Standard plasterboard	10mm
	Bathroom	GIB Aqualine® plasterboard	10mm
4.2	STANDARD SYSTEMS CEILINGS		
	Location	Plasterboard type / Lining requirements	Thickness Finish Level
	All ceilings	GIB® Standard plasterboard	13mm

6700R RESENE PAINTING GENERAL

1. GENERAL

This section relates to the general matters related to **Resene** painting work.

1.1 RELATED WORK

Refer to **RESENE** INTERIOR PAINTING

Refer to **RESENE** EXTERIOR PAINTING

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section INTERPRETATION AND DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

MPNZA Master Painters New Zealand Association Inc.

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents related to this section are:

Resene One-Line specifications and product data manual
(hard copy or at www.resene.co.nz)

Resene Putting your safety first

Copies of the above literature are available from **Resene**

Telephone: 0800 **RESENE** (0800 737 363)

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Warrant this work under normal conditions of use against failure referring to the **Resene** Promise of Quality in the **Resene** One-Line specifications and product data manual.

Requirements

This painting specification is written based on information available at the time of writing.

1.6 NO SUBSTITUTIONS

Substitutions are not permitted to any specified **Resene** coating system, or associated components and products. Do not combine paints from different manufacturers in a paint system.

If in the applicator's own expertise and judgement an amendment to this specification is required, or where a substrate preparation, or required painting system is not covered in this specification, this shall be brought to the attention of the contract administrator and any amendment agreed before work proceeds any further.

1.7 QUALIFICATIONS

Painters to be experienced competent workers, familiar with the materials and the techniques specified and with the **Resene** coating systems and be members of the Master Painters New Zealand Association Inc.

The applicator is to have the necessary skill, experience and equipment to undertake the work. The applicator remains responsible for ensuring proper completion of the work.

1.12 HEALTH AND SAFETY

Refer to and comply with the requirements of the Health and Safety in Employment Act 1992 including the obligation to:

- Eliminate hazards and if hazards cannot be eliminated or isolated, then minimise the hazards in this work by using the proper equipment and techniques as required by the MPNZA Painters hazard handbook and **Resene** Putting your safety first handbook.

- Supply protective clothing and equipment.
- Inform the contractor as well as the employees and others on site of those hazards and put in place procedures for dealing with emergencies.

1.15 INSPECTION OF THE WORK

Inspection of the whole of the work at each of the stages set out in SELECTIONS may be made. Agree on a programme that will facilitate such inspection, including notification when each part and stage of the work is ready for inspection.

2. PRODUCTS

Materials

2.1 MATERIALS GENERALLY

Do not combine paints from different manufacturer's in a paint system.

Use only Resene products (which are guaranteed for consistency and performance under ISO 9001 and APAS) prepared, mixed and applied as directed in the Resene One-Line Specifications and Product Data Manual. This specification has been written using where practical and available both low/no VOC and Environmental Choice approved products.

2.2 EXPOSED DARK COLOURS

Darker colours in areas of high sun exposure place significant stress on the coating and substrate. **Resene** 'Cool Colour' technology reducing heat absorption of a wide range of colours. Contact your local Resene Representative or visit www.resene.co.nz for more information. View a list of Resene colours available as Resene Cool Colours online at www.resene.co.nz/swatches/index.php.

2.3 THINNERS/ADDITIVES

Use only if and when expressly directed by Resene for their particular product in a particular application. Always wear gloves when handling any solvents including turpentine as harmful chemicals may be absorbed into the body through the skin.

Accessories

2.4 ACCESSORIES

Contact your local **Resene ColorShop** for a full range of accessories and usage advice.

3. EXECUTION

Conditions

3.1 EXECUTION

To conform to required trade practice, which shall be deemed to include those methods, practices and techniques contained in the Master Painters New Zealand Association Inc. Specification manual.

3.2 TREATED SURFACES

Where surfaces have been treated with preservatives or fire retardants, check with the treatment manufacturer that coating materials are compatible with the treatment and do not inhibit its performance. If they are not compatible, obtain instructions before proceeding.

3.3 ANCILLARY SURFACES

The descriptions of areas in schedules and elsewhere are of necessity simplified. Coat ancillary exposed surfaces to match similar or adjacent materials or areas, except where a fair-faced natural finish is required or items are completely prefinished. In cases of doubt obtain written instructions before proceeding.

3.4 HARDWARE

Do not paint hinges or hardware that cannot be removed. Before commencing work carefully remove hardware, fixtures and fittings, set aside where they cannot be damaged

or misplaced and replace on completion. Refer to SELECTIONS for hardware, fixtures and fittings for removal.

3.5 PROTECTION

Supply, lay and fix dropsheets, coverings and masking necessary to protect adjoining, fixtures, fittings and spaces from paint drops, spots, spray and damage.

Application - preparatory work

3.6 SURFACE PREPARATION

Refer to the **Resene** One-Line specifications and product data manual for surface preparation sheets (or obtain them by phoning 0800 **RESENE**, or at www.resene.co.nz) listed in the materials systems schedule clauses. Carry out the preparatory work required by them for each of the substrates.

3.8 SHARP EDGES, CRACKS AND HOLES

Remove and/or repair sharp edges, cracks and holes if present, as outlined in the preamble of the **Resene** One-Line specifications and product data manual.

Elastomeric sealants, if used, should not be painted. The paint film will not match the flexibility of the sealant and may severely limit its effectiveness.

3.9 REMEDIAL WORK

If any substrate or surface, that even with the preparation work called for in this section, cannot be brought up to a standard that will allow painting or clear finishing of the required standard then do not proceed until remedial work is carried out.

3.10 GAP FILLING

Make good cracks, holes, indented and damaged surfaces. Use suitable gap fillers to match the surface being prepared. Any special priming requirements of the fillers must be satisfied. Allow to dry or set before sanding back level with the surface. Prime or seal timber before using putty.

Exterior and wet areas: Use only Portland cement base or water-insoluble organic base gap fillers.

3.11 OFF-SITE WORK

Carry out this work under cover in a suitable environment with suitable lighting. Store items, both before and after coating, in a clean, dry area protected from the weather and mechanical damage, properly stacked and spaced to allow air circulation and to prevent sticking.

3.12 PRIMING JOINERY

Pre-treat any cut surfaces of preservative treated timber before priming. Ensure L.O.S.P. treated joinery has dried sufficiently to lose solvent odour. Pre-treat bare timber with **Resene** TimberLock (see Data Sheet D48) to improve the durability of subsequent coats.

Liberal coat end grain, allow to soak in and then recoat.

3.13 CONCEALED JOINERY SURFACES

Where off-site coatings are specified they must be applied to surfaces including those concealed when incorporated into the building.

3.14 CONCEALED METAL SURFACES

Apply primer to suit the coating system to surfaces which will be concealed when incorporated into the building.

Application - generally

3.18 PAINTING GENERALLY

Comply with the **Resene** One-Line specifications and product data manual data sheets and the additional requirements of this work section.

Ensure large wall areas that require more than one container of paint per coat, have enough paint boxed (mixed) together to complete the final coat. This will not apply if a single factory batch of paint, rather than shop tinted paint, is applied.

3.19 MIXING

Although generally supplied ready-mixed, thoroughly mix paints. Lift any settled pigment and ensure the paint is homogenous.

3.20 ENVIRONMENT

Defer painting of exterior surfaces until weather conditions are favourable - warm dry days without frost or heavy dews. Avoid painting in direct sunlight any surfaces that absorb heat excessively. As far as possible apply paint in the temperature range 15°C to 25°C. If temperatures fall outside the range of 10°C and 35°C do not paint unless paints with the necessary temperature tolerance have been specified. Do not apply solvent borne paint if moisture is present on the surface.

3.21 SEQUENCE OF OPERATIONS

Painting work to generally follow the following sequences:

- Complete surface preparation before commencing painting.
- Apply primers, sealers, stains, undercoats, paints and clear coatings in the sequences laid down by **Resene**.
- Allow the full drying time between coats laid down by **Resene**.
- Do not expose primers, undercoats and intermediate coats beyond **Resene's** recommendations before applying the next coat.
- Finish broad areas before painting trim.
- Ensure batch numbers of tins are matched for whole areas.
- Internally, paint ceilings before walls and walls before joinery, trim and other items.

3.22 APPLICATION

Select brush, roller, or pad and apply coatings to the requirements of **Resene** to obtain a smooth, even coating of the specified thickness, uniform gloss and colour.

3.23 LIGHTLY SAND

Lightly sand primers, sealers, undercoats and intermediate coats to remove dust pick-up, protruding fibres and coarse particles. Complete by removing dust immediately before applying the next coat.

3.24 DEFECTIVE WORK

Correct defective work immediately and recoat as required, following precisely the **Resene** system being applied.

3.25 EACH COAT

Each coat of paint and the completed paint system to have the following qualities and properties:

- Uniform finish, colour, texture, sheen and hiding power and the proper number of coats applied.
- No blemishes such as runs, sags, crinkling, fat edges, entrained paint skins, hairs, dust, bare or starved patches, cracks, brush marks, ladder marks and blistering.
- Proper covering of corners, crannies, thin edges, cracks, end grain and other difficult places of application.

Completion

3.26 CLEAN

Clean adjoining surfaces, glass and fittings of any paint contamination. Clean off glass indicators at the completion of the building works. Clean glass inside and out to a shining finish. Use the Resene Washwise on site 'paint equipment clean-up water' reclamation system to minimise the environmental impact of cleaning paint application tools.

- 3.27 **LEAVE**
Leave the whole of this work uniform in gloss and colour, of correct thickness, free from painting defects, clean and unmarked and to the standard required by following procedures.
- 3.28 **REMOVE**
Remove dropsheets, coverings and masking to leave surrounding surfaces and areas clean, tidy and undamaged. Remove debris, unused materials and elements from the site.
- 3.29 **REPLACE**
Replace hardware without damage to it or the adjoining surface and leave hardware properly fitted and in working order.
- 3.30 **DISPOSAL OF PAINTS AND THINNERS**
Note: The use and disposal of paint and thinners represents a significant environmental hazard.
Ensure all paint and thinners are disposed of in the following manner:
- When requested hand over part used paint containers to client for maintenance touch ups.
 - Recycle leftover paint at a Resene ColorShop as part of the Resene "Paintwise programme". Contact your local Resene ColorShop for details or view information online at www.resene.co.nz/paintwise.htm.
 - Donate left over paint to local community groups.
 - Solvent based paints, paint thinners, turpentine, mineral spirits and solvents require special disposal procedures. Do not pour down sewer or storm water drains, sinks or into the ground. If they cannot be recycled they must be disposed of in a refuse dump licensed to take toxic waste.
- 3.31 **MAINTENANCE**
Good maintenance of coating systems involves a routine of regular cleaning as well as regular inspections. Regular inspections of the coating systems are recommended to identify breakdown, accidental damage to or undesirable deterioration of the paint.
- Refer the Resene Caring for your paint finish brochure and the Resene website, www.resene.co.nz/comn/services/maintenance.htm.

4. SELECTIONS

- 4.1 **SELECTIONS**
Refer to **RESENE PAINTING EXTERIOR** and **RESENE PAINTING INTERIOR** for selections.

6711 PAINTING EXTERIOR

1. GENERAL

This section relates to the preparation of exterior unpainted and pre-painted surfaces, and the application of exterior:

- decorative paint coatings
- protective paint coatings
- sealers
- stains
-

Related work

1.1 RELATED SECTIONS

Refer to PAINTING GENERAL for general painting matters.

Refer to PAINTING INTERIOR for interior paint systems.

6721R RESENE PAINTING INTERIOR

1. GENERAL

This section relates to the surface preparation, painting and clear finishing of new and existing interior substrates using **Resene** architectural and decorative coating systems.

1.1 RELATED WORK

Refer to **RESENE PAINTING GENERAL** for general matters related to painting work.
Refer to **RESENE PAINTING EXTERIOR** for exterior paint systems.

2. PRODUCTS

Materials

2.1 PAINT TYPES GENERALLY/ THINNERS AND ADDITIVES

Refer to **RESENE PAINTING GENERAL** for product clauses.

3. EXECUTION

Conditions

3.1 EXECUTION

Refer to **RESENE PAINTING GENERAL** for execution clauses.

Resene interior paint systems

4.7 INTERIOR TIMBER

Description:	Interior timber, waterborne satin
System:	Resene One-Line Spec. No. 2i 1.3 (EC)
Surface prep:	D82; and Resene TimberLock D48 ^{NEC} , solventborne preserver/conditioner
1 st coat:	For normal recommended system - Resene Quick Dry D45, waterborne primer/undercoat; or For timber that stains - Resene Wood Primer D40 ^{NEC} , solventborne primer; or waterborne satin
2 nd coat:	Resene Lumbersider D34, waterborne satin
3 rd coat:	Resene Lumbersider D34, waterborne satin

4.10 INTERIOR TIMBER JOINERY

3 rd coat:	Resene Lustacryl D310, waterborne semi-gloss enamel
Description:	Interior timber joinery, solventborne semi-gloss
System:	Resene One-Line Spec. No. 3i 2.2
Surface prep:	D82; and Resene TimberLock D48, solventborne preserver/conditioner

4.11 INTERIOR PAPER FACED PLASTER

Description: **Interior paperfaced plaster waterborne low sheen**
System: **Resene** One-Line Spec. No. 15i 1.4 SC Level 5 (EC)
Surface prep: D84; D85; D87; **Resene** Broadwall Surface Prep & Seal D807, waterborne prep
1st coat (if reqd): For new wet areas - **Resene** Waterborne Smooth Surface Sealer D47a, waterborne sealer
2nd coat: **Resene** SpaceCote Low Sheen D311, waterborne low sheen enamel
3rd coat: **Resene** SpaceCote Low Sheen D311, waterborne low sheen enamel

For Level 5 Resene Broadwall 3 in 1 system - Resene One-Line Spec. No. 15i 1.41 SC Level 5 (EC)
Replace Resene Broadwall Surface Prep & Seal with Resene Broadwall 3 in 1 in the clause above

For Level 4 system - **Resene** One-Line Spec No. 15i 1.4 SC L 4 (EC)
Remove Resene Broadwall Surface Prep & Seal from Surface prep and add 1st coat:
Resene Broadwall Waterborne Wallboard Sealer D403, waterborne sealer

7112 RAINWATER STORAGE TANKS

1. GENERAL

This section relates to the installation of domestic rainwater storage tanks.

Requirements

1.4 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the materials and techniques specified.

Performance

1.5 PRODUCER STATEMENT

Provide a producer statement from a suitably qualified person for:

~

Producer statements to be in the form required by the Building Consent Authority.

1.6 DESIGN AND INSTALLATION

To HB 230 Rainwater Tank Design and Installation Handbook, to AS/NZS 3500.3 and to NZBC G1 and G12.

1.7 TESTING OF PRODUCTS

Materials used in the manufacture of rainwater tanks to be tested to AS/NZS 4020.

2. PRODUCTS

Components

2.1 RAINWATER STORAGE TANK

- Above ground tank manufactured from polyethylene to AS/NZS 4766 and to AS 2070.

-

Accessories

2.2 TANK FITTINGS

Fittings kit supplied with the tank for complete installation.

2.3 UPVC PIPES AND FITTINGS

Unplasticised PVC pipe and fittings to AS/NZS 1260.

2.4 POLYETHYLENE PIPES AND FITTINGS

High density polyethylene pipe and fittings to AS/NZS 4130.

2.5 WATER PUMP

Pump designed to pressurised water supply from tank into the building.

2.11 SEALS

Uniseals for pipe connections to the top of the tank.

2.12 TANK BASE BEDDING

Clean sand or concrete 100 to 150mm thick.

3. EXECUTION

Conditions

- 3.1 **SITE ACCESS**
Transportation on site to the position of the tank is at the risk and responsibility of the contractor. Make provision for manoeuvring and unloading of tank

Application - site

- 3.2 **SITE EXCAVATION FOR ABOVE GROUND TANK**
Select level site, free of sharp protrusions. Form solid pad with a bed of sand, screeded level to a minimum depth of 50mm. Extend pad 500mm past base of tank. On a sloping site excavate fully into bank and provide 600mm clearance from the tank to the base of the cut. Do not place tank on any fill, over in ground pipes, cables or underground structures.

- 3.4 **ABOVE GROUND TANK INSTALLATION**
Position tank on the prepared compacted level base.

- 3.5 **LAYING AND JOINTING**
Lay in straight lines between changes of line or grade from the lower end of the drain with sockets pointing uphill. Set each pipe true to line and grade and each joint completed before the next pipe is laid.

Application - fittings

- 3.6 **WATER PUMP INSTALLATION**
Install pump on a solid base bolted down through base plate. Place weather tight housing over the pump and secure to base. Connect to water supply and power supply

- 3.8 **BACK FLOW PREVENTION DEVICES**
Install to AS/NZS 2845.1, to AS/NZS 3500.1 and to NZBC G12/AS1.

Application - connections

- 3.11 **INLET CONNECTION**
Install inlet pipe into top of tank at manufacturer's designated mounting area using a Uniseal type connection.

- 3.12 **OUTLET CONNECTION**
Install pipe to manufacturer's installation details. To the outlet connect a floating arm draw-off to deliver water from 100mm below the surface. From the base connection run a flexible hose to the pump. Install ball valve in line between base connection and water pump. Support all pipework at outlet.

- 3.13 **OVERFLOW PIPE**
Install pipe to manufacturer's installation details and connect away from base of tank into garden.

- 3.14 **PIPE SEALS**
Insert Uniseals in clean cut holes of the correct size. Insert Uniseal into hole with widespread facing the pipe to be inserted. Lubricate the pipe with detergent and push through the Uniseal. Use only on top of tank connections.

- 3.15 **ELECTRICAL CONNECTION**
Installation to AS/NZS 3000. Allow to connect up water pump and water treatment unit to the power supply as provided.

Commissioning

- 3.16 **POST INSTALLATION TESTING**
Test and commission the completed system to manufacturer's requirements and AS/NZS 3500.1.16 Testing and Commissioning. At the completion and testing of the

water service, check all valves and other components to confirm their correct performance.

Completion

- 3.17 **REPLACE**
Replace damaged or marked elements.
- 3.18 **LEAVE**
Leave work to the standard required by following procedures.
- 3.19 **CLEAN**
Clean and flush out the whole installation. Remove silt and debris.
- 3.20 **REMOVE**
Remove debris, unused materials and elements from the site.

4. SELECTIONS

- 4.1 **RAINWATER TANK**

Manufacturer:	Baily	
Capacity:	Tank material:	~
	30,000	~ litres
Water pump:	grundfos	~

7120 HOT AND COLD WATER SYSTEM

1. GENERAL

This section relates to potable water supply connection to the project, and the installation of hot and cold water supply pipework

Related work

1.1 RELATED SECTIONS

Refer to SANITARY FIXTURES, TAPWARE AND ACCESSORIES for sanitary fixtures and tapware selections.

1.4 QUALIFICATIONS

Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a plumber registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

Warranties

1.5 WARRANTY

Warrant this work under normal environmental and use conditions against failure of materials and execution.

Warranty period: 2 years

Refer to the general section for the required form of WARRANTY AGREEMENT and details of when completed warranty must be submitted.

2. PRODUCTS

2.2 UPVC PIPE

Complete with fittings and accessories brand matched to the pipe manufacturer's requirements with durability to NZBC B2/AS1 Durability, Table 1 and NZBC G12/AS1 Water supplies Table 1.

2.3 POLYBUTYLENE PIPE

Polybutylene tubing to AS/NZS 2642.1, AS/NZS 2642.2 and AS/NZS 2642.3 complete with fittings and accessories brand-matched with durability to NZBC B2/AS1 Durability, table 1 and NZBC G12/AS1 Water supplies table1.

2.8 VALVES

Pressure reducing or limiting valve, filter, non-return valve, cold water expansion valve, pressure relief or temperature valve, pressure relief valve and isolating valves to NZBC G12/AS1: Water supplies.

2.9 BACKFLOW PREVENTION DEVICES

Provide backflow prevention devices to AS/NZS 2845 where it is possible for water or contaminants to backflow into the potable water supply. Refer to NZBC G12 AS/1 3.4 Backflow protection, and table 2, Selection of Backflow Protection.

Materials - hot water heating appliances

2.17 GAS HOT WATER HEATER, CONTINUOUS FLOW TYPE

Continuous flow unit with an integral gas burner and flue to NZS 4305.

Components

2.18 INSULATION

Pre-formed pipe sections complete with bends and fittings, with fixing tape to the manufacturer's requirements and to NZBC H1/AS1.

- 2.19 PROTECTIVE TAPE
Plasticised PVC tape system with primer, mastic fixing and outer coating.

3. EXECUTION

- 3.1 HANDLE AND STORE
Handle and store pipes, fittings and accessories to avoid damage. Store on site, under cover on a clean level area, stacked to eliminate movement and away from work in progress.

Store tapware in a shelved, dry and securely locked area. Retain tapware in the manufacturer's original packaging, complete with all fixings and installation instructions. Label each unit separately with its space/fixture number to match.
- 3.2 EXECUTION GENERALLY
Generally carry out the whole of this work and tests to NZBC G12/VM1 or G12/AS1: Water supplies.
- 3.3 CORE HOLES AND SLEEVES
Review location and fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Strip core holes and make good after installation of pipework.
- 3.4 CONCEAL
Conceal pipework within the fabric of the building unless detailed otherwise. Satin finish chrome plate exposed work, complete with matching ferrule at the surface penetration.
- 3.5 CORROSION
Separate all metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.
- 3.6 THERMAL MOVEMENT
Accommodate movement in pipes resulting from temperature change by the layout of the pipe runs, by expansion joints and by sleeving through penetrations.
- 3.7 PIPE SIZE
Flow rates to each outlet to be no less than those given in NZBC G12/VM1 or G12/AS1: Water supplies, table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in table 4, Tempering valve and nominal pipe diameters.
- 3.8 ELECTROLYTIC ACTION
Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.
- 3.9 EXCAVATE
Excavate for the water main to a firm, even trench base in straight runs. Allow to backfill.

Application - jointing

- 3.10 JOINTING COPPER PIPE
Braze pipe, fit alloy compression fittings, crox type joints and seal ring compression joints to NZBC G12/AS1: Water supplies.
- 3.11 JOINTING UPVC PIPE
Solvent welded joints using spigots and sockets, flanged joints and seal ring compression joints to NZBC G12/AS1: Water supplies.
- 3.12 JOINTING POLYBUTYLENE PIPE
Aluminium clamped, seal ring compression or push fit "O" ring seal jointing to pipe system manufacturer's requirements.

- 3.13 JOINTING POLYETHYLENE PIPE
Seal ring compression joints and electrofusion to NZBC G12/AS1: Water supplies.

- 3.14 JOINTING POLYPROPYLENE PIPE
Fusion weld joints to manufacturer's requirements.

Application - pipework installation

- 3.16 POTABLE WATER SUPPLY PIPEWORK INSTALLATION
From connection point, run pipes complete with all fittings, support and fixing, joins and install to manufacturers specifications. Size the pipes and branches in straight runs to deliver the acceptable flow rate to NZBC G12/VM1 or G12/AS1: Water supplies, table 3, Acceptable flow rates to sanitary fixtures at each outlet. Allow for the expected concurrent use of adjoining fixtures and size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Pipework support spacing to be firmly fixed and buffered to eliminate noise and hammer, with preformed tee-connection take-offs and branches, with machine made 3 diameter bends, complete with necessary valves and fittings. Conceal pipework and pressure test before the wall linings are fixed.

- 3.17 HOT WATER PIPEWORK
Use a take-off spigot to give separate branches to each fitting, lay out pipes with support spacing to NZBC G12/VM1 or G12/AS1: Water supplies, table 7 Water supply pipework support spacing. Fix firmly and buffer to eliminate noise and hammer, with preformed tee-connection take-offs and branches, and preformed 3 diameter bends, complete with all necessary valves and fittings.

Lag all pipes with rigid insulation to the manufacturer's requirements and G12/VM1 or G12/AS1: Water supplies.

- 3.18 EQUIPOTENTIAL BONDING
Earth metallic water supply pipe and metallic sanitary fixtures to NZBC G12/AS1: Water supplies: 9.0.

- 3.19 IN-LINE FILTER
Install an in-line filter immediately adjacent to the main isolating valve at the point of entry to the building, in an accessible position to allow for easy cleaning.

Application - hot water systems

- 3.20 INSTALLING HOT WATER PIPE INSULATION
Insulate all hot water pipes to NZBC H1/AS1 Energy Efficiency, AS/NZS 3500.5, 3.11.7 Insulation of piping and to the insulation manufacturer's instructions. Cut insulation sections tight between timber framing.

- 3.23 INSTALL GAS HOT WATER HEATER, CONTINUOUS FLOW TYPE
Install where shown complete with all the necessary fittings to the cylinder manufacturer's requirements and in accordance with NZBC G12/AS1: 6.11. Install flue in accordance with the manufacturer's details and requirements.

- 3.26 PENETRATIONS
Provide and fit collars and escutcheon plates to match the pipework at all penetrations through constructions.

Installation - valves

- 3.28 INSTALLING APPLIANCE ISOLATING VALVES - CONCEALED
Install isolating valves for appliances in accessible positions. Locate in adjacent cupboards and position to allow for easy connection and operation.

- 3.29 **INSTALLING BACKFLOW PREVENTION DEVICE**
Provide and install backflow prevention device as near as practicable to the potential source of contamination, and in an accessible position for maintenance and testing to AS/NZS 2845.3.

Completion

- 3.30 Clean all in-line filters on completion of works.
- 3.32 **REPLACE**
Replace damaged or marked elements.
- 3.33 **LEAVE**
Leave work to the standard required by following procedures.
- 3.34 **REMOVE**
Remove debris, unused materials and elements from the site.

4. SELECTIONS

- 4.1 **POLYETHYLENE WATER MAIN**
Size: 25mm outside diameter (i.e. DN 25 in AS/NZS 4130)
- 4.18 **APPLIANCE ISOLATING VALVES - EXPOSED**
Appliance: Washing machine
Brand/type: Refer to tapware selections

7411 RAINWATER SPOUTING SYSTEMS

1. GENERAL

This section relates to rainwater disposal systems including spouting and downpipes:

- PVC

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

AS 1273 Unplasticised PVC (uPVC) downpipe and fittings for rainwater
Documents listed above and cited in the clauses that follow are part of this specification. However this specification takes precedence in the event of it being at variance with the cited document.

1.4 ABBREVIATIONS AND TERMS

The following abbreviations are used throughout this part of the specification:

Spouting	Roof gutter bracketed off the roof edge or fascia.
Gutter	Internal gutter or gutter formed as integral part of the roof fabric.

Requirements

1.5 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the materials and techniques specified.

Warranties

1.6 WARRANTY

Warrant this work under normal environmental and use conditions against:

3 years:	For weatherproofing by substandard workmanship:
From:	Commence the warranty from the date of completion of installation
Form:	Installers standard warranty form

Refer to the general section WARRANTIES for details of when completed warranty must be submitted.

1.7 WARRANTY - MATERIAL

Warrant this work under normal environmental and use conditions:

10 Years	For failure of coating adhesion
10 Years	For weatherproofing by material penetration

Form:	Manufacturer's standard warranty form
From:	Commence the warranty from the date of completion of installation

Refer to the general section WARRANTIES for details of when completed warranty must be submitted.

Performance

1.8 TEST

Test the completed rainwater disposal system with water to ensure spoutings are laid to correct falls, that both spouting and downpipes are unobstructed and that no ponding occurs in spoutings.

2. PRODUCTS

Materials - uPVC

- 2.1 **uPVC SPOUTING**
Rainwater system to AS 1273, profile, jointing, brackets, rainwater heads and fittings brand matched and complete to the manufacturer's requirements. Refer to SELECTIONS for type.
- 2.2 **uPVC DOWNPIPES**
To suit the spouting system, pipes solvent cement jointed and complete with stand-off brackets, galvanized screws and accessories, brand matched and complete to the manufacturer's specifications. Refer to SELECTIONS for type.
- 2.3 strips. Do not allow copper downpipes to discharge onto lower galvanized or zinc aluminium coated steel roofs.

Application - uPVC

- 3.5 **INSTALL uPVC SPOUTINGS**
From high points fix brackets true-to-line to give a fall of 1mm every 2 metres to outlets. Allowing for necessary expansion, fit expansion joiners, assemble and fit spouting to brackets complete with all accessories solvent welded or rubber sealed.
- 3.6 **INSTALL uPVC DOWNPIPES**
Assemble downpipes, solvent welded complete, fit to outlets, galvanized screw fix with pipe clips to rigidly stand 25mm off the wall, plumb and discharging into the stormwater gully or pipe inlet to the downpipe manufacturer's required practice.
- 3.25 **REMOVE**
Remove debris, unused materials and elements from the site.

7430 DRAINAGE

1. GENERAL

This section relates to the supply and laying of gravity foul water (sewage), stormwater and field drains.

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC B1/AS1	Structure - general
NZBC E1/AS1	Surface water
NZBC E2/AS1	External moisture
NZBC G13/AS2	Foul Water
AS/NZS 1254	PVC pipes and fittings for storm and surface water applications
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of Polyethylene pipe systems
AS/NZS 2566.1	Buried Flexible Pipelines - Structural Design
AS/NZS 2566.2	Buried Flexible Pipelines - Installation
AS/NZS 3500.2	Plumbing and drainage - Sanitary plumbing and drainage
AS/NZS 3500.3	Plumbing and drainage - Stormwater drainage
AS/NZS 4671	Steel reinforcing materials
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
NZS 3104	Specification for concrete production
Plumbers, Gasfitters and Drainlayers Act 2006	

1.3 AS-BUILT DRAWINGS

Supply a 1:100 scale as-built drawing of drains and fittings to the territorial authority and to the owner on completion.

1.4 QUALIFICATIONS

Drainlayers to hold a current licence within the terms of the Plumbers Gasfitters & Drainlayers Act 2006 and be experienced, competent and familiar with the materials and techniques specified.

2. PRODUCTS

2.1 CONCRETE

17.5 MPa prescribed mix to NZS 3104.

2.2 REINFORCEMENT

Plain round and/or deformed steel bars, Grade 300 to AS/NZS 4671.

2.3 UPVC PIPES

uPVC pipes bends, junctions, fittings and joints to AS/NZS 1254 and AS/NZS 1260.

2.4 POLYETHYLENE PIPES

Polyethylene pipes and fittings to AS/NZS 5065.

2.5 FIELD DRAINS

Plastic piping for field drains perforated (straight sections or coiled) with filter fabric to prevent silting of the pipe.

2.6 GULLY TRAPS

To NZBC G13/AS2: 3.3 Gully traps, complete with grating.

2.7 SURFACE WATER SUMP GRATINGS

Cast iron frame with lift-up grating.

2.8 STRIP DRAIN CHANNEL

Proprietary, modular, variable invert, PVC or precast concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

- 2.9 **INSPECTION COVERS**
Cast iron frame with screw-down cover.
- 2.10 **DRAINAGE AND FILLING MATERIALS**
Granular: Clean gravel or crushed stone or a blend of these. Particle size from minimum 7mm to maximum 20mm.
Selected: Fine grain soil or granular material suitable for bedding; excluding topsoil.
Ordinary: Top soil or other excavated materials.
- 3. EXECUTION**
- 3.1 **EXCAVATE**
Excavate for drains to a firm even base with correct gradients set in straight runs.
- 3.2 **MANUFACTURER'S REQUIREMENTS**
All drainage installations to the pipe and fitting manufacturer's requirements.
- 3.3 **DRAINAGE GENERALLY**
Carry out drainage work and tests to AS/NZS 3500.2 (sanitary drainage) AS/NZS 3500.3 (stormwater drainage) as modified by NZBC B1/AS1: 6.0. Lay uPVC pipe systems to relevant sections of AS/NZS 2032, NZS 2566.1 and AS/NZS 2566.2. Lay polyethylene pipes and fittings to relevant sections of AS/NZS 2033 and NZS 2566.1.
- 3.4 **LAY FOUL WATER DRAINS**
Lay drains in straight runs to correct gradients, to discharge into the network utility operator's sewer. Set inspection fittings on a concrete base.
- 3.5 **INSTALL GULLY TRAPS**
Set on concrete 50mm above the surrounding ground or paving and brought up to protect the top of the fitting. Trowel off.
- 3.6 **LAY STORMWATER DRAINS**
Confirm the required location of downpipes and finished ground levels before commencing pipework. Set downpipe bends in concrete with the concrete brought up to protect the top of the bend from damage. Lay drains in straight runs to correct gradients to discharge into the
- 3.7 **LAY SUBSOIL DRAINS**
Lay perforated piping firmly in a granular bed in straight runs to correct gradients, discharging into a cesspit. Carry the granular bed up over the pipes without disturbing them to a total depth of 300mm and cover with geotextile fabric to the pipe manufacturer's requirements. Carry the high end of all lines up to the surface to allow for flushing out and finish with a protected removable cap.
- 3.15 **FIELD TEST**
Field test drains for watertightness (UPVC to AS/NZS 2032 or AS/NZS 2566. 2 Appendix N) to the satisfaction of the territorial authority inspector.
- 3.16 **BACKFILL**
Backfill drain lines in 150mm layers, well tamped but without disturbing the drains. Finish off with 150mm of topsoil, slightly mounded above the finished ground line.

7462 WASTEWATER TREATMENT SYSTEM

1. GENERAL

This section relates to the installation and management of on-site domestic wastewater treatment systems.

Related work

1.1 RELATED SECTIONS

Refer to DRAINAGE GENERAL for general requirements
Refer to SANITARY SYSTEMS for above ground pipework
Refer to ELECTRICAL sections for electrical connections

Requirements

1.5 OPERATION AND MAINTENANCE

Provide to the owner and regulatory authority, specific O & M guidelines for the on-site system as designed and installed. Refer to AS/NZS 1547 for basic technical information covering operation, maintenance and monitoring of on-site domestic wastewater systems.

1.6 DESIGN

Specific design of wastewater treatment system by the manufacturer or consulting engineer experienced in wastewater disposal.

1.7 STRUCTURE

Construct from durable materials, to be watertight, impervious to contamination from waste contained within and from groundwater, be capable of withstanding vertical, lateral and uplift loads, prevent direct flow of wastewater between inlet and outlet, avoid foul air and gases and provide access for the removal of waste contents.

1.8 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the materials and techniques specified.

Performance

1.9 PRODUCER STATEMENT

Provide a producer statement from a suitably qualified person for:

~

Producer statements to be in the form required by the Building Consent Authority.

1.10 INSTALLATION CERTIFICATION

Certify the installation to AS/NZS 1547. The certificate to be issued to and held by the regulatory authority.

2. PRODUCTS

Components

2.2 AERATED WASTEWATER TREATMENT SYSTEM

- Tank construction to AS/NZS 1546.1 manufactured from 30 MPa reinforced concrete, or
- Tank construction to AS/NZS 1546.1 manufactured from glass fibre reinforced concrete, or

Tank to have manufacturers name and other required information as per AS/NZS 1546.3.3.3.1.

2.4 FILTER FOR TANK VENT

Activated carbon filter fitted to the tanks vent to absorb odours.

- 2.5 **EFFLUENT FILTER**
Proprietary septic tank effluent filter installed either in the tank or outlet pipe.
- 2.7 **DISTRIBUTION BOX**
Precast concrete or concrete block construction, located between AWTS and the land application system, to direct flow of effluent to different parts of absorption area.
- 2.8 **DISTRIBUTION VALVE**
Proprietary valve to automate the distribution of effluent to multiple zoned wastewater dispersal systems.
- Accessories**
- 2.9 **UPVC PIPES AND FITTINGS**
Unplasticised PVC pipe and fittings to AS/NZS 1260.
- 2.10 **POLYETHYLENE PIPES AND FITTINGS**
High density polyethylene pipe and fittings to AS/NZS 4130. Perforated pipe for dispersal in land application areas to AS 2439 part 2.
- 2.11 **BEDDING, SURROUND AND FILLING MATERIALS**
Granular: Clean gravel or crushed stone or a blend of these. Particle size from minimum 7mm to maximum 20mm.
Selected: Fine grain soil or granular material suitable for bedding and excluding topsoil, organic matter and rubbish.
Ordinary: Top soil or other excavated materials excluding organic matter and rubbish.
- 2.12 **CONCRETE**
To NZS 3104:
- Prescribed mix 17.5 MPa: For in situ bases, anchors and pipe surrounds.
- Prescribed mix 14 MPa: For bedding only.
- 3. EXECUTION**
- Conditions**
- 3.1 **EXCAVATION**
Open not more than 120 metres of trench at any one time. Excavated trench to a minimum width of pipe diameter plus 300mm. Do not batter or cut the trench wider above the top of the pipe.

For deep excavation, trench width to be sufficient to provide safe access and to accommodate shoring to OSH requirements. Width of bottom of trench up to 300mm above top of pipe to be pipe diameter plus 300mm.

Maintain free of water and free of all falling material.
- 3.2 **BEDDING**
Place to NZBC G13/AS2: Foul water drainage, 5.0 Installation, figure 7, Bedding and backfilling, using compacted granular material to avoid differential settlement and to obtain longitudinal support of the pipe.
- 3.3 **SURROUND AND BACKFILL**
Place to NZBC G13/AS2: Foul water drainage, figure 7 Bedding and backfilling, using compacted granular material and compacted fill. Compact in layers not exceeding 100mm.
- 3.4 **SETTING OUT**
Position on site wastewater treatment system to comply with local authority approval. Use string line, boning rod or laser equipment methods. Use surveying and levelling equipment to accurately set out design invert levels.

- 3.5 **LAYING AND JOINTING**
Lay in straight lines between changes of line or grade from the lower end of the drain with sockets pointing uphill. Set each pipe true to line and grade and each joint completed before the next pipe is laid. Cap ends of uncompleted runs each day to prevent entry of foreign matter. Test drains and backfill progressively to minimise site disruption. Concrete cap trenches to drains with less than 375mm cover.

- 3.6 **LAYING FOUL WATER DRAINS**
Lay the drainage system from soil stacks and gully traps, including access chambers, inspection chambers, bends, junction inspections, buchan traps and vents (fresh air inlets). Discharge into the network utility operator foul water system to their requirements.

- 3.7 **DIFFERENTIAL SETTLEMENT**
Provide flexible jointing, bedding and surrounding of pipes at junctions with manholes, foundation walls and other points where differential settlement may occur.

Application - fittings

- 3.8 **CONSTRUCT GULLY TRAPS**
Set in a minimum 75mm thick concrete with top surround 25mm above paving and 100mm above other surfaces, to NZBC G13/AS2: Foul water drainage, 3.3 Gully traps.

- 3.9 **CONSTRUCT ACCESS CHAMBERS**
Construct as detailed on a poured concrete footing using precast concrete units and a removable cast iron cover, to NZBC G13/AS2: Foul water drainage, 5.7 Access points. Provide all necessary haunching to channels.

- 3.10 **CONSTRUCT INSPECTION CHAMBERS**
Construct as detailed on a poured concrete footing to NZBC G13/AS2: Foul water drainage, 5.7 Access points. Provide all necessary haunching to channels.

- 3.13 **INSTALL WASTEWATER TREATMENT SYSTEM**
Install to manufacturer's requirements. In situations when flotation due to hydrostatic uplift from a high water table is possible, anchor the AWTS to manufacturer's instructions. Connect to pipe systems and electrical supply. Installation completed by manufacturer's licensed installer.

Application - connections

- 3.14 **SEPTIC TANK DISPERSAL METHOD FOR LAND APPLICATION SYSTEM**
The following systems to be verified by specific design:
- absorption trenches and beds
- ETS
- mound
- irrigation by subsurface drip, surface drip, or spray system
Carry out installation of system to comply with the design and to AS/NZS 1547. Place filter cloth above the distribution aggregate to prevent soil incursion.

- 3.18 **TEMPORARY BRIDGES**
Provide temporary bridges over trenches to prevent heavy construction traffic damaging pipes after backfilling.

Completion

- 3.19 **REPLACE**
Replace damaged or marked elements.
- 3.20 **LEAVE**
Leave work to the standard required by following procedures.

- 3.21 CLEAN
Clean and flush out the whole installation. Remove silt and debris.
- 3.22 REMOVE
Remove debris, unused materials and elements from the site.

4. SELECTIONS

- 4.1 SEPTIC TANK
Manufacturer: ~
Material: ~
Type: ~
Capacity: ~ litres
Outlet filter: Yes/No
- 4.2 AERATED WASTEWATER TREATMENT SYSTEM
Manufacturer: ~
Material: ~
Type: ~
Control and alarm system: ~
Irrigation pump: ~
Filter: ~
- 4.3 LAND DISPERSAL SYSTE

Planning Processing Check Sheet

Building Consent Number: BC 100637.

Property Information				
Property Address	104 Rankawa Road, Peka Peka			
Legal Description	Lot 6 DP 362593			
Planning Zone	Rural			
Building Project	Bedroom Studio & Workshop			
	Yes	No	Action reqd	Actioned
Certificate of Title	✓			
Easements	✓			
Section 221	✓		Include copy	
District Plan Items to Check				
	Yes	No	Action Reqd	Actioned
Designations	✓		Rural/Residential	
Heritage Register		✓		
Flood Hazards		✓		
Min Floor Level		✓		
Other Hazards		✓		
EQ Faults		✓		
Services		✓		
Eco-site/Native Veg		✓		
	Complies?		Action Reqd	Actioned
Yards (+water bodies)	✓		Neighbours Approval??	
HIRB	✓			
Max Height	✓			
Site Coverage	✓			

BC Number: BC/00637

Permeable Surface	<input checked="" type="checkbox"/>			
Earthworks	<input checked="" type="checkbox"/>		Refer to RM 100123	
Fences/Retaining Wall	<input checked="" type="checkbox"/>			
Parking	<input checked="" type="checkbox"/>			
Water Tank / Siting	<input checked="" type="checkbox"/>			
Airport Noise 45dbI	<input checked="" type="checkbox"/>			
Other Provisions				
	Yes	No	Action reqd	Actioned
Does the building straddle a Title/cross-lease boundary?		<input checked="" type="checkbox"/>		
Existing Resource Consent?			RM 100123	
Resource Consent Required?		<input checked="" type="checkbox"/>	Apply Section 37 and advise Plan Vetting Team.	
DIF Required?		<input checked="" type="checkbox"/>	Calculate Fees:	
Section 72 or 77 Required?		<input checked="" type="checkbox"/>	Advise Plan Vetting Team and send letters out.	
Section 221 Consent Notice			Advise Plan Vetting Team	

Additional Comments

Decision: (delete item that does not apply)

- Application complies with District Plan requirements
- Application does not comply with District Plan – BC to be issued subject to s37

Officer's Name & Signature:

Goodman

Date: 27.08.2010



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

**IN THE MATTER OF A PLAN LODGED FOR DEPOSIT UNDER
NUMBER 362593
AND RESOURCE CONSENT N^o. RM050063**

**(BEING THE SUBDIVISION OF LOT 3 DP 359656),
AT RAUKAWA ROAD, PEKA PEKA
FOR TASMAN LAKES ESTATE LIMITED**

The Regional Regulatory Titles Officer at Wellington

PURSUANT to Section 221 of the Resource Management Act 1991 the Kapiti Coast District Council hereby gives notice that it has consented to the subdivision and that with respect to Lots 1 to 7 only (unless otherwise nominated below) the following conditions are to be complied with on a continuing basis:

1. The following works shall take into account the findings and recommendations contained within the Engineering report prepared by Hamish Wells entitled "Tasman Lakes Rural Residential – Ruakawa Road, Peka Peka Beach" dated 7 November 2005 and submitted to Council in relation to application no. RM0050063:

- Foundation design and construction for any new building or additions and alterations to any building;
- The provision, maintenance and monitoring of any on site water supply system that provides a minimum storage capacity of 30,000 litres or other minimum storage approved by the Subdivision Engineer in a manner that ensures that any adverse effects on the environment from the operation of the system are minor; and
- The installation and ongoing management of any on site wastewater system in a manner that ensures that any adverse effects on the environment from the operation of the system are minor

Note: It shall be the responsibility of the owner of the land to maintain and monitor the wastewater disposal system and to ensure that any adverse effects on the environment are minor. The On-site waste water treatment and disposal systems shall be designed, constructed and operated to meet the following criteria:

- a) It shall be designed with sufficient wastewater retention time to enable adequate treatment in relation to any constraints identified in the site investigation;

Kapiti Coast District Council

Phone (04) 904 5700, Fax (04) 904 5830 175 Rimu Road, Private Bag 601, Paraparaumu. Website www.kapiticoast.govt.nz

Zone 2 from 30 June 2008

Non-Solid Reference Building.

Component	Description	Area	R-value	Heat Loss	Heat Loss = Area/R-value
Roof		78	2.9	26.9	
Wall		83.7	1.9	44.1	
Floor		78	1.3	60.0	
Glazing (30%)		35.9	0.26	138.1	
Glazing (>30%)			0.31		Total Loss
Skylights			0.31		269.0

Set wall area as either 70% of total wall area, or actual wall area, whichever is **lower**

Set glazing area as either 30% of total wall area, or actual window area, whichever is **higher**

Total area of glazing (including skylights) must be $\leq 50\%$ of the total wall area

An R-value of 0.26 may be used for traditional leadlight glass if the total area is $\leq 2.6 \text{ m}^2$

Non-glazed areas of door openings greater than 3 m^2 are treated as wall.

CODE COMPLIANCE CERTIFICATE

Section 95 Building Act 2004 [Form 7 – Building (forms) Regulations 2004]



Consent No: 170863

The Building			
Street address of building:	104 Raukawa Road, Peka Peka	Building name:	N/A
Current, Lawfully established, use:	Detached dwelling	Location of building within site/block number:	Middle of property
Level/unit number:	N/A	Intended life of the building if 50 years or less:	-
Legal description of land where building is located:	LOT 6 DP 362593 C/T 255394	Year first constructed:	2010
The Owner			
Name of owner:	Cargill Lorraine Joy & CMS Trustees Limited	Street address /registered office:	N/A
Contact person:	Bill	Phone numbers:	
Mailing address:	104 Raukawa Road RD 1 Waikanae 5391	Landline:	042937323
Email address:	-	Mobile:	027 2412097
Website:	-	Daytime:	-
		After hours:	-
		Facsimile number:	-
First point of contact for communications with the Kapiti Coast District Council:			
As above			
Building Work			
Building Consent No:	170863	Issued by:	Kapiti Coast District Council
Project Description:	Addition to dwelling including bathroom & inbuilt fireplace		

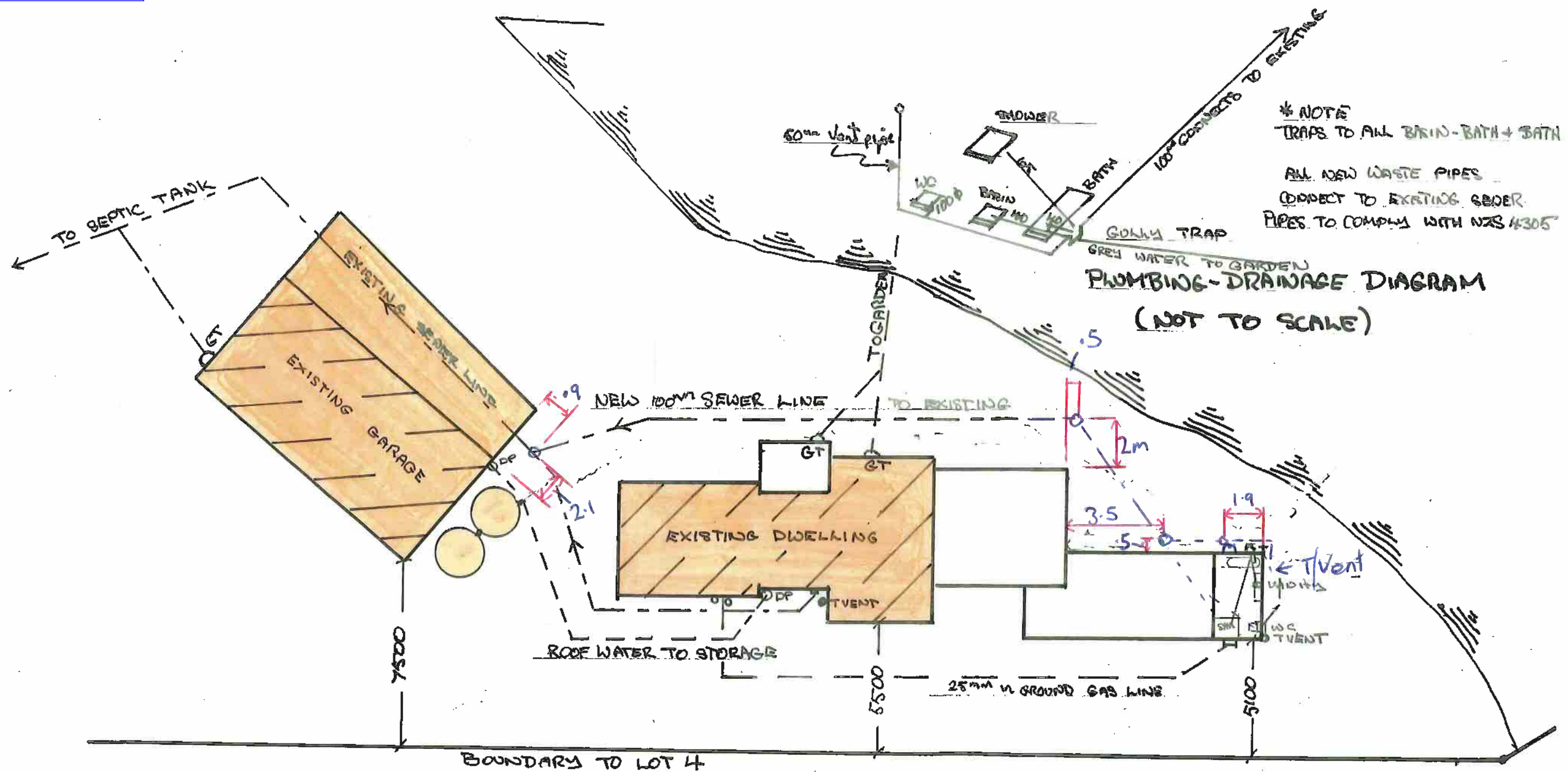
Code Compliance

The building consent authority named below is satisfied, on reasonable grounds, that:

- (a) the building work complies with the building consent

Michelle Salmon –
Building Inspections Team Leader
On behalf of **Kapiti Coast District Council**

Date: 20 May 2021



PLUMBING AND DRAINAGE PLAN 1:200

NOTE:
PIPE SIZES NEED TO COMPLY WITH NZS 4305
TABLE 5
THE SANITARY DRAINAGE AND WASTE PIPE SYSTEMS
SHALL BE INSTALLED TO SATISFY COMPLIANCE WITH
THE RELATIVE PERFORMANCES, PROVISIONS AND CONDITIONS
OF AS/NZS 3500.2.2003
WATER SERVICES SHALL COMPLY WITH THE NZ BUILDING CODE G12/AS1
HOT WATER SHALL BE AT A TEMPERATURE THAT SHALL NOT EXCEED 55°



PlaceMakers

Know how. Can do.

BC170863

Received by
Kapiti Coast District Council
14/05/21
via Front Counter

THE BUILDING

Street address: 104 Rawkawa Rd.
Suburb: Peka Peka.
Town/City: KAPITI Postcode: 5391

THE PROJECT

Building consent number: 170863

THE OWNER(S)

Name(s): HORRAINE CARGILL LTC TRUSTEES.
Mailing address: 104 RAWKAWA RD
Suburb: Peka Peka. PO Box/Private Bag:
Town/City: Kapiti Postcode: 5391
Phone number: Email address:

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

PRIMARY STRUCTURE

Work that is restricted building work Tick	Description of restricted building work If necessary, describe the restricted building work	Carried out or supervised Tick <input checked="" type="checkbox"/> whether you carried out the RBW or supervised someone else.
Foundations and subfloor framing <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Walls <input checked="" type="checkbox"/>	Go	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Roof <input checked="" type="checkbox"/>	Coloursteel roof + Flashings Supervised. Membrane roofing.	<input checked="" type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised
Columns and beams <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Bracing <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Other <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

EXTERNAL MOISTURE MANAGEMENT SYSTEMS

Damp proofing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Roof cladding or roof cladding system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Ventilation system (for example, subfloor or cavity)	<input type="checkbox"/>	<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Wall cladding or wall cladding system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Waterproofing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Other	<input checked="" type="checkbox"/> Fireplace installation & Fwe.	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised

ISSUED BY

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

Name: WILLIAM CARGILL	LBP number: 114618
Class(es) licensed in: CARPENTRY SITE 2.	
Plumbers, Gasfitters and Drainlayers registration number (if applicable):	
Mailing address (if different from below):	
Street address/Registered office: 104 RAKAWA RD.	
Suburb: PEKA PEKA	Town/City: KAPITI
PO Box/Private Bag:	Postcode: 5391
Phone number: 021 2412094	Mobile: 021 2412094
After hours:	Fax:
Email address: billcargill@xtra.co.nz	Website:

DECLARATION

I, W. Cargill, carried out or supervised the restricted building work recorded on this form.

Signature: W. Cargill Date: 11th May 21



ELECTRICAL CERTIFICATE OF COMPLIANCE & ELECTRICAL SAFETY CERTIFICATE

REFERENCE/CERTIFICATE ID No.: 104 MT
This form has been designed to be used by licensed electrical workers to certify that installations or Part installations under Part 1 or Part 2 of AS/NZS 3000 are safe to be connected to the specified system of electrical supply.

Location Details:

104 Raukawa Peka Peka

Contact Details:
(Name and address)

Cargill construction

Name of Electrical worker:

M. Tholen

Registration/Practising licence number:

I2666

Phone & email:

tholen.elect@extra.co.nz

Name and registration number of person(s) supervised:

Certificate of Compliance

Type of work:

☐ Addition

☐ Alteration

☒ New work

The prescribed electrical work is:

☐ Low risk

☐ General

☐ High-risk (Specify):

Prewire and fit off for new extension

Means of compliance:

☐ Part 1 of AS/NZS 3000

☒ Part 2 of AS/NZS 3000

Additional Standards or electrical code of practice were required:

☒ No

☐ Yes (specify):

Date or range of dates that prescribed electrical work undertaken:

Contains fittings that are safe to connect to a power supply?

☒ Yes

☐ No

Specify type of supply system:

230-400V MEN

The installation has an earthing system that is correctly rated (where applicable)

☐ Yes

☐ No

Parts of the installation to which this certificate relates that are safe to connect to a power supply?

☒ All ☐ Parts (specify)

The work relies on manufacturers instructions:

☐ Yes

☒ No

If yes - identify the instruction manual including name, date and version. Also attach a copy of manufacturer's instructions to this certificate.

(Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

The work has been done in accordance with a certified design:

☐ Yes

☒ No

If yes - identify the certified design including name, date and version. Also attach a copy of the certified design to this certificate.

(Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

The work relies on a Supplier Declaration of Conformity (SDoC):

☒ Yes

☐ No

If yes - identify the SDoC including name, date and version OR EESS registration. Also attach a copy of the SDoC to this certificate.

(Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

J.A. Russels - Lighting Plus

The installation has been satisfactorily tested in accordance with the Electricity (Safety) Regulations 2010

☐ No

☐ Yes

Description of Work:

Prewire new light and Power points
fit off the new light and Power
bins connect lighting feed and
2x Power feeds to existing RCD supplies
MCB's 8- Power - 16x lights

Test Results (provide values)

Polarity (Independent earth):	<input checked="" type="checkbox"/>
Insulation resistance:	Ohms
Earth Continuity:	0.1 Ohms
Bonding:	0.1 Ohms
Fault Loop impedance:	0.68 Ohms
Other (specify):	

By signing this document I certify that the completed prescribed electrical work to which this Certificate of Compliance applies has been done lawfully and safely, and the information in the certificate is correct.

Certifier's signature:

M. Tholen

Date:

12-5-2021

Electrical Safety Certificate

By signing this document I certify that the installation, or part of the installation, to which this Electrical Safety Certificate applies is connected to a power supply and is safe to use.

Certifier's name:

M. Tholen

Registration/Practising licence number:

I2666

Certifier's signature:

M. Tholen

Certificate Issue Date:

12-5-2021

Connection Date:

12-1-5-2021

CUSTOMER COPY - THIS IS AN IMPORTANT DOCUMENT AND SHOULD BE RETAINED FOR A MINIMUM OF 7 YEARS

This Electrical Safety Certificate also confirms that the electrical work complies with the building code for the purposes of Section 19(1)(a) of the Building Act 2004.

STATEMENT DRAINAGE WORK INSTALLED Construction Review

Received by
Kāpiti Coast District Council
at Paraparaumu
Me Huri Whakamuri, Ka Titiro Whakarua

11 APR 2021

By John Time 10:17am

Send or deliver this form to: Kapiti Coast District Council,
175 Rimu Road, Paraparaumu 5032; Private Bag 60601, Paraparaumu 5254
For enquiries, phone 04 296 4700 (Toll Free: 0800 486 486)

TO BE COMPLETED BY THE INSTALLER

Issued by: Kapiti Plumbing

Registration number: 12724

Tick applicable



In respect of: Stormwater Drains installed in accordance with E1 AS1 as shown on the approved plans or as per the attached amended plan.



In respect of: Private Sewer Drains installed in accordance with G13 AS2 or AS/NZS 3500 .2.2 as shown on the approved plans or as per the attached amended plan.

Installed at: 104 Rawkawa Rd Peka Peka.

Building Consent No: 170863

As a certified drainlayer, currently holding an annual practicing license, I certify that I, or personnel under my control, have carried out the installation of the above system and I believe on reasonable grounds that the installation complies with the New Zealand Building Code.

Name: Mark Scaite

Signature: M Scaite

Address: 9 McGrath Ave

Date: 11.5.21

Phone: 9027586

Fax: -

Mobil: 021 565546

Email: markscaite450@Outlook.com

Note: Fully dimensioned as built drain plan to be supplied.(scale 1:100)
Drains may be laid and backfilled without inspection provided that the drain is left under test with a min of 1.0 m head and the inspection at the lateral left exposed.

Kāpiti Coast District Council Office Use Only

Statement author authenticated and current registration verified. Verification and Registration checked through public register on www.pgdb.co.nz.

Name:

Signature:

Date:

+ Record of work, not required.

BC170863
Received by
Kapiti Coast District Council
11/05/21
via Front Counter

STATEMENT PIPED SERVICES AND PLUMBING STACKS



Construction Review

Send or deliver this form to: Kapiti Coast District Council,
175 Rimu Road, Paraparaumu 5032
Private Bag 60601, Paraparaumu 5254
For enquiries, phone 04 296 4700 (Toll Free: 0800 486 486)

Received by
Kapiti Coast District Council
at Paraparaumu
11 APR 2021
By Janita Time 10:17am

TO BE COMPLETED BY THE INSTALLER

Issued by: Eric the Plumber Limited

Registration number: 21912

In respect of Piped Services installed in accordance with G12/AS1 as shown on the approved plans or as per the attached amended plan and Sanitary Plumbing Stacks installed in accordance with G13/AS1 or AS/NZS 3500.2.2

Installed at: 104 Rawkansa Rd. Peka Peka

Building Consent No: 170863

As a certified plumber, currently holding an annual practicing license, certify that I, or personnel under my control, have carried out the installation of the above system and I believe on reasonable grounds that the installation complies with the New Zealand Building Code. Both hot and cold systems have been pressure tested for a period of 15 minutes at a pressure of 1500 kPa.

Name: Erich van der Merwe Signature: E.v.d. Merwe

Address: 52 Waterstone Ave Date: 11/05/2021

Phone: Fax:

Mobile: 021-117-5699 Email: office@erichthep plumber.co.nz

Kāpiti Coast District Council Office Use Only

Statement author authenticated and current registration verified. Verification and Registration checked through public register on www.pgdb.co.nz.

Date:

Name:

Signature:



Building Code Clause(s) **B1 VM1**

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance on use of Producer Statements (formerly page 2) is available at www.ipenz.nz)

ISSUED BY: **BASE CONSULTING ENGINEERS LTD**
(Construction Review Firm)

TO: **MR. W. CARGILL**
(Owner/Developer)

TO BE SUPPLIED TO: **KAPITI COAST DISTRICT COUNCIL**
(Building Consent Authority)

IN RESPECT OF: **CARGILL DWELLING**
(Description of Building Work)

AT: **104 RAUKAWA ROAD**
(Address)

Town/City: **PEKAPEKA** LOT **DP** SO **SO**
(Address)

We **BASE CONSULTING ENGINEERS LTD** have been engaged by **MR. W. CARGILL**
(Construction Review Firm)

To provide ☐ CM1 ☒ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with
owner/developer **MR. W. CARGILL**

or ☐ other **services**
(Extent of Engagement)

in respect of clause(s) **B1 VM1** of the Building Code for the building work described in
documents relating to Building Consent No. and those relating to

Building Consent Amendment(s) Nos. issued during the
course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions/variation(s) No. **Construction Monitoring Reports Job No: 17120** (copies attached)
or by the attached Schedule ☐ have been issued during the course of the works.

On the basis of ☐ this review ☒ these review(s) and information supplied by the contractor during the course of the
works and on behalf of the firm undertaking this Construction Review, I believe on reasonable grounds that
☐ All or ☒ Part only of the building works have been completed in accordance with the relevant requirements of the

Building Consent and Building Consent Amendments identified above, with respect to Clause(s) **B1 VM1**
of the Building Code, I also believe on reasonable grounds that the persons who have undertaken this construction review
have the necessary competency to do so.

Peter Bolton am: ☒ CPEng **56179** # ☐ Reg Arch #
(Name of Construction Review Professional)

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: **BE Civil**
The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than
\$200,000*.
The Construction Review Firm is a member of ACENZ: ☐

SIGNED BY **Peter Bolton**
(Name of Construction Review Professional)

ON BEHALF OF **BASE CONSULTING ENGINEERS LTD** Date **06/04/2018**
(Construction Review Firm)

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

This form is to accompany Forms 6 or 8 of the Building (Form) Regulations 2004 for the issue of a Code Compliance
Certificate.

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

SITE VISIT RECORD # 2

Sheet No. 1 of 4

Site: 104 Raukawa Road, Peka Peka

Builder: Onsite, with Brick layer

Day & Date of Visit: Friday 06 April 2018

Arrival Time: 10:30

Departure Time: 10:45

Weather and Site Conditions: Overcast

Builder on Site: Yes

No. People On Site: 2

Builders Activities & Plant On Site (Employees, Subcontractors, Idle and working plant etc)

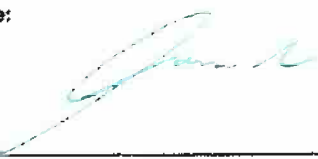
- Block wall being constructed

Site Records/Observations

Photos attached

- Base Consulting Engineers drawing 17120 SS2

Signature:









PRODUCER STATEMENT/WARRANTY

OUR WINDOWS AND DOORS COMPLY WITH THE NEW ZEALAND BUILDING CODE

All products supplied by FIRST WINDOWS & DOORS meet or exceed the requirements of the New Zealand Building Code and New Zealand Standards; NZS4211, Performance of Windows, and NZS4223, Glazing in Buildings - Parts 1-4 Incl.

This means our windows and doors have been designed and successfully tested to perform in New Zealand's most diverse conditions, and will:

- satisfy the strength and deflection requirements of the standards
- deliver the desired levels of weathertightness appropriate to the prescribed wind zones
- meet the air leakage requirements necessary to provide comfort and efficiency
- include glazing of appropriate weight, strength and safety to satisfy not only the expected wind load but also accidental human impact.

In accordance with the TERMS AND CONDITIONS OF WARRANTY, a warranty for all FIRST WINDOWS & DOORS products is provided, under normal conditions of use, against failure of materials and/or workmanship for a period of 5 years from the date of practical completion.

The surface finishing of the aluminium extrusion is covered by a separate Performance Warranty which is dependent on the actual finish selected.

A window and door hardware/component warranty protects against defects in manufacturing, functionality and surface finish for a period of 5 years, provided care and maintenance guidelines have been followed. Plated (soft) finishes are excluded from the warranty.

PLEASE NOTE

- This warranty is subject to correct installation, as outlined in the Building Code Acceptable Solution Clause E2/AS1 External Moisture, or an approved alternative solution.

WARRANTY NUMBER 11083-Ver 14

PURCHASER Bill Cargill

ADDRESS 104 Ruakawa R.D.1 Waikanae

CONSENT NUMBER BC#

SITE ADDRESS / LOT NUMBER 104 Ruakawa Rd Waikanae

MANUFACTURER Bernie Walsh Aluminium & Glass Ltd

ADDRESS 11 MILLER ST DANNEVIKKE

SIGNATURE

[Handwritten Signature]

FIRST
WINDOWS & DOORS

**RE AMENDMENTS TO ADDITIONS TO 104 RAUKAWA RD
PEKAPEKA
BC 170863**

EN SUITE BATHROOM

Please find on the attached drawings the changed layout of the ensuite bathroom.
The position of the WC and shower have been changed along with the non structural wall in the dressing room.

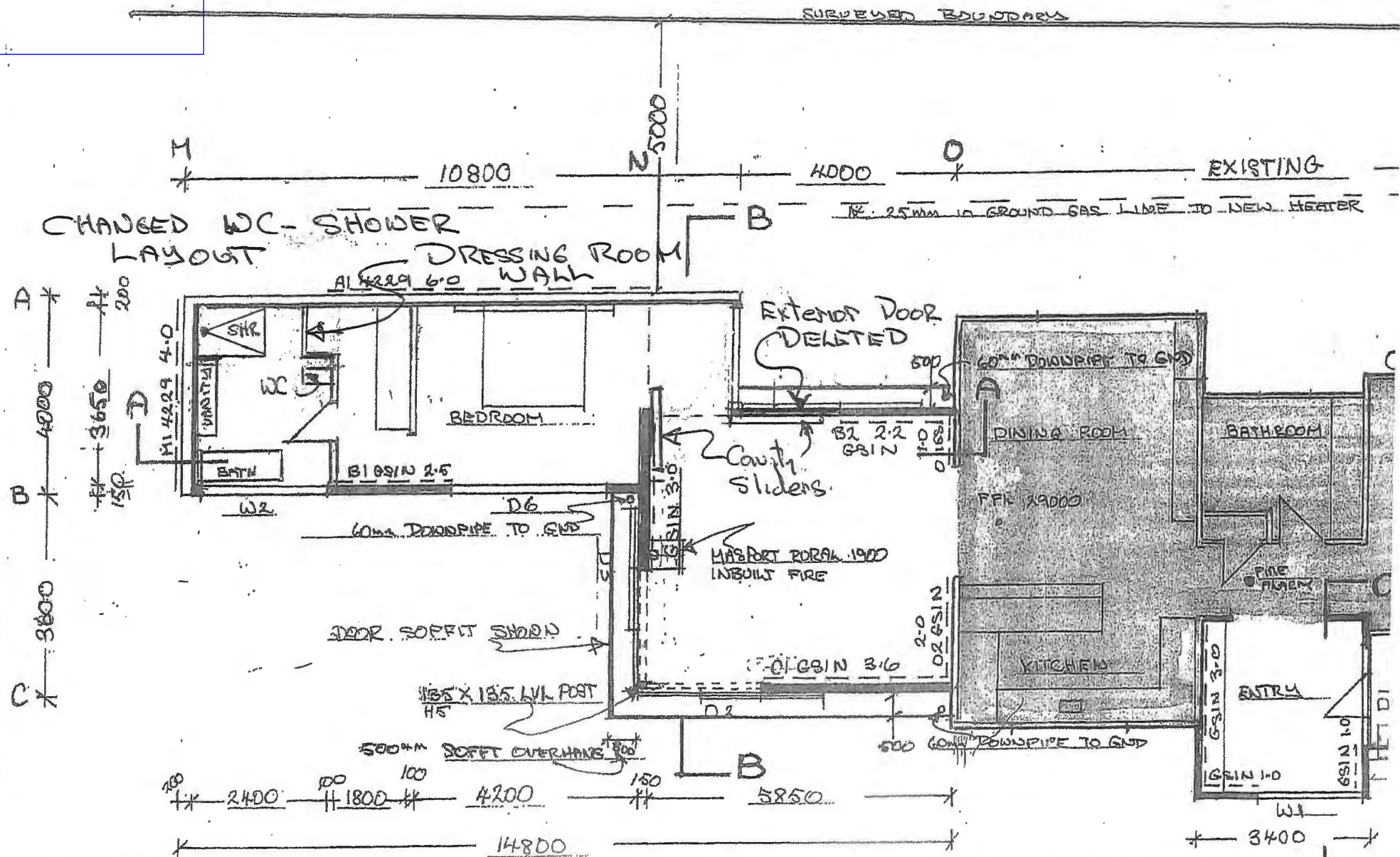
D4 REMOVED

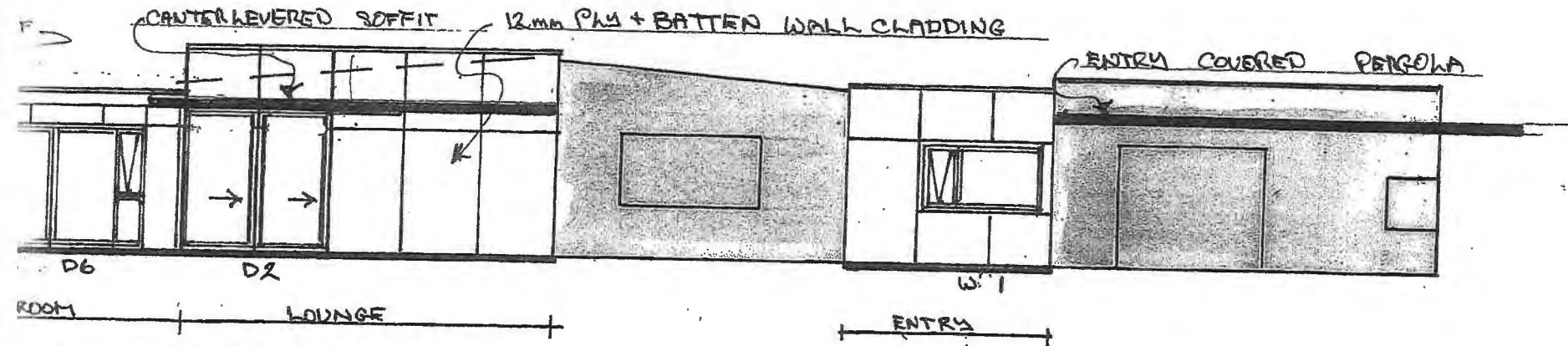
Door 4 has been omitted and replaced with the same exterior cladding to match existing

CAVITY SLIDERS

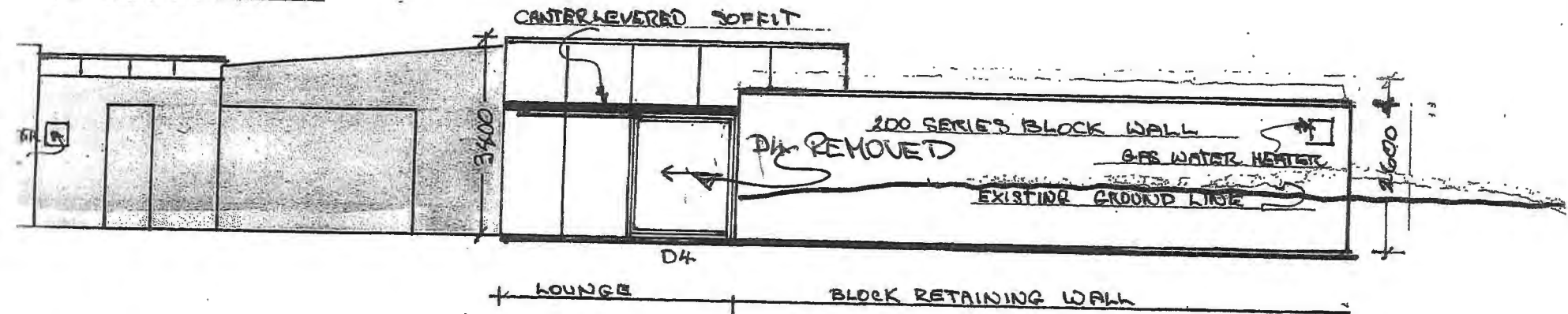
Amended plans show position of the two cavity sliders installed between the lounge and bedroom

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10/05/21
via Site



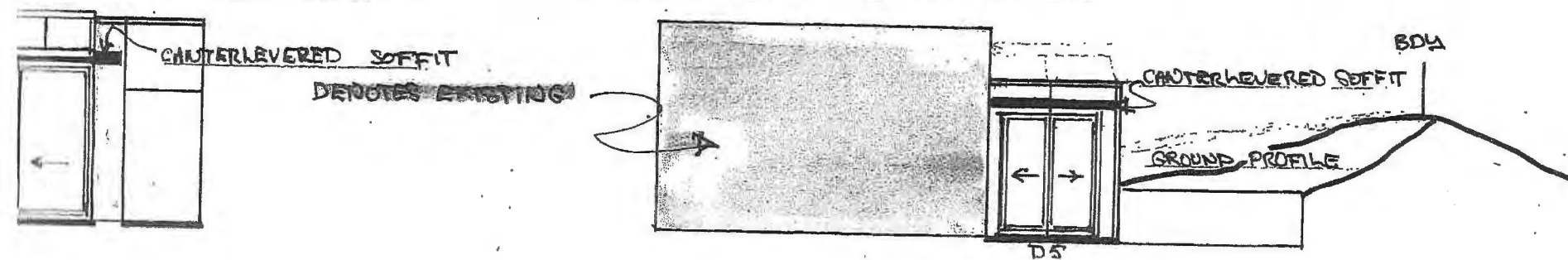


ELEVATION



SOUTH ELEVATION

T. RIS SANDSTONE GREY



From: Anna Clisby anna@protechroofing.co.nz
Subject: ROW
Date: 18 June 2019 at 11:51 AM
To: billcargill@xtra.co.nz

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Kapiti Coast District Council
10/05/21
via Site

AC

Hi Bill

Record of Work attached.

Kind Regards

Anna Clisby
Protech Roofing Ltd
06 368 6477
0274 402 302



Memorandum from licensed building practitioner:
Record of work



Section 88, Building Act 2004

The Building

Street address:	104 Raukawa Road
Suburb:	Waikanae Beach
Town/City:	Peka Peka
Postcode:	5391

The Project

Building Consent number: 170863

The Owner(s)

Name(s):	Bill Cargill
Mailing address:	104 Raukawa Road
Suburb:	Waitarere Beach
Town/City:	Peka Peka
Phone No.	027 241 2097
PO Box/Private Bag:	
Post Code:	5391
Email address:	billcargill@xtra.co.nz

Record of Work that is Restricted Building Work

External Moisture Management Systems

Roof Cladding or roof cladding system	<input checked="" type="checkbox"/>	Installation of 1.5mm Dove Grey Butynol to flat roof extension area approx. 66m2.	<input type="checkbox"/> Carried Out
Wall Cladding or wall cladding System	<input type="checkbox"/>		<input checked="" type="checkbox"/> Supervised
			<input type="checkbox"/> Carried Out
			<input type="checkbox"/> Supervised

Issued By

Name:	Benjamin Clisby	LBP number:	BP114385
Classes licensed in:	R2 & R4		
Street Address:	14 Sheffield Street, Levin, 5510		
Phone No:	06 3686 477	Mobile:	0272 485 688
Email address:	ben@protechroofing.co.nz	Website:	www.protechroofing.co.nz

Declaration

DECLARATION

I, Benjamin Clisby carried out or supervised the restricted building work recorded on this form.

Signature: Ben Clisby

Date: 18/6/2019

BC170863
Received by
Kapiti Coast District Council
10/05/21
via Site

Residential Warranty

ColorCote®
The right roof always lasts longer


Pacific Coilcoaters® produces high quality roofing, cladding and rainwater goods under the ColorCote® brand. We warrant that your ColorCote® pre-painted product will not flake, peel or perforate as a result of corrosion for the minimum period specified in the Warranty Certificate subject to compliance with all warranty terms and conditions. To the maximum extent permitted by law our liability under this warranty shall in all cases be limited to replacing or re-painting any defective product at our discretion and subject to the conditions contained in this warranty.

Owner / Site Details

Property Owner	Bill Cargill		
Start Date	01-12-2018		
Site Address	104 Raukawa Road, Waikanae Beach, Peka Peka, New Zealand	Atmospheric Environments (Refer AS/NZS 2728)	4 (Severe Marine)

Roofing

Product	ZinaCore
Warranty Period	Will not flake, peel or excessively fade: 15 Years Will not perforate through corrosion: 15 Years
Paint System	ColorCote standard paint
Colour	Sandstone Grey
Coil Lot Number	P532357C
Rollformer	Quin Buildings Direct
Profile	Corrugated
Contractor	Bill Cargill
Special Conditions	


Signed for and on behalf of
Pacific Coilcoaters

Official Warranty Manager
or authorised deputy

Warranty Terms And Conditions

This warranty is issued by Fletcher Steel Limited, trading as Pacific Coilcoaters. It is given solely and exclusively to the person or entity named on Pacific Coilcoaters' copy of the warranty.

The product/s covered under this warranty are subject to normal wear and tear, which may include fading, chalking and dirt collection. Minor white corrosion may appear at unwashed tension bends or cut edges. This is a natural weathering consequence and does not constitute a failure of the coating system. Testing to determine coating performance will be in accordance with the methods described in Australian Standard AS1580.

This warranty is subject to the following terms and conditions:

1. The product being warranted must be that recommended by Pacific Coilcoaters, through their online warranty enquiry service or other written advice, to ensure the correct product for the environment and application has been used
2. The attached Maintenance Schedule must be strictly complied with and documented. *Failure to comply with the attached Maintenance Schedule requirements may result in the warranty being voided at our discretion.*
3. The installed pitch of the roof must be equal to or greater than 3°, or the minimum recommended for the profile, whichever is greater.
4. This warranty only extends to product/s which are coated with the ColorCote® paint system referred to in the schedule overleaf and which have been coated and supplied by Pacific Coilcoaters. No downgraded product is covered by this warranty.
5. To the maximum extent permitted by law Pacific Coilcoaters excludes liability (whether statutory, contract or tort) for any indirect loss, loss of profits, expectation loss, consequential or any other incidental loss or costs, special damage or loss of any kind whatsoever (including, but not limited to, damage caused by leaks).
6. To the maximum extent permitted by law, Pacific Coilcoaters excludes liability for business to business transactions under the Consumer Guarantees Act and the Fair Trading Act (in particular sections 9, 12A, 13 and 14)
7. Pacific Coilcoaters expressly disclaims and will not be responsible for any other warranty issued by any other party in respect of any component of your ColorCote® pre-painted metal roof or the specification, design, manufacture or installation thereof. All claims under warranties issued by third parties must be directed to those third parties.
8. Failure of the product, in whole or in part, due to one or more of the following causes is NOT covered by this warranty:
 - Collapse or movement of the structure on which the roof is mounted or any removal or weakening of the roof's supports or foundations.
 - Failure to comply with the the Maintenance Schedule.
 - Physical damage during or after installation, including scratching, contact with other metal items, incorrect installation of external objects such as air-conditioning units, PV/solar energy systems and failure to remove swarf.
 - Failure to transport, handle, store, install or maintain the product in accordance with recommendations given by Pacific Coilcoaters and the NZ Metal Roof and Wall cladding Code of Practice (MRM Code of Practice) or prudent trade practice.
 - Use of incorrect fasteners or failure to replace corroded fasteners
 - Attack from chemical or other agents, fumes, solids or liquids other than direct rain or run-off falling onto the product under warranty.
 - Contact with, or runoff from, copper or other metals likely to cause cathodic reactions, or with acidic, alkaline, or similar corrosive substances, chemical agents, green or wet timber or treated timber.
 - Contact with soil, ash, fertilizer, moisture retaining substances, or sunscreen
 - Corrosion arising from lapped areas of end-lapped sheets.
 - Corrosion from the underside of the ColorCote® material, as a result of high humidity, condensation or pollution from within the building.
 - Any acts or omissions on your part or on the part of paint suppliers, metal producers, rollformers, fabricators, builders, subcontractors, architects, specifiers or any other party excluding Pacific Coilcoaters.
 - Incorporation of the ColorCote® product into, or use in connection with, roofing or cladding materials manufactured by someone other than Pacific Coilcoaters.
 - Application of post paint treatments or systems unless expressly recommended by Pacific Coilcoaters.
 - Any abnormal natural phenomena or act of god including, without limitation, earthquakes, fires, floods, tornadoes, storms, hurricanes, lightning, strong winds, heavy hail, volcanic activity or the build-up of snow or other natural substances.

Pacific Coilcoaters and/or the roofing manufacturer reserve the right to inspect a building prior to issuing of the warranty and/or to inspect and conduct tests as necessary at any time after a claim is made under this warranty and accordingly have access to the property.

If your ColorCote product has failed to perform as warranted, then a claim in writing, specifying in what respect the product has failed to perform, must be made within the applicable warranty period to Pacific Coilcoaters, whose liability in respect of any defect appearing in your ColorCote® pre-painted metal product is limited solely to the replacement of roofing materials or repainting in accordance with the above warranty at Pacific Coilcoaters discretion and subject to these warranty terms and conditions. All claims must be accompanied by this original warranty document, and must be made within two months of the defect coming to your attention. If any ColorCote materials are replaced or repainted in satisfaction of the warranty obligation, the above warranty will apply to those replacement or repainted materials *but only for the unexpired portion of the original warranty period.*

This warranty replaces and supersedes all previous warranties or representations made by Pacific Coilcoaters.

968 Great South Road, PO Box 12046, Penrose, Auckland 1642.

Telephone: 0800 279 979 Facsimile: +64 9 579 7515

www.colorcote.co.nz

ColorCote® is a registered trademark of Fletcher Steel Ltd.
ZincCore™, MagnaFlow™ and AlumiGard™ are trademarks
of Fletcher Steel Ltd.

Pacific Coilcoaters is a trading division of Fletcher Steel Limited,
a Fletcher Building Limited Business.

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How to wash down your roof

Washing naturally unwashed areas	<ul style="list-style-type: none">• Use water and a soft nylon-bristled brush• A low pressure spray (less than 1000psi) may also be used• We support the use of outdoor cleaning detergents that don't contain bleach as part of your 6 monthly washdown. Ensure any run off is not captured into potable water tanks for 2-3 weeks.
Removing Lichen or Mould	<ul style="list-style-type: none">• Wash off loose growth with water and brush• Disconnect any rainwater connection tank from gutter• Apply a diluted bleach (sodium hydrochloride) at 2% solution* and leave for 5 minutes before washing down with copious quantity of clean fresh water.
Removing Pollen deposits	<ul style="list-style-type: none">• Wash off loose growth with water and brush• Disconnect any rainwater connection tank from gutter• Wash roof with an effective detergent-based cleaning product such as Transwash or Simple Green, following the manufacturer's instructions and applying with a soft brush or low pressure spray (less than 1000 psi)• Wash off whole area thoroughly with water to rinse.
Removing oxidation on guttering bends	<ul style="list-style-type: none">• White deposits sometimes become obvious on guttering & fascia, particularly on the bends. This is a natural reaction of the metal and should not cause concern, however it is visually apparent and can be easily cleaned off if attended to early.• Use water and a soft bristle brush, as for washing unwashed areas.

Holes, fixtures and fittings

Holes and penetrations can expose the substrate and let in moisture, therefore care needs to be taken every time you make a hole in any ColorCote product to ensure you don't void the warranty.

- All holes need to be sealed or flashed correctly.
- Fasteners used to attach fixtures must be compatible with the product you are attaching it to, or otherwise be isolated from your ColorCote product. Use of an incorrect fastener type can accelerate corrosion and will void your warranty.
- Areas around fixtures should be closely inspected for any corrosion or contaminants every 6 months when checking your roof.

Fixtures may also have other potential issues which need to be considered:

- Solar panels must have adequate clearance to allow the roof underneath to be washed.
- Solar panels must have adequate clearance to allow the roof underneath to be washed. This area underneath must be washed every 6 months.
- Ensure all fixtures are isolated from your roof with the use of EPDM washers.

Use of touch-up paints and overpainting

Touch-up paint should NOT be used on ColorCote products and use of these products will void your warranty. The paint on our products is oven-cured at a high temperature, whereas touch-up paints air dry. While these paints may look identical when first applied, over time they will become visually very different. Contact Pacific Coilcoaters for advice if your product requires overpainting, to ensure your warranty will be upheld.

Health and Safety Note:

Take care to ensure your safety and the safety of others when completing any maintenance. We would recommend homeowners use a roofer or roof cleaning company where possible. All work, particularly work at heights, must be done safely and in accordance with relevant legislation and best practice. Relevant best practice guidelines for working on roofs can be viewed at the Ministry of Business Innovation & Employment website: www.dol.govt.nz

For further assistance contact Pacific Coilcoaters on 0800 279 979,
by email on enquiries@colorcote.co.nz or visit www.colorcote.co.nz.



BC170863
Received by
Kapiti Coast District Council
10/05/21
via Site



Building Code Clause(s) **B1 VM1**

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance on use of Producer Statements (formerly page 2) is available at www.ipenz.nz)

ISSUED BY: **BASE CONSULTING ENGINEERS LTD**
(Construction Review Firm)

TO: **MR. W. CARGILL**
(Owner/Developer)

TO BE SUPPLIED TO: **KAPITI COAST DISTRICT COUNCIL**
(Building Consent Authority)

IN RESPECT OF: **CARGILL DWELLING**
(Description of Building/Work)

AT: **104 RAUKAWA ROAD**
(Address)

Town/City: **PEKAPEKA** LOT: DP: SO:
(Address)

We **BASE CONSULTING ENGINEERS LTD** have been engaged by **MR. W. CARGILL**
(Construction Review Firm)

To provide ☐ CM1 ☒ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with
owner/developer **MR. W. CARGILL**

or ☐ other services
(Extent of Engagement)

In respect of clause(s) **B1 VM1** of the Building Code for the building work described in
documents relating to Building Consent No. and those relating to

Building Consent Amendment(s) Nos. issued during the
course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions/variation(s) No. **Construction Monitoring Report Job No: 17120** (copies attached)
or by the attached Schedule ☐ have been issued during the course of the works.

On the basis of ☒ this review ☐ these review(s) and information supplied by the contractor during the course of the
works and on behalf of the firm undertaking this Construction Review, I believe on reasonable grounds that
☐ All or ☒ Part only of the building works have been completed in accordance with the relevant requirements of the

Building Consent and Building Consent Amendments identified above, with respect to Clause(s) **B1 VM1**
of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review
have the necessary competency to do so.

I, **Peter Bolton** am: ☒ CPEng **56179** # ☐ Reg Arch #
(Name of Construction Review Professional)

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: **BE Civil**

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

The Construction Review Firm is a member of ACENZ: ☐

SIGNED BY **Peter Bolton** (Signature) 
(Name of Construction Review Professional)

ON BEHALF OF **BASE CONSULTING ENGINEERS LTD** Date **16/03/2018**
(Construction Review Firm)

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

This form is to accompany Forms 6 or 8 of the Building (Form) Regulations 2004 for the issue of a Code Compliance
Certificate.

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 Design Review Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 Construction Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011²

PS4 Construction Review Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

*Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers³). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

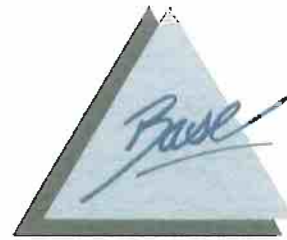
Refer Also:

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

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



CONSTRUCTION MONITORING REPORT



PROJECT: **Cargill Dwelling**

Job: 17120

CONTRACTOR:

CONTRACTORS SITE REPRESENTATIVE : **Bill Cargill**

DATE: **15:03:18**

TIME: **4:00pm**

INSPECTION No: **#1**

WEATHER CONDITIONS : **fine**

LOCATION: **104 Raukawa Road**

Pekapeka

NOTES & PHOTOGRAPHS:

1.1 General Project Overview:

Site visit as requested to check reinforcing prior to pouring concrete foundation

1.2 Specific Elements Inspected:

Piles driven, reinforcing all in place, DPM and mesh in place

2 D12 to bottom in place, D12 stirrups in place under D20 thru pile

D10 stirrups to FD2 ok

Laps and corner bars ok

OK to pour when complete

1.3 Miscellaneous:



View to East



P. Bolton

Peter Bolton
CMEngNZ CPEng
Base Consulting Engineers Ltd
peter@basecon.co.nz
0274 444 080

From: Eric the Plumber office@erictheplumber.co.nz
Subject:
Date: 8 April 2021 at 9:35 PM
To: billcargill@xtra.co.nz

EP

Hi Bill,

Here is your gas certificate.

Regards

Eric

GASFITTING CERTIFICATE OF COMPLIANCE – GAS SAFETY CERTIFICATE	
Client Name:	Bill Cargill
Reference / Job #:	ICP (if known):
Address of work:	104 Raukawa Rd
Suburb:	Town / City: Peka Peka
Description of gasfitting work: (If different gasfitting work was done by different people, state who did what gasfitting.)	
Installation of a twin 8kg LPG bottle station and connecting 20mm copper pipework clipped to exterior of dwelling on west wall to one Rinnai REU-A2426WG-ZK 184mj water heater. Tested and commissioned installation.	
Gas supply pressure	2.75 kPa
Risk classification (tick one)	<input type="checkbox"/> Low-Risk <input checked="" type="checkbox"/> General <input type="checkbox"/> High-risk
Gas type (tick one)	<input type="checkbox"/> Natural gas <input checked="" type="checkbox"/> LPG <input type="checkbox"/> Biogas <input type="checkbox"/> Other (specify)
The work has been done in accordance with a certified design: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<input type="checkbox"/> Copy of certified design attached. (Or provide reference to readily accessible format, eg internet link.)	
The work relies on manufacturer's instructions: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Copy of manufacturer's instructions attached. (Or provide reference to readily accessible format, eg internet link.)	
www.rinnai.co.nz	
The work has been done in accordance with means of compliance (specify):	
<input checked="" type="checkbox"/> Yes – AS/NZS 5601.1 sections 3 to 6 <input type="checkbox"/> Yes – AS/NZS 5601.2 sections 3 to 9 <input type="checkbox"/> No	
Were any other standards required for compliance?	
<input type="checkbox"/> Yes (specify) <input checked="" type="checkbox"/> No	
Parts of the gas installation that are safe to connect to a gas supply?	
<input checked="" type="checkbox"/> All <input type="checkbox"/> Parts (specify)	
Date(s) on which the work was done (if different from date of certifying gasfitting):	
Name and registration number of anyone who carried out work under supervision:	
<input checked="" type="checkbox"/> I confirm that I am satisfied that the work described in this certificate of compliance has been done lawfully and safely, and that the information on this certificate is correct.	
Certifier name:	Erich van der Merwe
Registration number:	21912
Certifier signature:	<i>E. v. d. Merwe</i>
Date:	08/04/2021
<input checked="" type="checkbox"/> I confirm that the work described in this Gas Safety Certificate, and the installation or part installation, is connected to a gas supply and is safe to use.	
Name of person authorized to certify the connection:	Erich van der Merwe
Registration number:	21912
Date of completion or connection (if different from date of issuing GSC):	

Certifier Signature:

E. v. d. Merwe

Date:

08/04/2021

This certificate confirms that the gasfitting work complies with the building code for the purposes of Section 19(1)(e) of the Building Act 2004.

Construction Chemicals (NZ) Ltd's Waterproof Membrane System

Installation Check Sheet

BC No :- 170863

Project Name	BILL AND LORRAINE CARGILL - BATHROOM		
Project Address	104 RAUKAWA RD, PEKA PEKA.		
Building Contractor	BILL CARGILL		
	Phone	027 2412097	
Applicator	ADAM PETTEFAR - PTPM LTD		
Commencement Date	24/8/20	Completion Date	25/8/20

(WATERPROOFING)

Construction By Builder	Signature	Date
Concrete deck structurally sound and cured at least 28 days (installed 1 1 1)	A. Pettifar	22/8/20
Compressed fibre cement sheet, glued and screwed to falls and without ponding	N/A	
Check support structure is H3.2 treated timber on 200x50 joists @ 400mm centres	N/A	
Ensure doors, penetrations and cladding are not installed prior to waterproofing (Remove if necessary)	A. Pettifar	22/8/20
Falls (minimum 1:80) even to adequate outlets/overflows	A. Pettifar	22/8/20
Construction Chemicals Certified Applicator		
Substrates checked and satisfactory (cleaned and ready)	A. Pettifar	24/8/20
Repairs (listed separately) carried out	N/A	
Primer (Primer & Grout Additive, SuperPrimer or Bonding Slurry) applied to all surfaces PRIMEBOND	A. Pettifar	24/8/20
50mm Bond Breaking Tape applied to all sheet joints, penetrations and changes of plane	A. Pettifar	
1 st coat of selected membrane applied and 140mm Reinforcing Tape embedded fully to all sheet joints, penetrations and changes of plane	A. Pettifar	
2 nd and 3 rd coats of selected membrane applied to the whole substrate of the selected areas	A. Pettifar	25/8/20
Curing and Protection Time given to builder - Work may commence (1 1 1)	N/A	
Project completed to satisfactory standard, warranty provided	A. Pettifar	25/8/20

Repairs required to conform to NZ Building Code	Builder	Applicator
Problem		
Remedy		
Problem		
Remedy		
Problem		
Remedy		
Problem		
Remedy		

N/A

Product

Areas where membranes applied			
Product	Type of Area	m ²	Warranty Period
HYDRATHANE	TO THE SHOWER WALLS, BASE AREA AND THE MAIN FLOOR, 'TANKED' APPROX 100mm UP THE WALLS OUTSIDE OF THE SHOWER AREA.	17.6	15 YRS (Product)

Quality Assurance Checklist		TICK
1. Supporting Structures and substrate checked		✓
2. Substrate cleaned, prepared and primed		✓
3. Application in accordance with Construction Chemicals (NZ) Ltd written instructions, NZ Building Code, project documents and sound trade practise		✓
4. Application work supervised and inspected at each stage		✓
5. Maintenance/remedial work carried out		N/A
6. Satisfied that the work is to a very high standard		✓
7. Quality Assurance form remitted to Construction Chemicals (NZ) Ltd?		N/A
8. Is there a main contractor Project Warranty required for this installation		N/A
9. Have you provided the Workmanship warranty and Producer Statement to the main contractor		✓
10. If so, for what period (.....2.....years) WORKMANSHIP		✓
11. Has this installation been inspected by Construction Chemicals (NZ) Ltd KAPITI COAST DISTRICT COUNCIL		
12. If so, name of representative (.....GARETH MCCULLAGH.....)		
PASSED		Date 25/8/20

Products Used on site		
Number	Size	Product Name
21-7	LITRES	HYDRATHANE

In support of this application, we advise that Construction Chemicals (NZ) Ltd (CCNZ) supplied all materials used and covered under this warranty. Further, in consideration of your Issuing the Product Performance Warranty to the benefit of our client, we warrant and declare that all the materials, application and processes have been applied and carried out by us in accordance with Construction Chemicals (NZ) Ltd application instructions and technical literature, AS 3740-2004 and other relevant Standards and will comply with the NZ Building Code, Sections B2, E2 & E3. Furthermore we agree to indemnify and keep indemnified Construction Chemicals (NZ) Ltd against all liability incurred by them to our client as a result of the issue of the Product Performance Warranty for materials supplied that become faulty due to incorrect application procedures. We will further issue a separate Workmanship Warranty and Producer Statement to the client

Signature of the Applicator 

APPLICATOR'S PRODUCER STATEMENT

I/We ADAM PETTEFAR

Of PETTEFAR TILING & PROPERTY MAINTENANCE LTD

Being an Applicator

Confirm that we have applied HYDRATHANE (Product)

At 104 RANKAWA RD, PEKA PEKA - BATHROOM

Completed 25/8/20 for MR + MRS CARGILL

In accordance with the manufacturers written application instructions, AS3740-2004 and clauses E2, E3 and B2 of the current NZ Building Code.

I/We are satisfied that the substrate over which this system has been applied has been suitably prepared, and the materials have been correctly installed, including 50mm wide Bond Breaking Tape or Neutral-Cure Silicone, Reinforcing Tape 140mm minimum and Reinforcing Matting 970mm as required.

This work has been certified by ADAM PETTEFAR

Signed



Date

25/8/20.

Manufacturer's 15 year Guarantee

- *Construction Chemicals manufactures products throughout Australia, Asia and New Zealand and has over 30 years of manufacturing experience.*
- *We maintain a Research and development laboratory that maintains and develops leading edge technology.*
- *We guarantee our tile adhesives and grout; Waterproof membranes are guaranteed when applied by an Accredited Applicator.*

"When tiles are installed in accordance with AS 3958 Part 1- guide to the installation of ceramic tiles, and waterproofing is installed in accordance with AS 3740 -2004, Waterproofing of wet areas within residential areas, in conjunction with our written instructions, good trade practise and any relevant local requirement, Construction Chemicals guarantees the performance of the products mentioned on the guarantee when applied to structurally sound surfaces"

This guarantee is for a fifteen (15) year period from the time of the original installation and covers only the cost of materials and labour of the original installation when the product is proven and acknowledged to be faulty.

**CONSTRUCTION
CHEMICALS**

Adelaide, Brisbane
Melbourne, Sydney, Perth
Auckland & Kuala Lumpur

Dribond



ENGINEERED SOLUTIONS FOR
TILING, FLOORING & WATERPROOFING

Standard Materials Warranty

Warranty Number: NZCBM-0074278

Date of Installation: 14-Dec-2018

Building/Project Address: 104 Raukawa Road, Peka Peka

Company: Protech Roofing ("the Applicator")

Address: 326 Arapaepae South Road, RD 1, Levin 5571

Phone: 0800 427 372

Reference: 040619

Product Type and Use: 1.5mm Dove Grey Butynol, Roof

Area Laid: 66.00 SquareMetres

Subject to the conditions appearing below, ARDEX NEW ZEALAND LIMITED ("ARDEX") warrants to 104 Raukawa Road that the ARDEX Membrane stated as the Product Type will retain its waterproofing properties for the following period from the date of installation of the Membrane:

This warranty is effective for (20) twenty years years from the date of installation of the Membrane.

This Warranty is subject to the following conditions.

Extent of Liability

1. Warranty shall only apply to any defect in the Membrane which permits the entry of water due solely to the natural deterioration of the Membrane or ridges or splits not caused by structural failure of movement of or cracks in the substrate or roof base or insulation over which the Membrane is applied. This Warranty does not cover workmanship which is and shall be the sole responsibility of the approved applicator who is not an agent, servant, or employee of ARDEX.
2. Failure to follow the ARDEX Specification and Instructions of use of the Product and/or all applicable laws will render this Warranty null and void. This includes protection of the Membrane when used in below ground DPM tanking, internal waterproofing and external waterproofing applications. ARDEX advise that products may have limitations as detailed in the product datasheets.
3. This Warranty will not apply where any other product or material has been added to or used in conjunction with the product, unless approved by ARDEX in writing (permission can be given or withheld at ARDEX's discretion and is not required when using ARDEX Tile adhesives in conjunction with ARDEX Undertile Membranes).
4. ARDEX's obligations under this Warranty shall be limited to the timely repair or replacement by ARDEX of any defective Membrane which permits the entry of water at ARDEX's cost. This is ARDEX's sole and total liability under this Warranty.
5. ARDEX shall have no further liability or responsibility other than set out in this Warranty. In particular, ARDEX shall not be liable for any loss of profits or loss of revenue or for any other economic loss or for any special, indirect, incidental, consequential damage, loss or injury of any kind, including but not limited to, damage to the structure or its contents arising under any theory of law whatsoever.
6. Without limiting the generality of the preceding clauses, this Warranty shall not cover and ARDEX shall have no liability for the following acts, conditions, or circumstances or any damage or defects which may arise there from:
 - a. Wars, strikes, lock-outs, delays, acts of God, fire, earthquake, flood, hail, lightning, hurricane, tornado, windstorm, governmental or environmental interference or any other cause (whether similar or dissimilar) beyond the reasonable control of ARDEX; or
 - b. The act, omission, default or representation of any party other than ARDEX or its servants or agents; or
 - c. Exposure to a chemical or solution, fire or radiation, or contamination by radioactivity from any nuclear fuel or waste; or
 - d. Settlement, distortion, failure of the walls or foundations of the building, ponding or cracking of the roof or the deck; or
 - e. Infiltration or condensation of moisture in, through, or around the walls, copings, building structure, or underlying or surrounding materials; or
 - f. Any design defect or structural failure of any framework or material in or on which the Membrane has been installed or applied which was not supplied by ARDEX; or
 - g. Materials other than the membrane, including, but not limited to, metal work expansion or control joints, fasteners, drains, vents, vapour retarders, walkways, pitch pockets, flashing materials and rooftop units and equipment; or
 - h. Expansion or contraction of any flashing or metal work, any adjacent or abutting building, structure or improved or unimproved property, or any component thereof, including but not limited to, structural failure or damage, leakage, or drainage; or
 - i. Any new installations, repairs, or other maintenance or construction on, to or through the Membrane; or
 - j. Damage caused directly or indirectly by falling objects or traffic of any nature on the roof; or
- k. Improper installation of insulation or defects or failure of any material used in any roof base or insulation over which the Membrane is applied; or



WORKMANSHIP WARRANTY

"The Longrun & Membrane Specialists"

BC170863

Received by

Kapiti Coast District Council

10/05/21

via Site

Date: 17th June 2019
Property: 104 Raukawa Road, Peka Peka
For: Butynol to extension roof
Term: 5 (five) years from 14th December 2018 – 13th December 2023
Scope: Installation of 1.5mm Dove Grey Butynol to flat roof area approx.. 66m2

CONDITIONS:

1. This guarantee provides, for the stated period above, against any faulty workmanship in application and installation under conditions of normal use.
2. This guarantee does not cover any fault in the materials that are manufacturing faults and a separate manufacturer's guarantee for their product should be provided direct from the manufacturers.
3. Protech Roofing Ltd, under this guarantee, shall provide for making good any problems that may arise from any installation fault, within a reasonable time frame, and that no person or persons other than the said fixer (Protech Roofing Ltd) attempt to make good without the consent of the said fixer.
4. Protech Roofing Ltd, under this guarantee, shall have no liability for any other trades or persons making application or installing any foreign articles e.g aerals, skylights, etc to/on the said membrane.
5. Protech Roofing Ltd, under his guarantee, shall have no liability for any puncture, fissure or tear that has been caused by any article that has been placed or dropped on the membrane e.g. furniture, plant pots, stands, etc.
6. Protech Roofing Ltd, under this guarantee, shall have no liability for any fissures, splits or damage to the membrane caused by any defective substrate or movement in the substrate causing the membrane to split, or tear.
7. Protech Roofing Ltd, under this guarantee, shall have no liability for any damage caused by chemicals, adhesives or additional product used for the purposes of tiling, decking, covering or cleaning the membrane.
8. Protech Roofing Ltd takes responsibility for the work that he/she has provided as long as the membrane is maintained in accordance with the manufacturer's recommendations, and these recommendations should be laid out in the manufacturer's guarantee.
9. Protech Roofing Ltd, under this guarantee, is not liable for any consequential loss or damage to the substrate, structure or contents of the building.

Signed by the Guarantor:
David Clisby
PROTECH ROOFING

Protech Roofing Ltd
14 Sheffield Street
Levin 5510

Email: dave@protechroofing.co.nz
Mobile: Dave Clisby 0274 402 301
Office: 0800 427 372

Website: www.protechroofing.co.nz
LBP No. BP114385





ENGINEERED SOLUTIONS FOR
TILING, FLOORING & WATERPROOFING

- l. The failure of material or structures to conform to manufacturer's specifications as to roof slopes or other requirements; or
- m. Negligence, misuse, improper treatment or improper site preparations; or
- n. Storage, handling or installation of the Membrane otherwise than in accordance with ARDEX's published use and handling procedures and installation specifications.

Claim

- 7. This Warranty shall be invalid unless ARDEX receives the Owner's written claim within the warranty period and within fourteen (14) days after the date of reasonable discovery of any alleged defect.
- 8. This Warranty remains current for the period as specified previously in this document and is transferable should ownership of the property on which the membrane is applied change.

Access to Material and Site

- 9. In the event that it is necessary for ARDEX to repair or replace any defective Membrane, the Owner shall provide ARDEX with clear and unrestricted access to the Membrane. Nothing in this Warranty shall require ARDEX to remove and/or replace plant, equipment or any other object or substance in order to gain access to the defective Membrane. The Owner shall co-operate in all respects with ARDEX to accomplish the said repair or replacement. The cost of any site visit requested under a Warranty claim which does not reveal any problem which ARDEX has liability for under this Warranty shall be paid for, at ARDEX's sole discretion, by the party requesting the inspection at the then current trade consultancy rates.

Consumer Guarantees Act

- 10. Where the Membrane is being acquired by you in trade you agree that it is fair and reasonable in the circumstances that the Consumer Guarantees Act 1993 (CGA) not apply. Accordingly, to the maximum extent permitted by law, the CGA shall not apply.

No Other Warranty

- 12. Except as expressly set out in this Warranty, and with the exception of the relevant statutory warranties contained in the CGA that cannot be excluded, no other warranty or condition shall be implied against ARDEX by any statute, at common law or otherwise, and no representation, express condition, warranty or variation of this warranty shall be binding on ARDEX unless it is in writing and signed for or on behalf of ARDEX. This Warranty shall prevail despite any indication to the contrary by any person acting or purporting to act on ARDEX's behalf and shall replace all or any other alleged rights or remedies contained in any other document or representation whether issued or made prior to or subsequent upon the granting of this Warranty by ARDEX.

Validity of Warranty

- 13. This Warranty is valid and enforceable on the condition that ARDEX has been paid in full for the Membrane supplied.

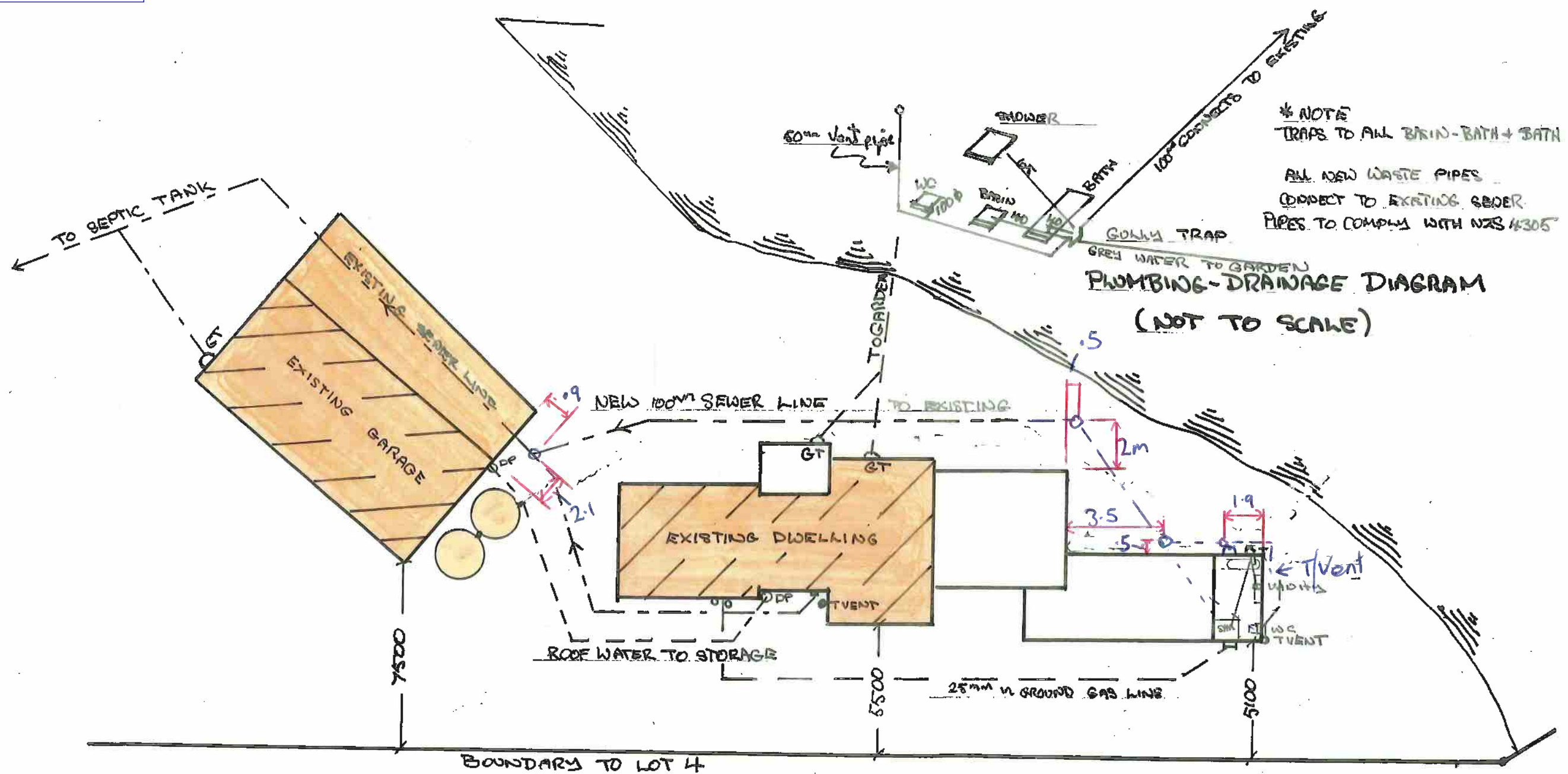
Applicable Law

- 14. This Warranty is governed by the laws of New Zealand.

By:

DJ [Signature]

Date: 04-Jun-2019



PLUMBING AND DRAINAGE PLAN 1:200

NOTE:
PIPE SIZES NEED TO COMPLY WITH NZS 4305
TABLE 5
THE SANITARY DRAINAGE AND WASTE PIPE SYSTEMS
SHALL BE INSTALLED TO SATISFY COMPLIANCE WITH
THE RELATIVE PERFORMANCES, PROVISIONS AND CONDITIONS
OF AS/NZS 3500.2.2003
WATER SERVICES SHALL COMPLY WITH THE NZ BUILDING CODE G12/AS1
HOT WATER SHALL BE AT A TEMPERATURE THAT SHALL NOT EXCEED 55°

PRODUCER STATEMENT PIPED SERVICES AND PLUMBING STACKS



Construction Review

Send or deliver this form to: Kapiti Coast District Council,
175 Rimu Road, Paraparaumu 5032
Private Bag 60601, Paraparaumu 5254
For enquiries, phone 04 296 4700 (Toll Free: 0800 486 486)

BC170863

Received by
Kapiti Coast District Council
10/05/21
via Site

TO BE COMPLETED BY THE INSTALLER

Issued by: *Erich van der Merwe*

Registration number: *21912*

In respect of Piped Services installed in accordance with G12/AS1 as shown on the approved plans or as per the attached amended plan and Sanitary Plumbing Stacks installed in accordance with G13/AS1 or AS/NZS 3500.2.2

Installed at: *104 Rankana Rd*

Building Consent No: *170863*

As a certified plumber, currently holding an annual practicing license, certify that I, or personnel under my control, have carried out the installation of the above system and I believe on reasonable grounds that the installation complies with the New Zealand Building Code. Both hot and cold systems have been pressure tested for a period of 15 minutes at a pressure of 1500 kPa.

Name: *Erich van der Merwe*

Signature: *E.v.d. Merwe*

Address: *52 Waterstone Avenue*

Date: *06/04/2021*

Phone: *_____*

Fax: *_____*

Mobile: *021-117-5629*

Email: *office@erichplumber.co.nz*

Kāpiti Coast District Council Office Use Only

Producer Statement author authenticated and current registration verified. Verification and Registration checked through public register on www.pgdb.co.nz.

Date:

Name:

Signature:

ADVICE OF LICENSED BUILDING PRACTITIONER(S)

Owner must notify names of licensed building practitioners before restricted building work commences

Building Act 2004, section 87

Send or deliver this form to: Kapiti Coast District Council,
175 Rimu Road, Paraparaumu 5032
Private Bag 60601, Paraparaumu 5254
For enquiries, phone 04 296 4700

Kapiti Coast District Council
at Paraparaumu

26 FEB 2018

Council use only:
Application #
Property ID

By *Letta* Time *3-25*

THE BUILDING (project location)

Building name (if applicable)

Building street address *104 Raukawa Rd PEKA PEKA*

THE PROJECT

Building consent number *140 863*

THE OWNER (must be completed and all details must be the owner's)

Owner's name (for individuals, state the preferred form of title, e.g. Mr, Mrs, Ms, Miss, Dr. For companies, trusts and other organisations provide a contact person's name)

W + LJ CARGILL

Address *104 Raukawa Rd Peka Peka*

Date *26th Feb 18.* Landline *—* Mobile *02724120917*

After hours Fax Email *billcargill@extra.co.nz*

LICENSED BUILDING PRACTITIONERS ENGAGED TO CARRY OUT/SUPERVISE RESTRICTED BUILDING WORK

Particular work to be carried out or supervised	Name	Licensing class	Licensed building practitioner number (or registration number if treated as being licensed under section 291 of Act)
<i>Building + Construction</i>	<i>Bill Cargill</i>	<i>Carpentry SR</i>	<i>114618</i>
<i>Plumbing Drainage Gas Fitting.</i>	<i>MARK SCAIFE</i>	<i>Plumbing Drainage Gas Fitting</i>	<i>X 11244 12424</i>
<i>Block laying</i>	<i>Jason Bean</i>	<i>B1 B2</i>	<i>106353</i>

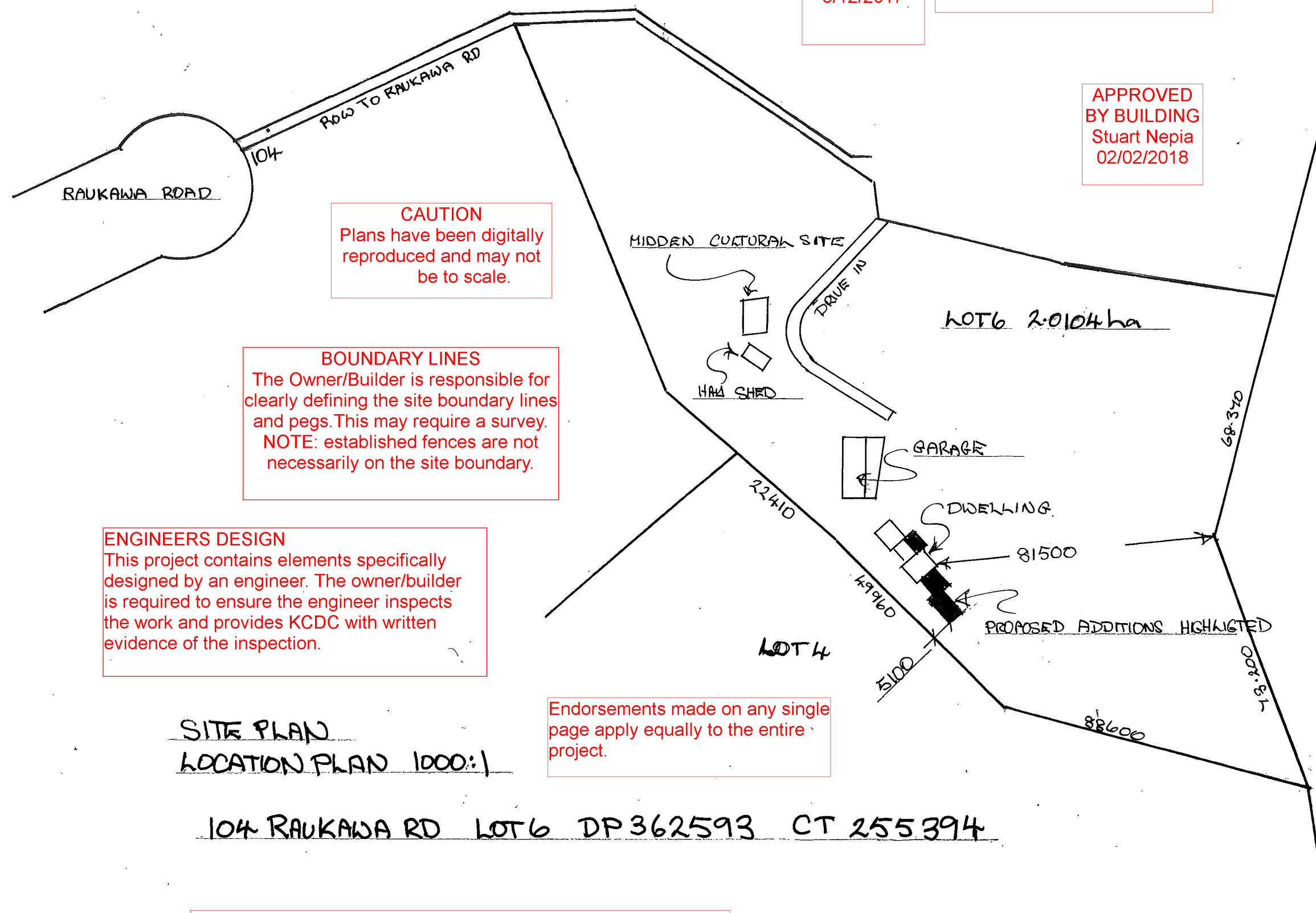
LICENSED BUILDING PRACTITIONERS ENGAGED TO CARRY OUT/SUPERVISE RESTRICTED BUILDING WORK (cont.)

Particular work to be carried out or supervised	Name	Licensing class	Licensed building practitioner number (or registration number if treated as being licensed under section 291 of Act)
Roofing. Butynol.	HRC Roofing	Roofing Roof Membranes	106553 116534
Waterproofing. Block wall.	Cargill Const.	Carpentry SZ.	114618
Framing.	Cargill Const.	Carpentry SZ	114618
Colour steel Roofing + Flashings.	Cargill Const	Carpentry SZ	114618
ELECTRICAL	O'NEAR'S ELECTRICAL	Electrical Reg.	E17118

COUNCIL USE ONLY

LBP(s) checked	Y	All OK	Y	N
Comments				
Date issued				

BC170863
Received by
Kapiti Coast District Council
26/02/2018



APPROVED
BY
PLANNING
nancyg
5/12/2017

Earthworks 1.1m deep & 19m³
volume,
as per the Excavation Plan.
nancyg - 5/12/2017

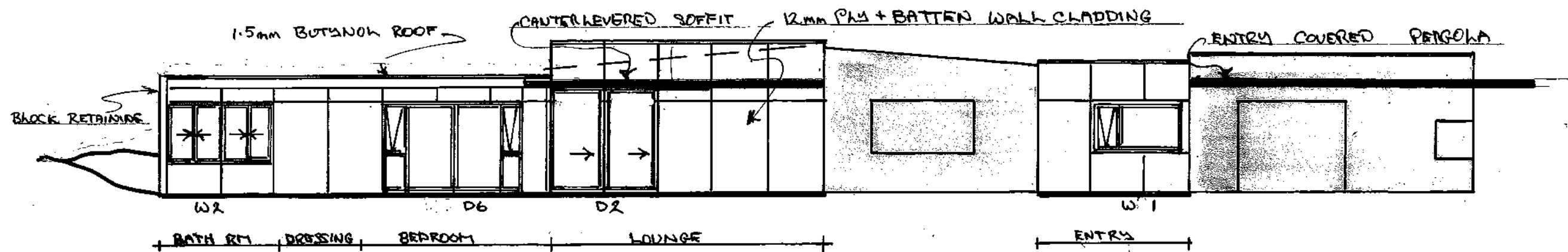
APPROVED
BY BUILDING
Stuart Nepia
02/02/2018

Endorsements made on any single
page apply equally to the entire
project.

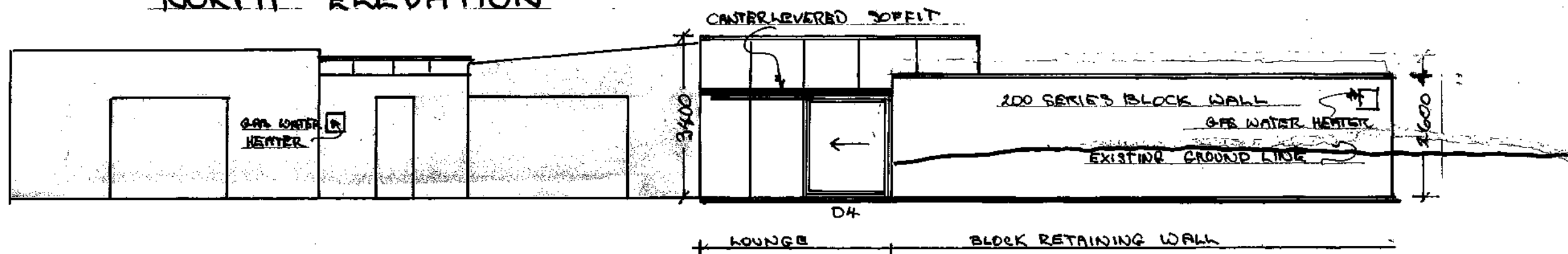
Noisy Equipment
It is the responsibility of the owner to ensure that no work with noisy equipment shall be carried out before 7:30 a.m. or after 6 p.m. Monday to Saturday. During the week there may be workers on site from 6:30 a.m. quietly preparing for work. Work with noisy equipment is not permitted on Sundays or public Holidays.

BC17086;

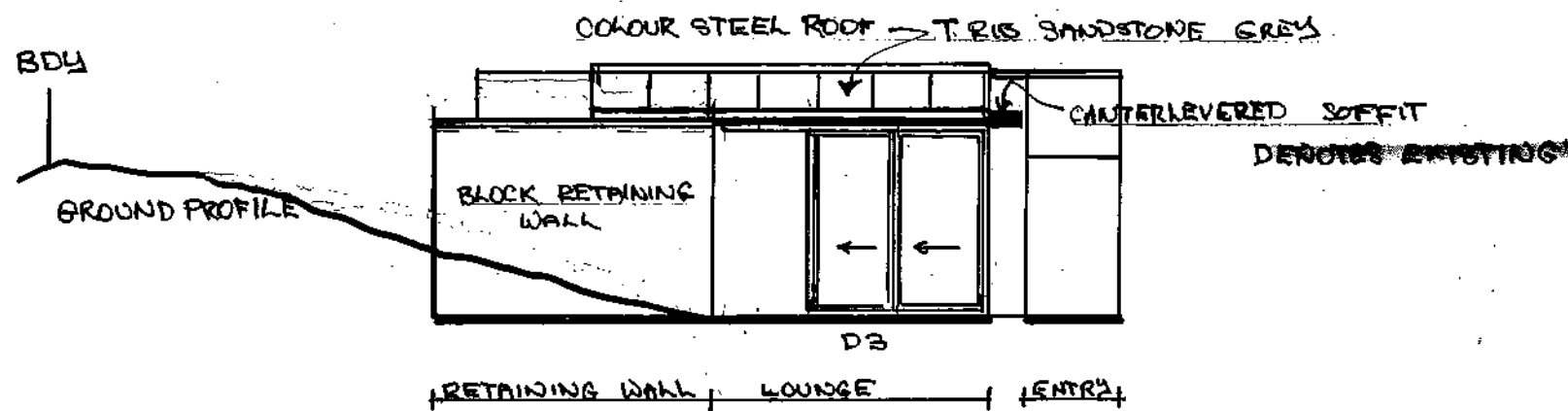




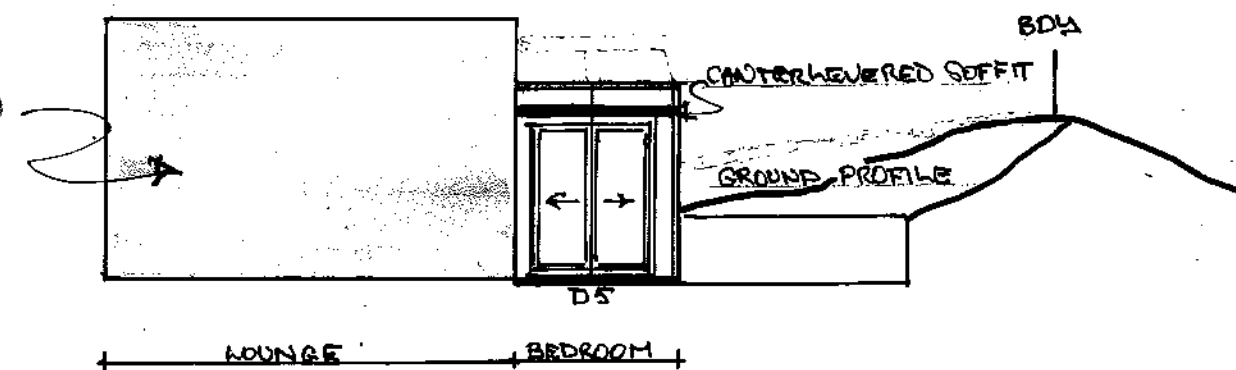
NORTH ELEVATION



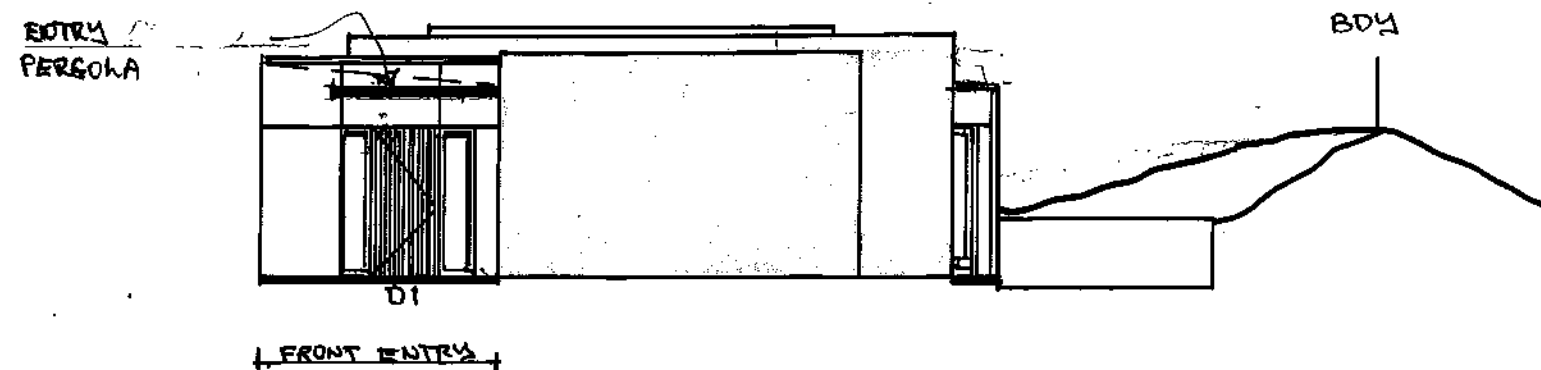
SOUTH ELEVATION



EAST ELEVATION

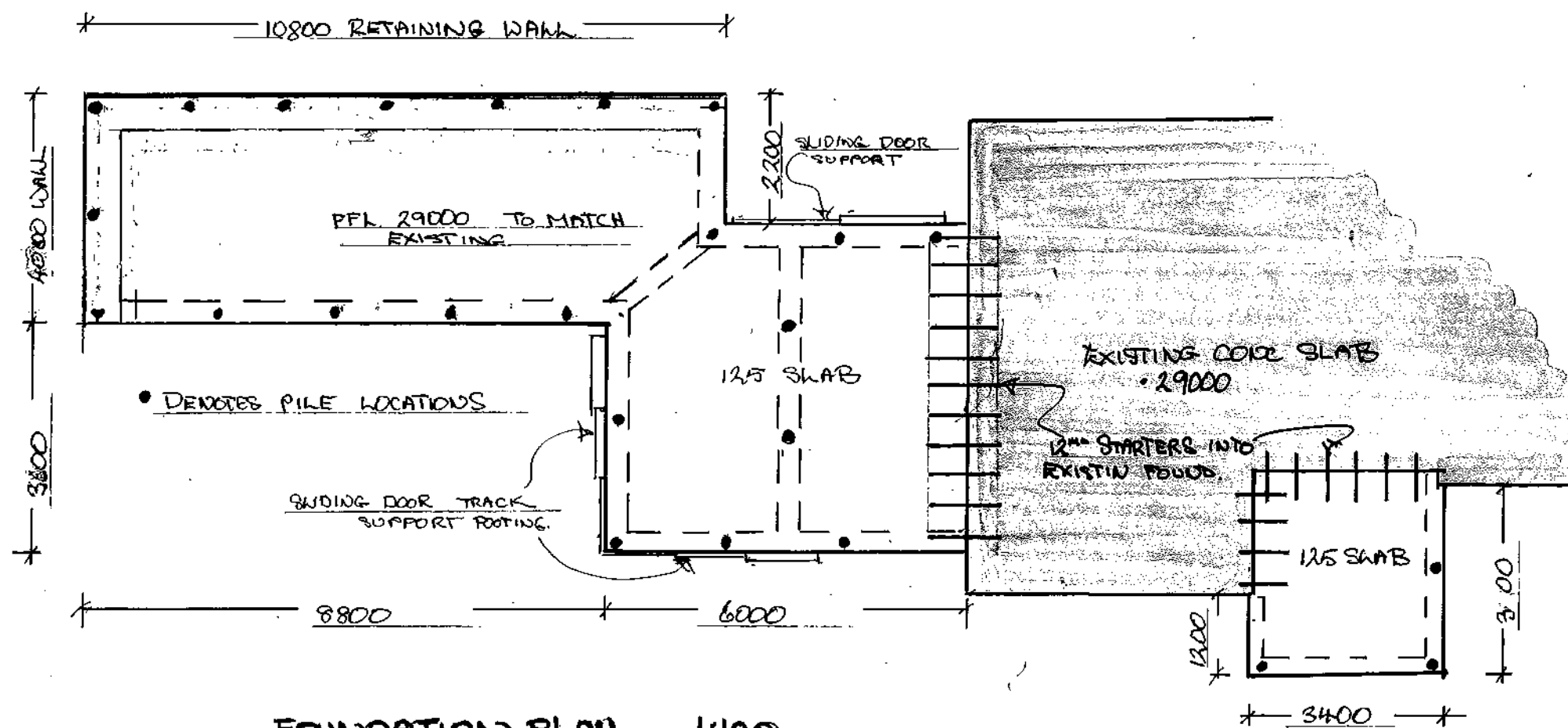


WEST ELEVATION

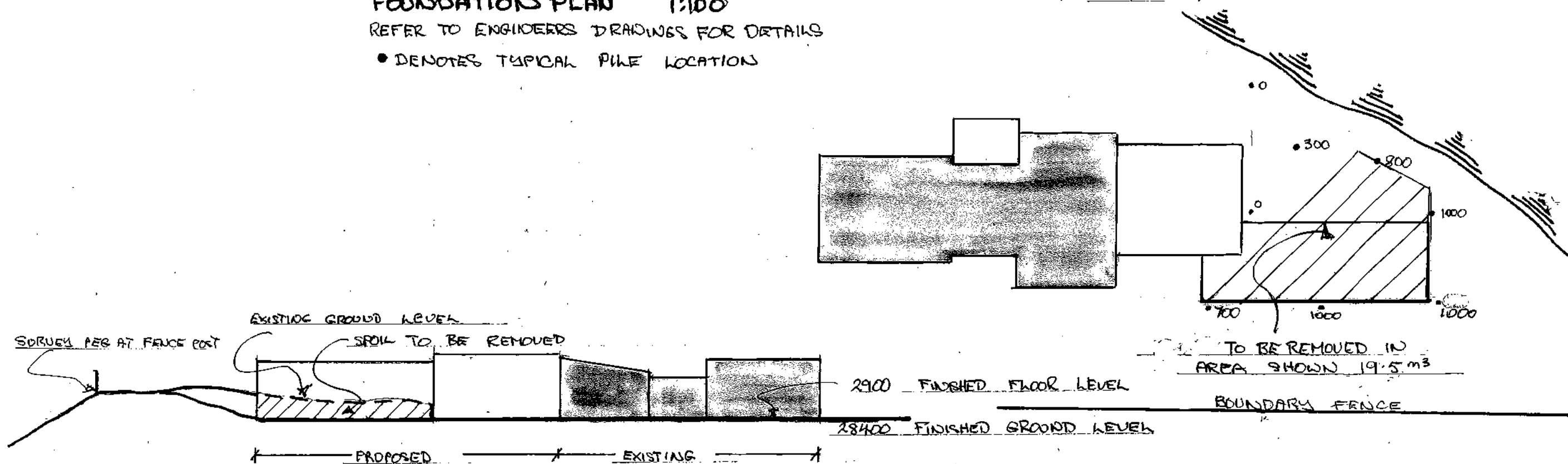


WEST ELEVATION

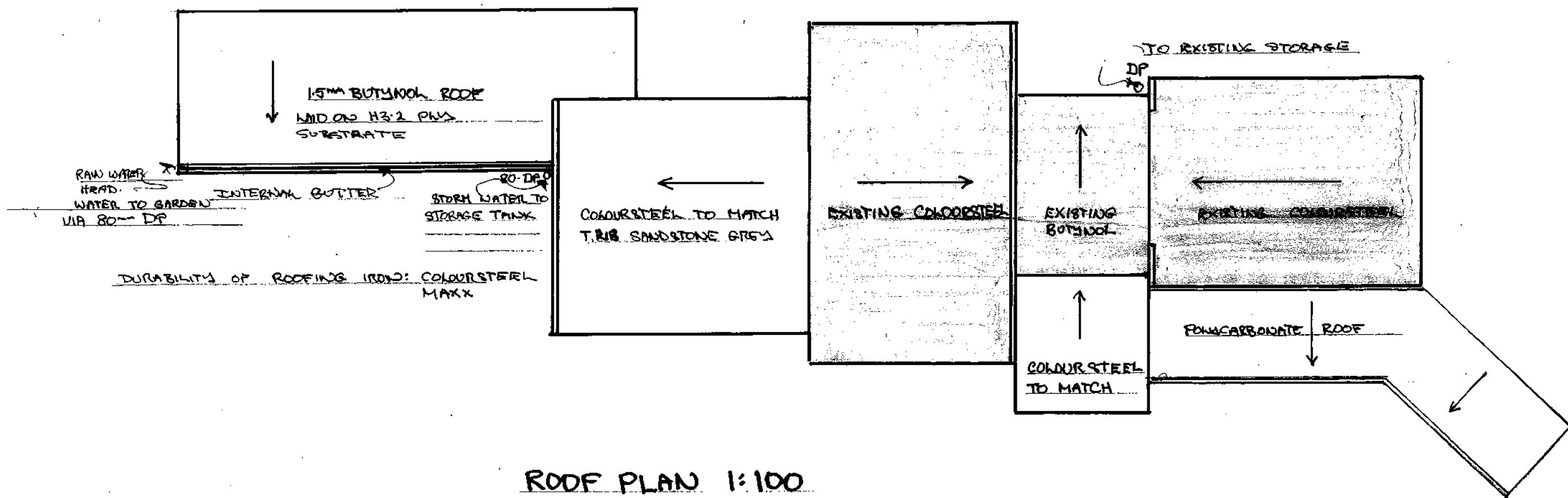
ELEVATIONS 1:100



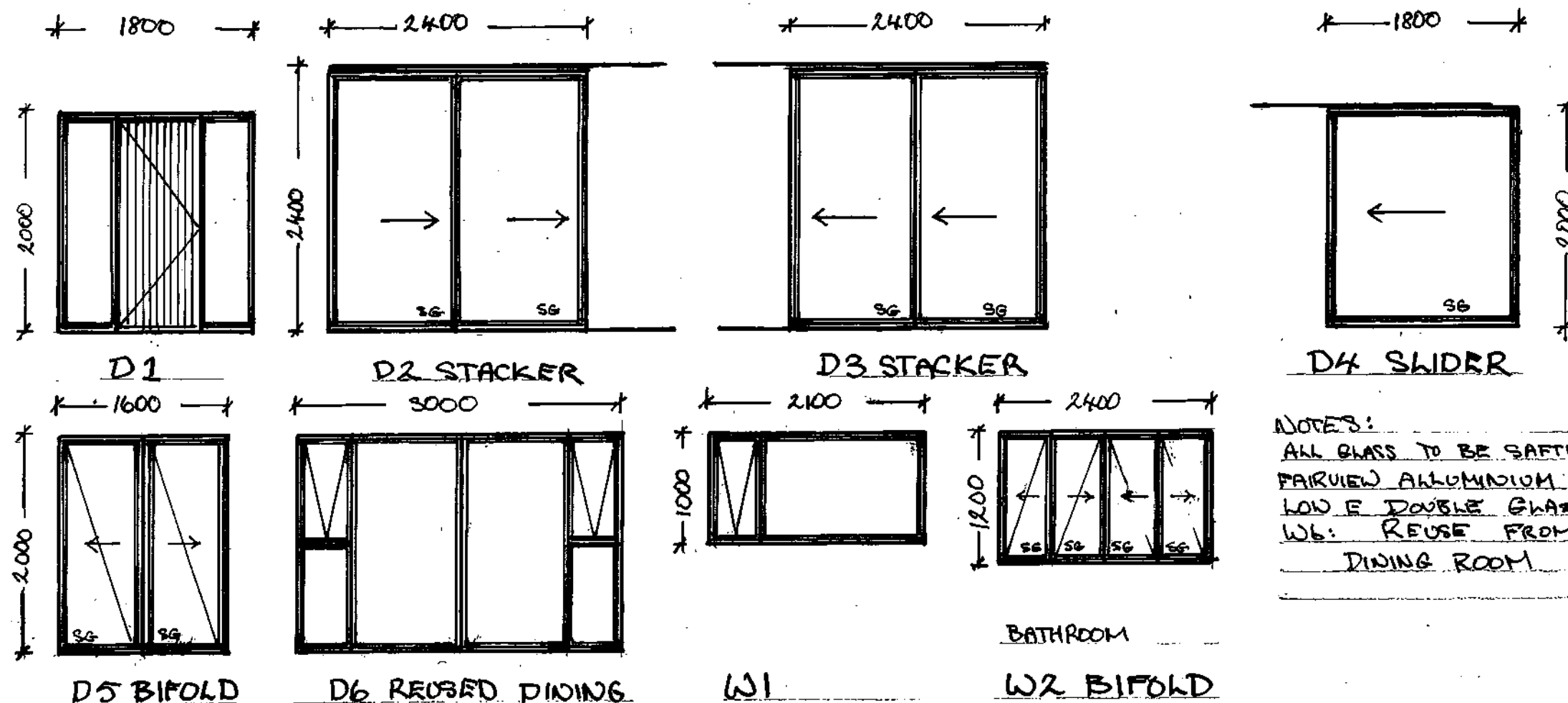
FOUNDATION PLAN 1:100
 REFER TO ENGINEERS DRAWINGS FOR DETAILS
 • DENOTES TYPICAL PILE LOCATION



SITE LEVELS — EXCAVATION PLAN 1:200



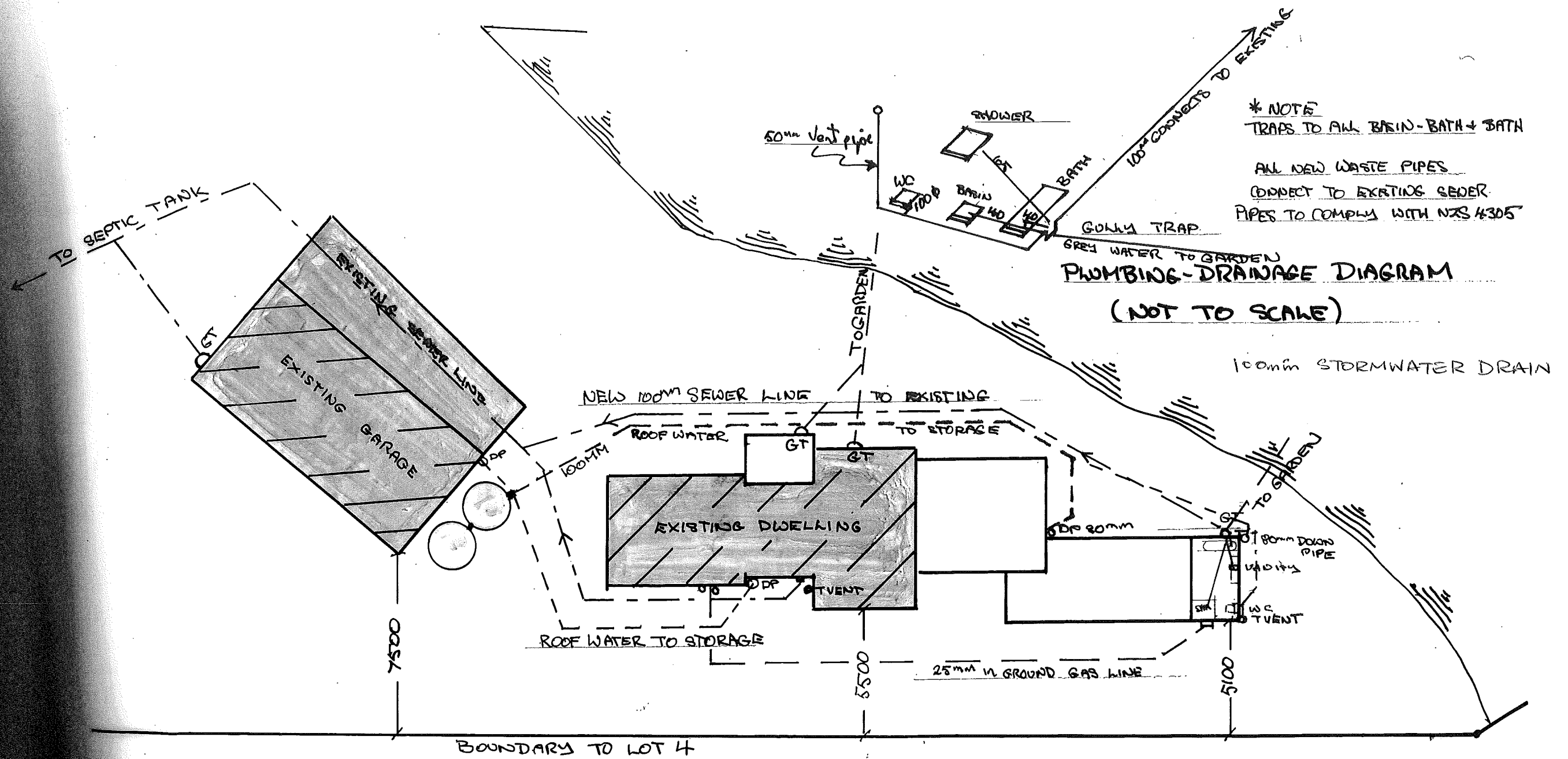
ROOF PLAN 1:100



NOTES:
ALL GLASS TO BE SAFETY GLASS
FAIRVIEW ALUMINIUM SUITE
LOW E DOUBLE GLAZED
W6: REUSE FROM EXISTING
DINING ROOM

WINDOW + DOOR SCHEDULE 1:50

A CERTIFYING PLUMBER/DRAINLAYER TO FILL OUT ATTACHED PRODUCER STATEMENT FORMS AND RETURN TO COUNCIL .ALSO PROVIDE NEAT ASBUILT DRAINAGE PLAN SHOWING SEWER,STORMWATER AND WATER.



PLUMBING AND DRAINAGE PLAN 1:200

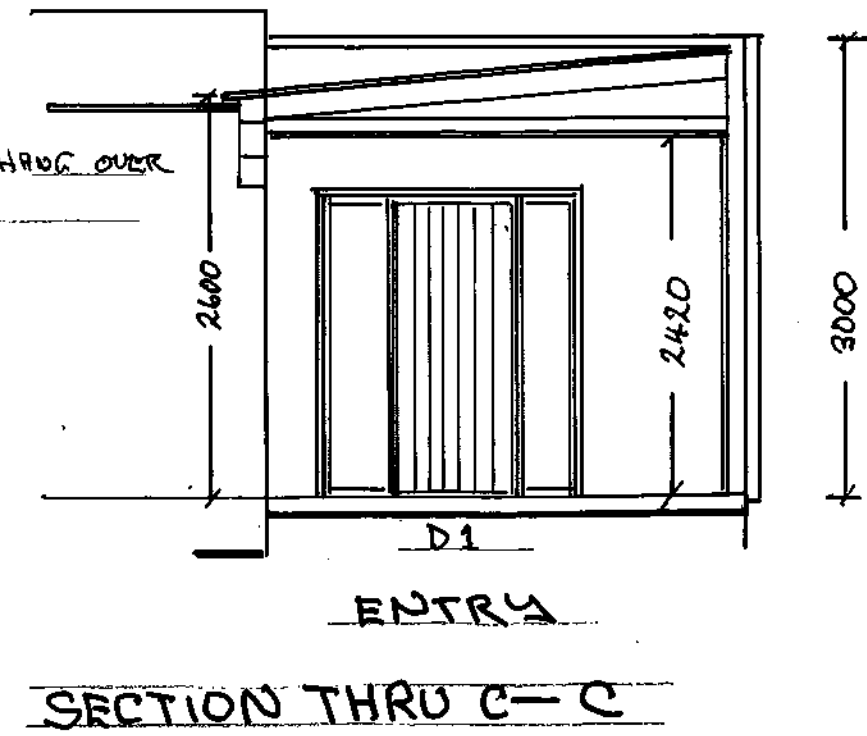
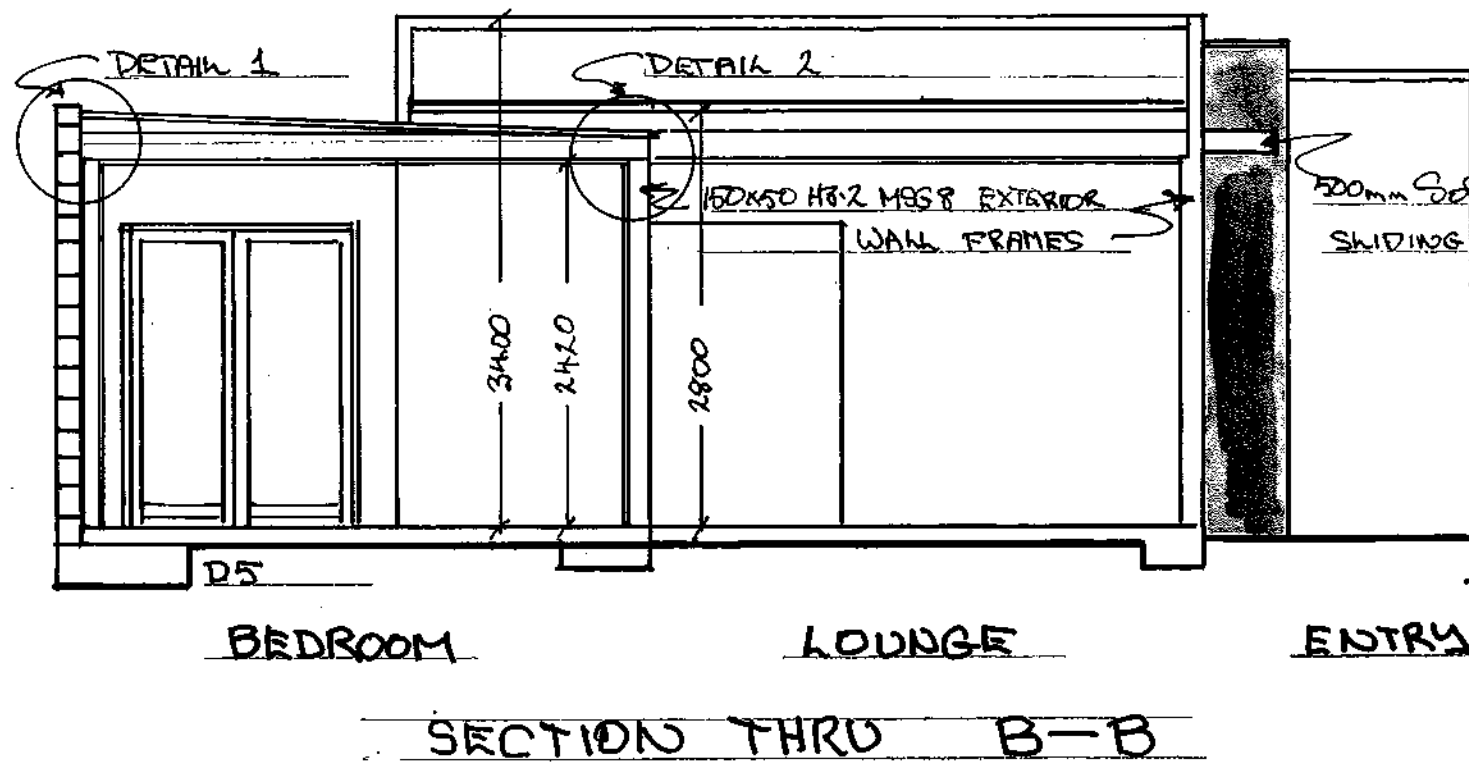
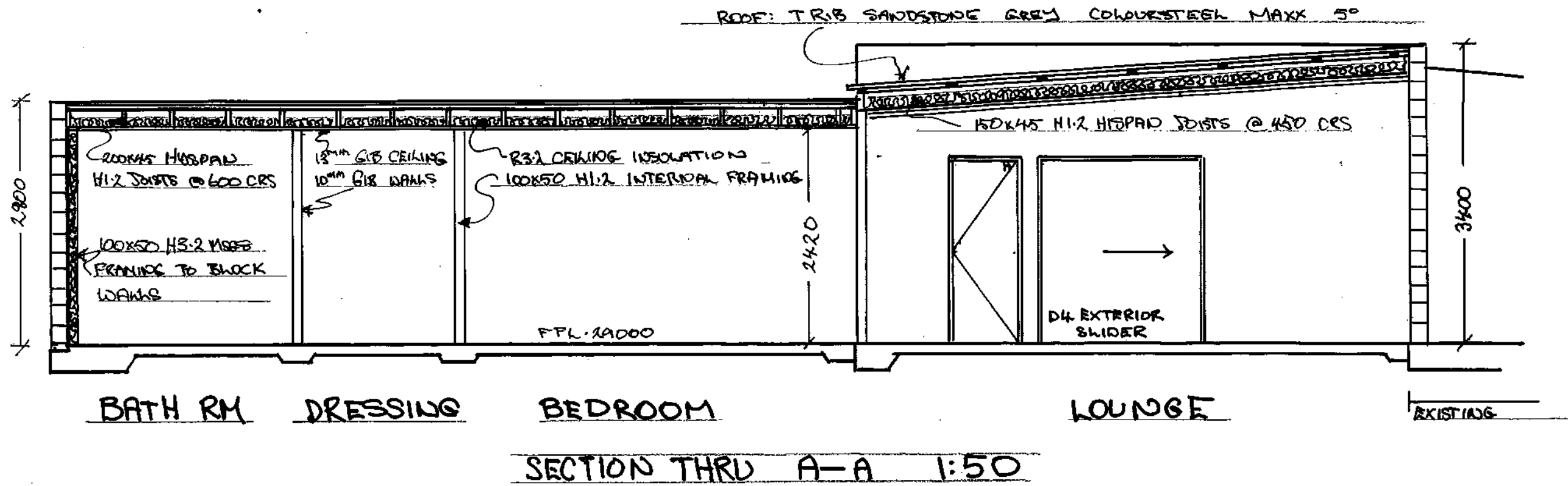
Pipes under the slab to be inspected before covering.

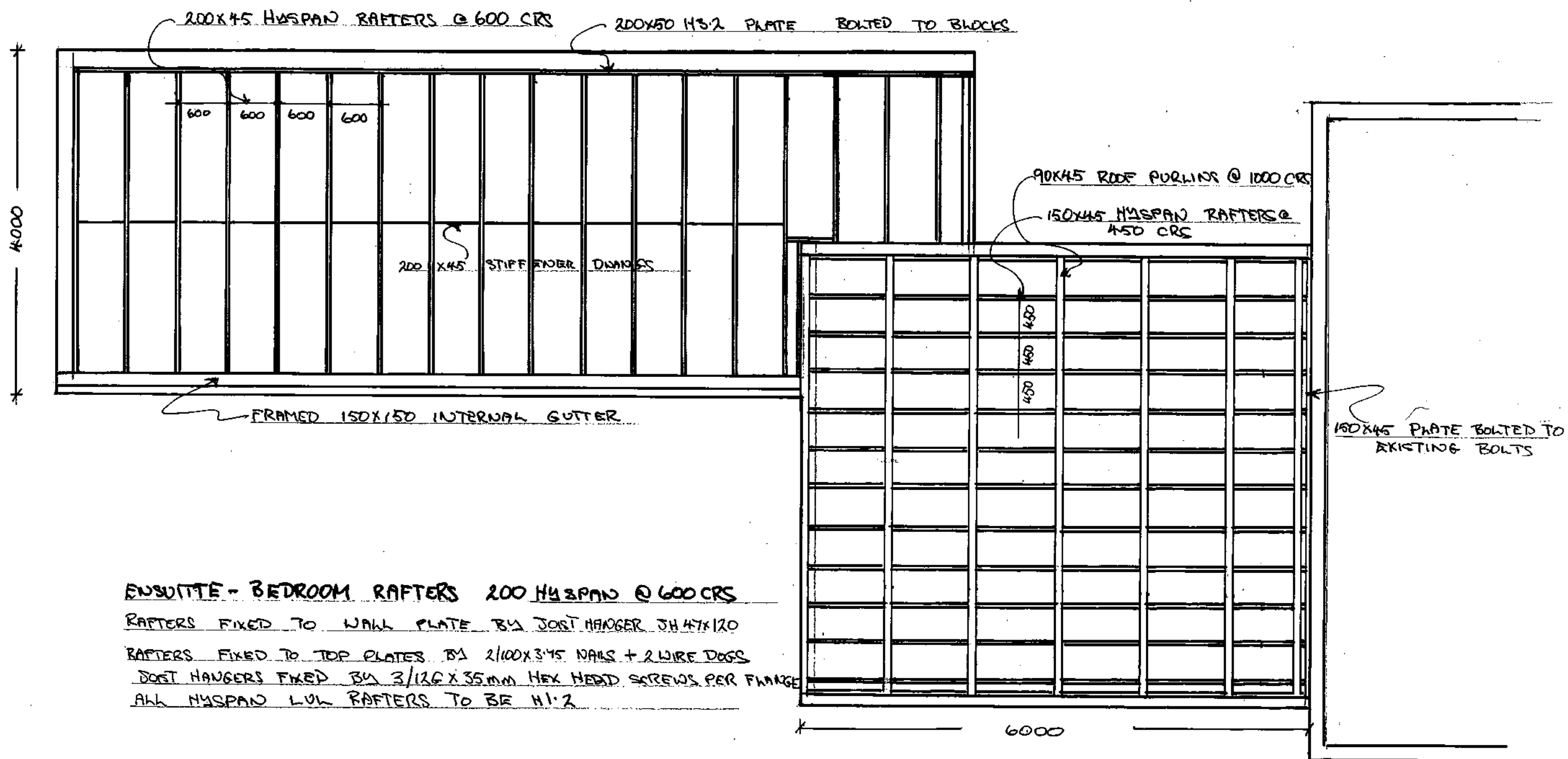
THE BUILDER IS TO ENSURE THAT
PROPOSED FOUNDATION
HEIGHT WILL ALLOW A
SATISFACTORY DRAINAGE
CONNECTION TO THE
SEWAGE TREATMENT SYSTEM

SIZES NEED TO COMPLY WITH NZS 4305

WASTEWATER DRAINAGE AND WASTEPIPE SYSTEMS
BE INSTALLED TO SATISFY COMPLIANCE WITH
PERFORMANCE, PROVISIONS AND CONDITIONS
3500.2.2003

SERVICES SHALL COMPLY WITH THE NZ BUILDING CODE G12/AS1
SHALL BE AT A TEMPERATURE THAT SHALL NOT EXCEED 55°





ENSUITE - BEDROOM RAFTERS 200 Hyspan @ 600 CRS

RAFTERS FIXED TO WALL PLATE BY JOIST HANGER JH 47x120

RAFTERS FIXED TO TOP PLATES BY 2/100x3.75 NAILS + 2 WIRE DOGS

JOIST HANGERS FIXED BY 3/12G x 35mm HEX HEAD SCREWS PER FLANGE

ALL Hyspan LVL RAFTERS TO BE H1.2

ROOF FRAMING PLAN 1:50

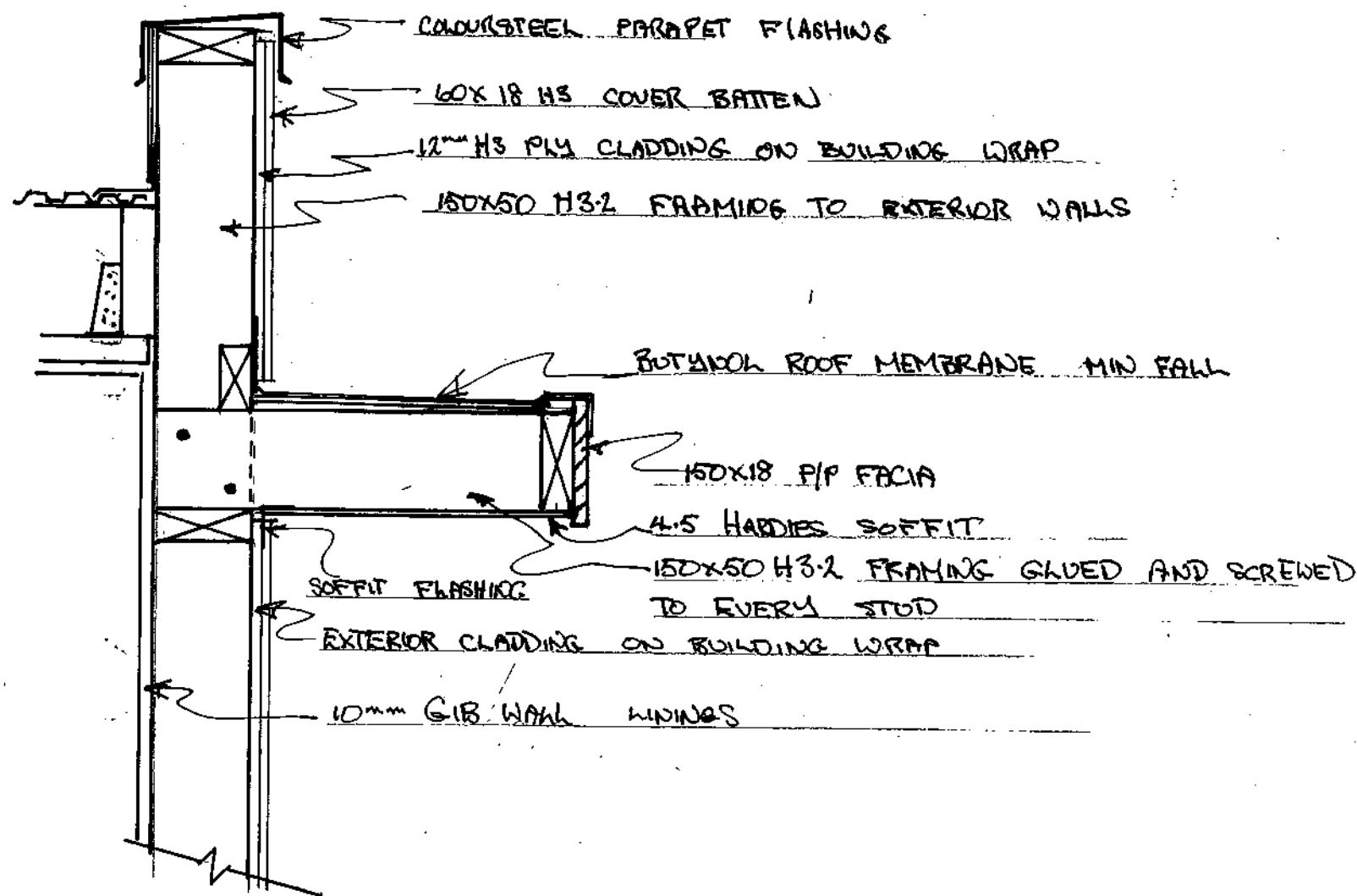
Lounge RAFTERS 150x45 Hyspan @ 450 CRS

PURLINS 90x45 @ 1000 SPACINGS MAX. FIXINGS TYPE

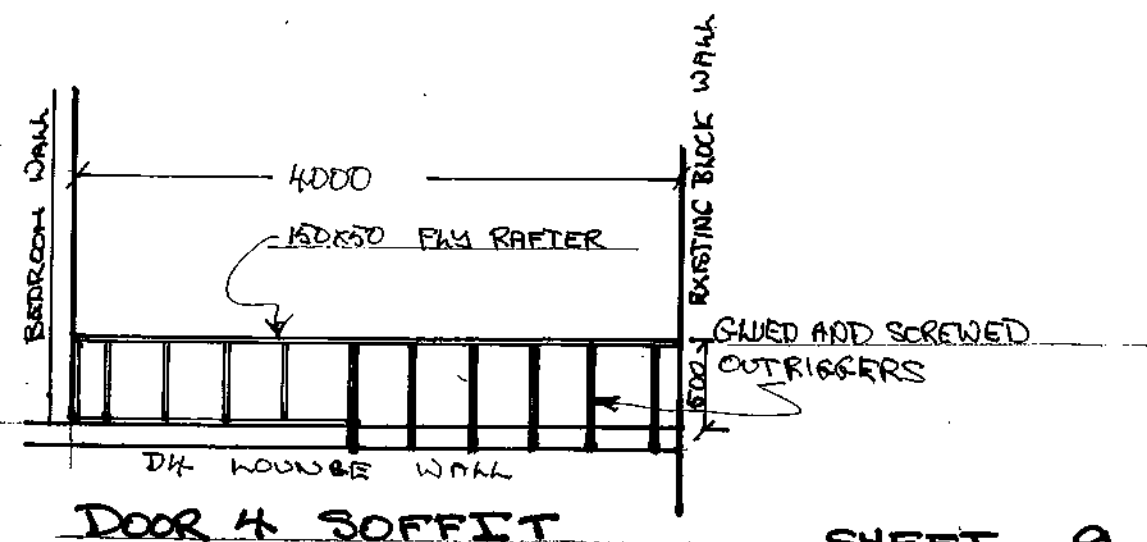
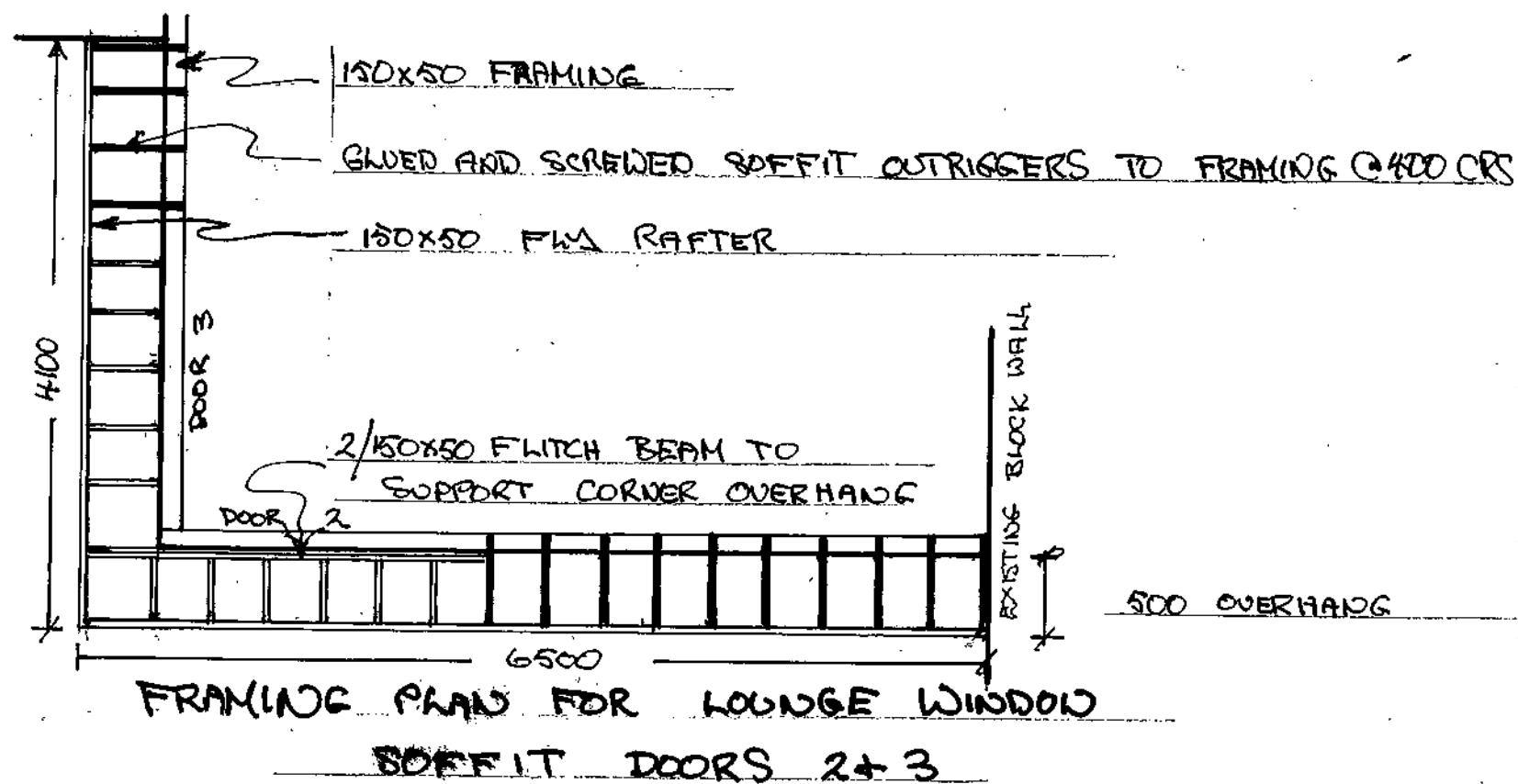
D AS PER SH/AS1 TABLE 5.1.2 IN SPECS

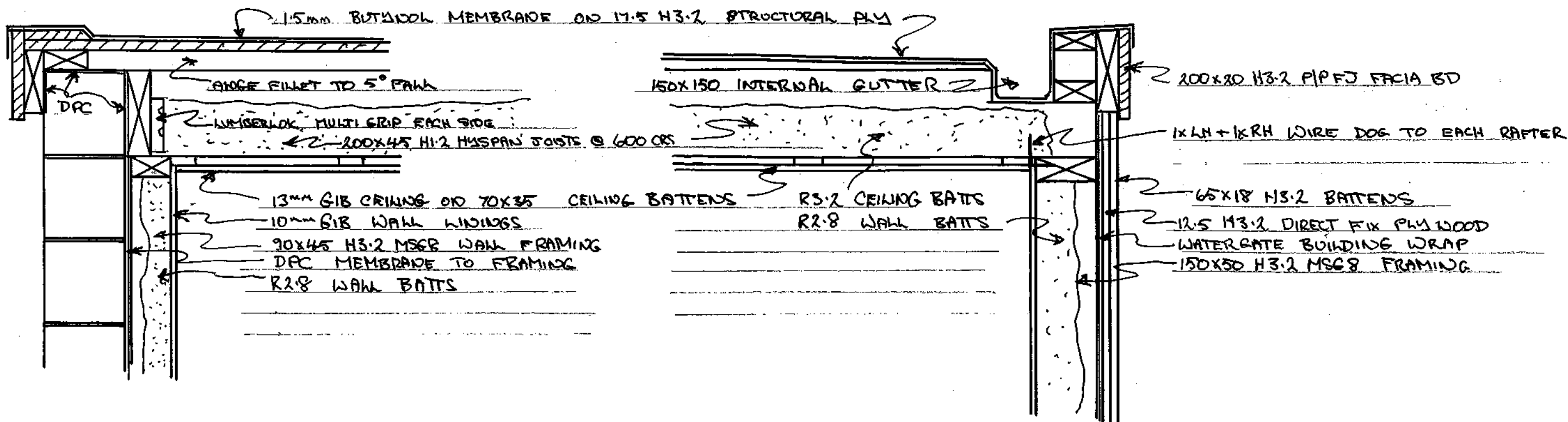
RAFTERS FIXED TO WALL PLATE BY JOIST HANGERS JH 47x120

FIX WITH 2/12G x 35mm HEX HEAD SCREWS PER FLANGE



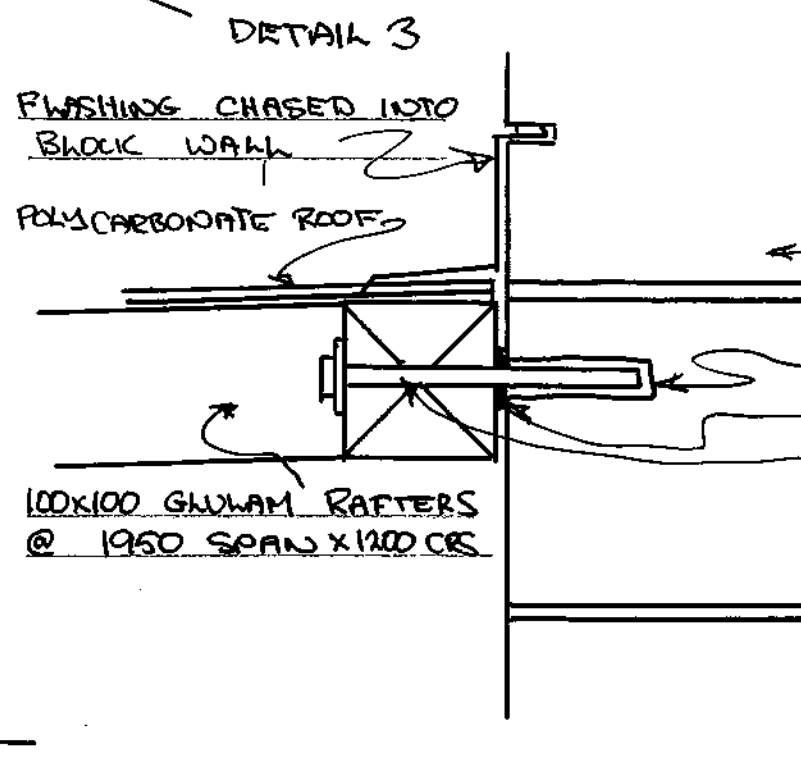
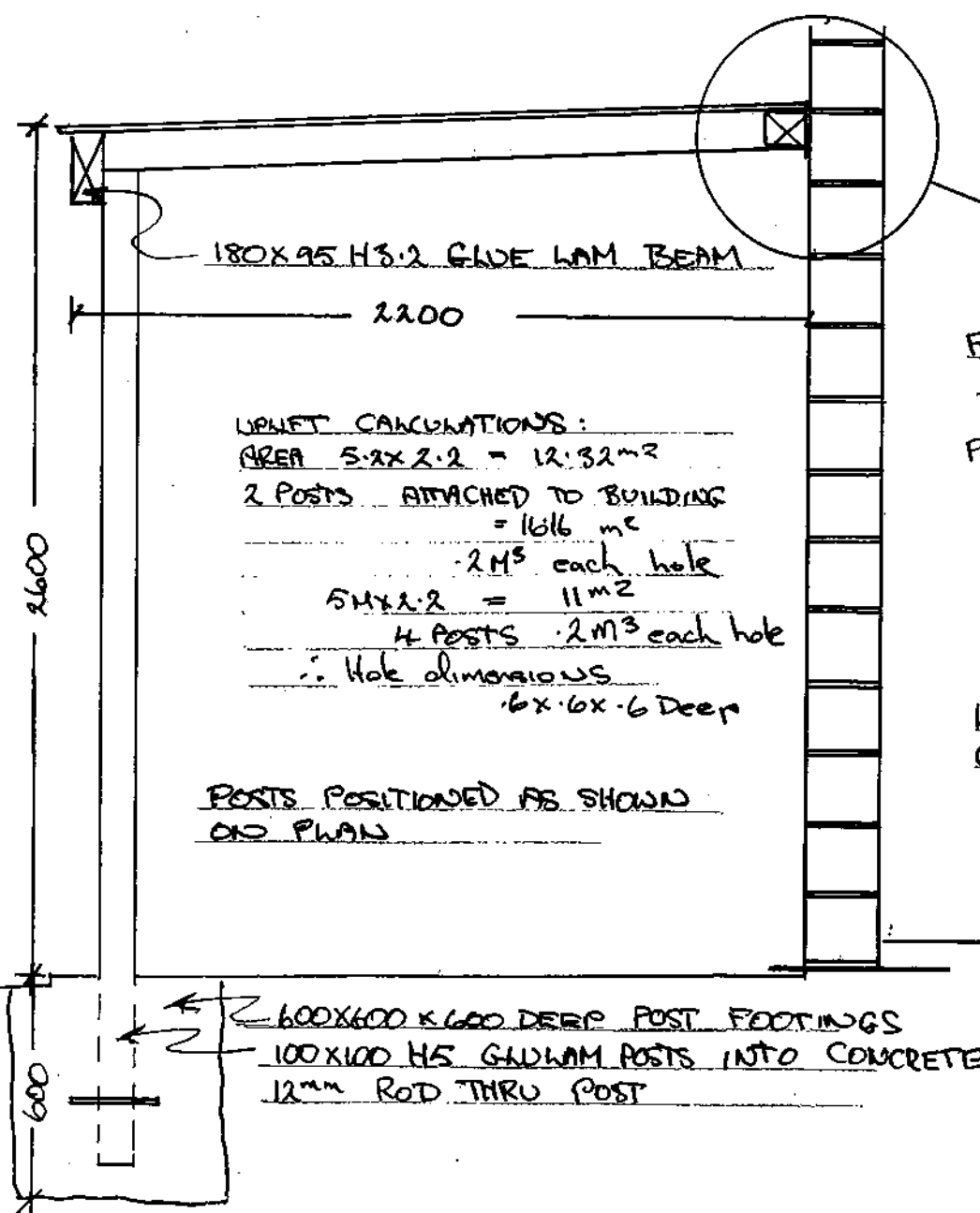
SECTION THRU SOFFIT OVER SLIDING DOORS



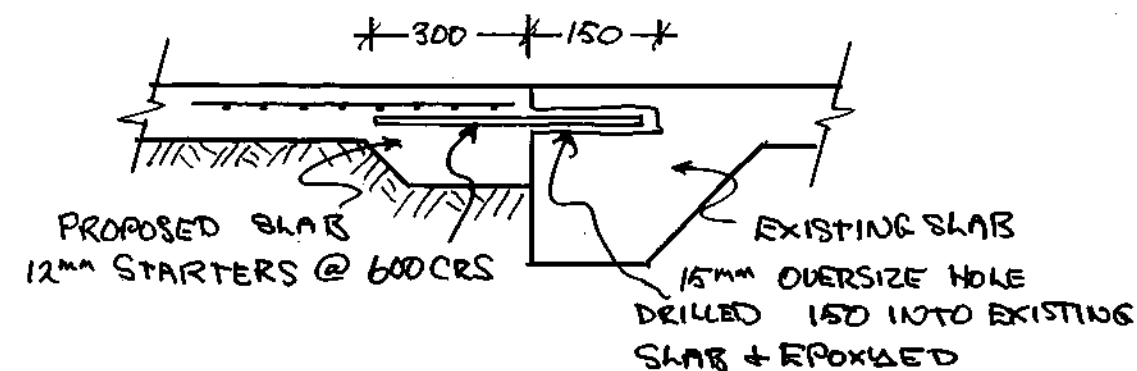


BLOCK WALL-ROOF DETAIL 1

INTERNAL GUTTER DETAIL 2

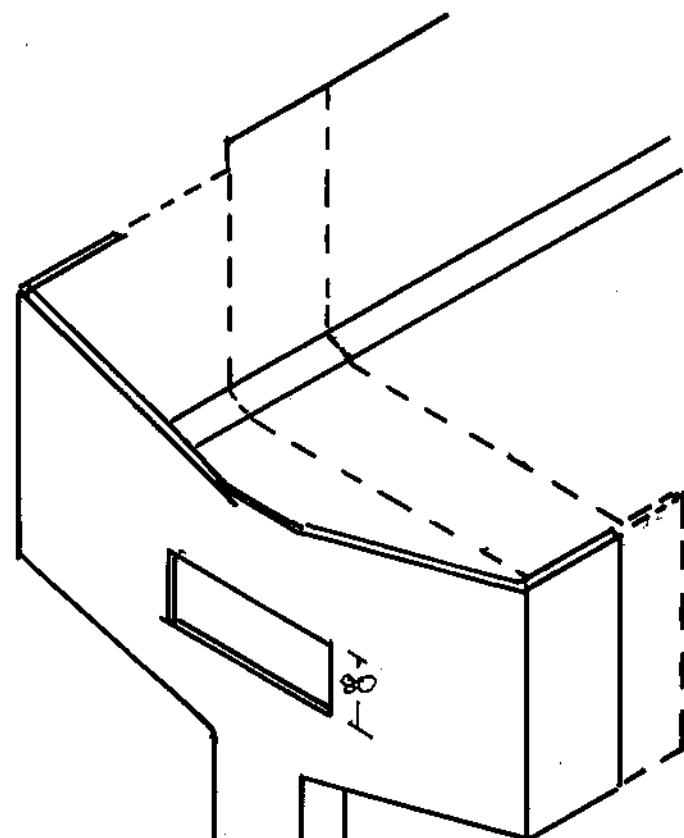


PERGOLA FIXING DETAIL 3

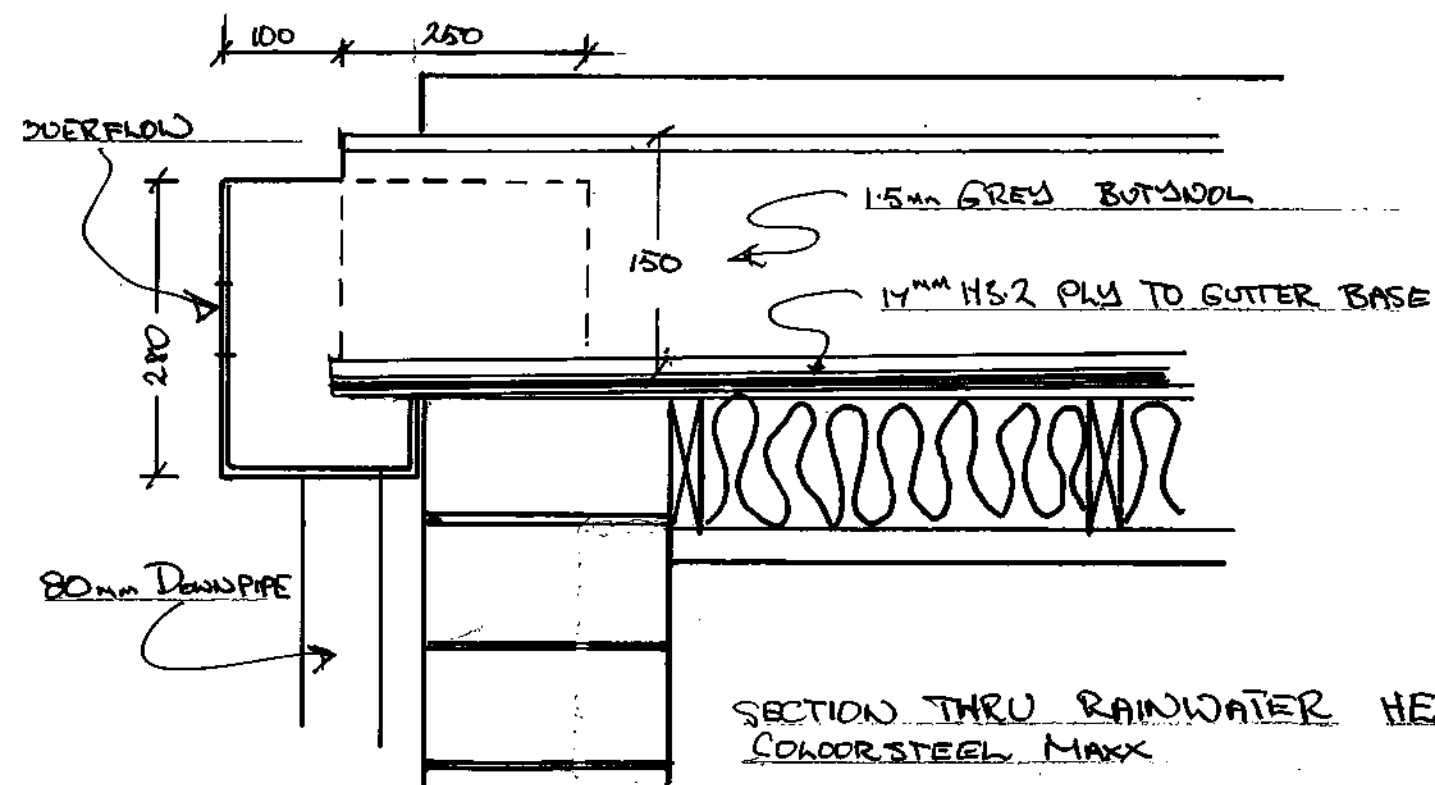


SLAB STARTER DETAILS

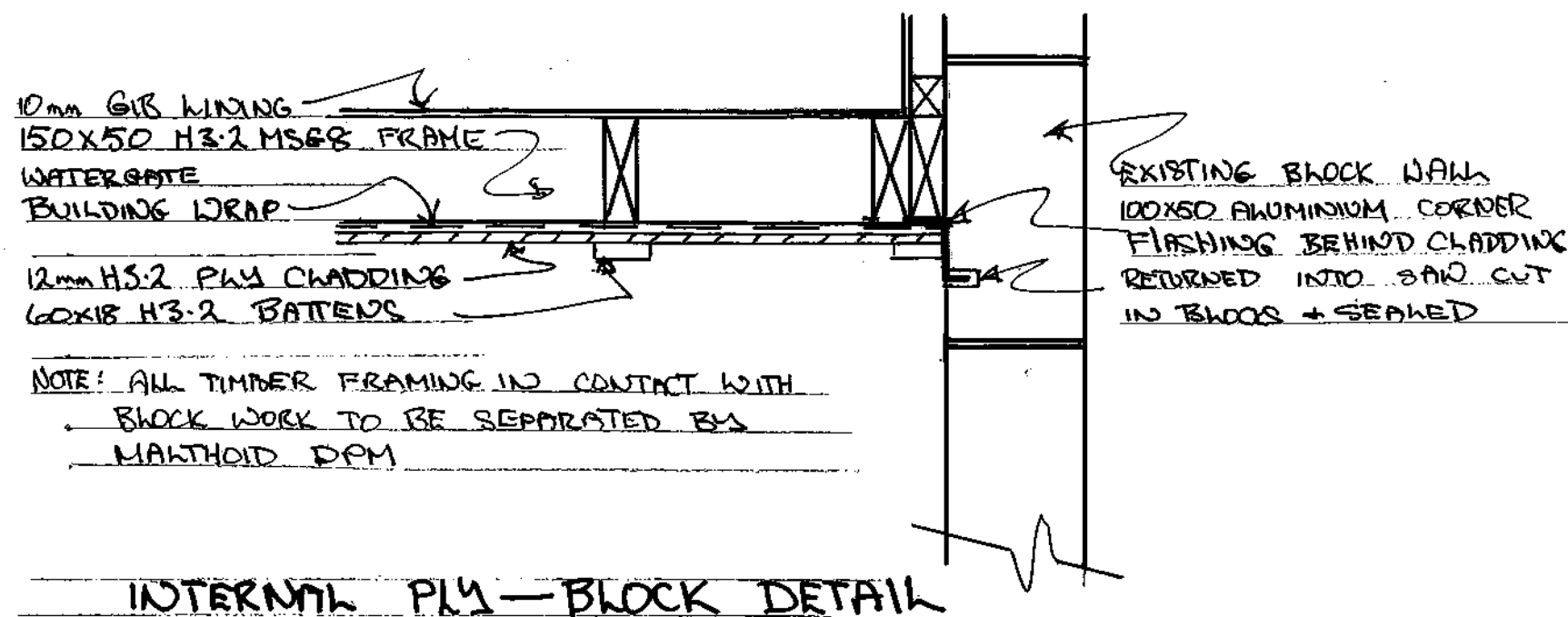
- BLOCK WALL
- 15mm OVERSIZE HOLE FOR EPOXY
- 10mm SPACER
- 12mm STAINLESS THRU BOLT @ 1200 CRS
- 50X50 STAINLESS SQUARE WASHER



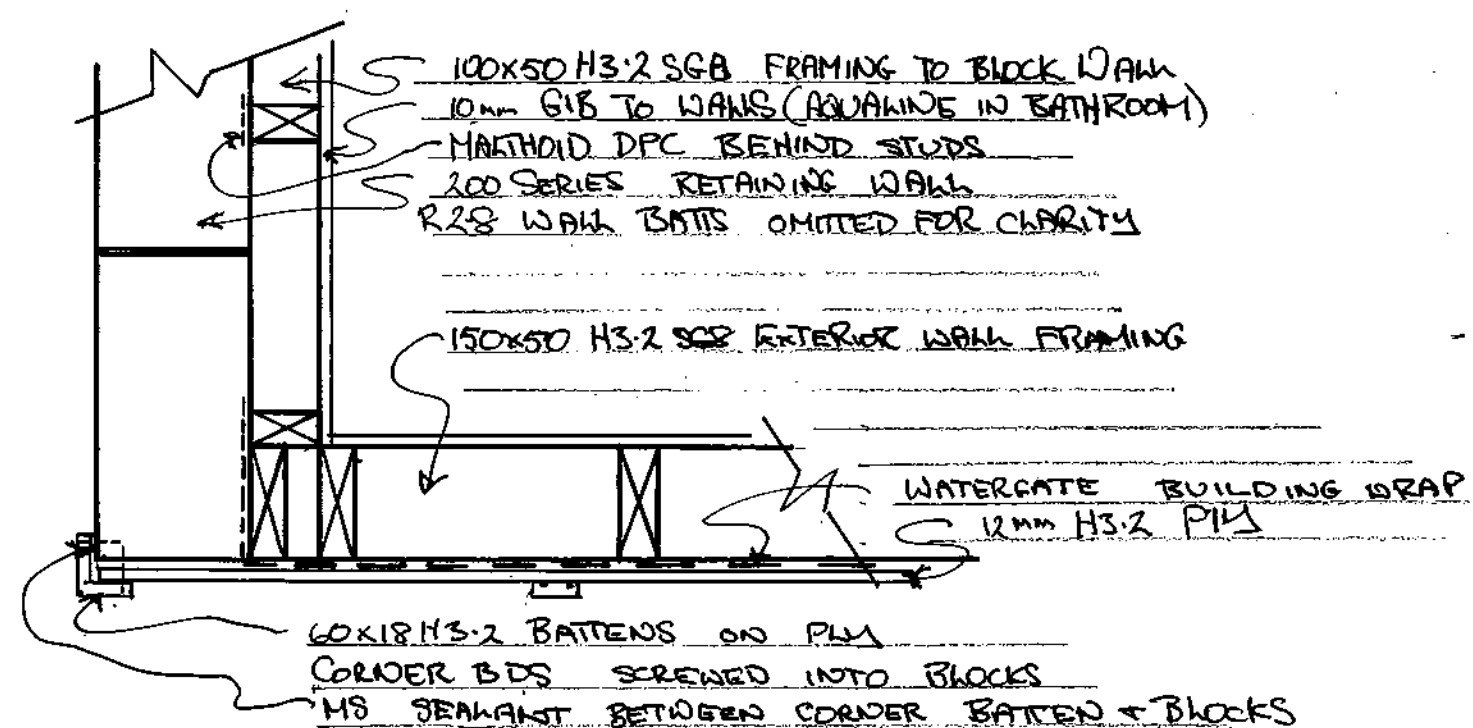
ISOMETRIC VIEW OF RAINWATER HEAD
APPROXIMATELY 600 WIDE
OVERFLOW AT GUTTER BASE LEVEL



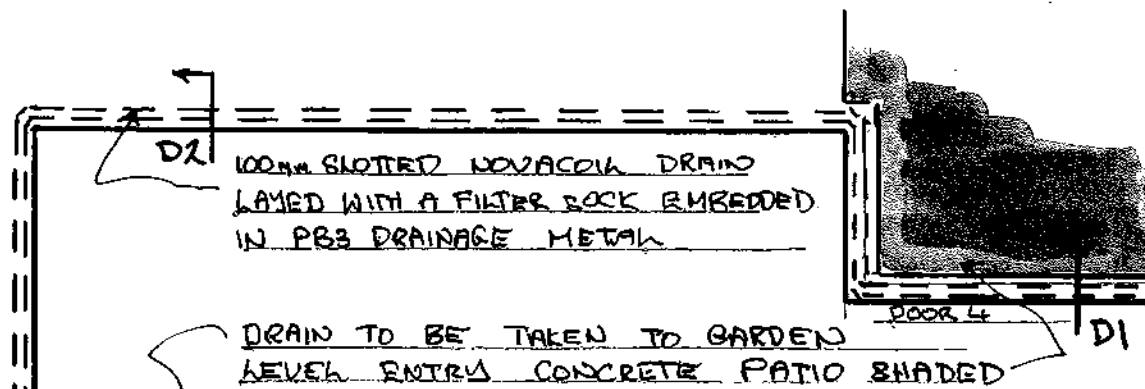
SECTION THRU RAINWATER HEAD - GUTTER
COLOR STEEL MAXX



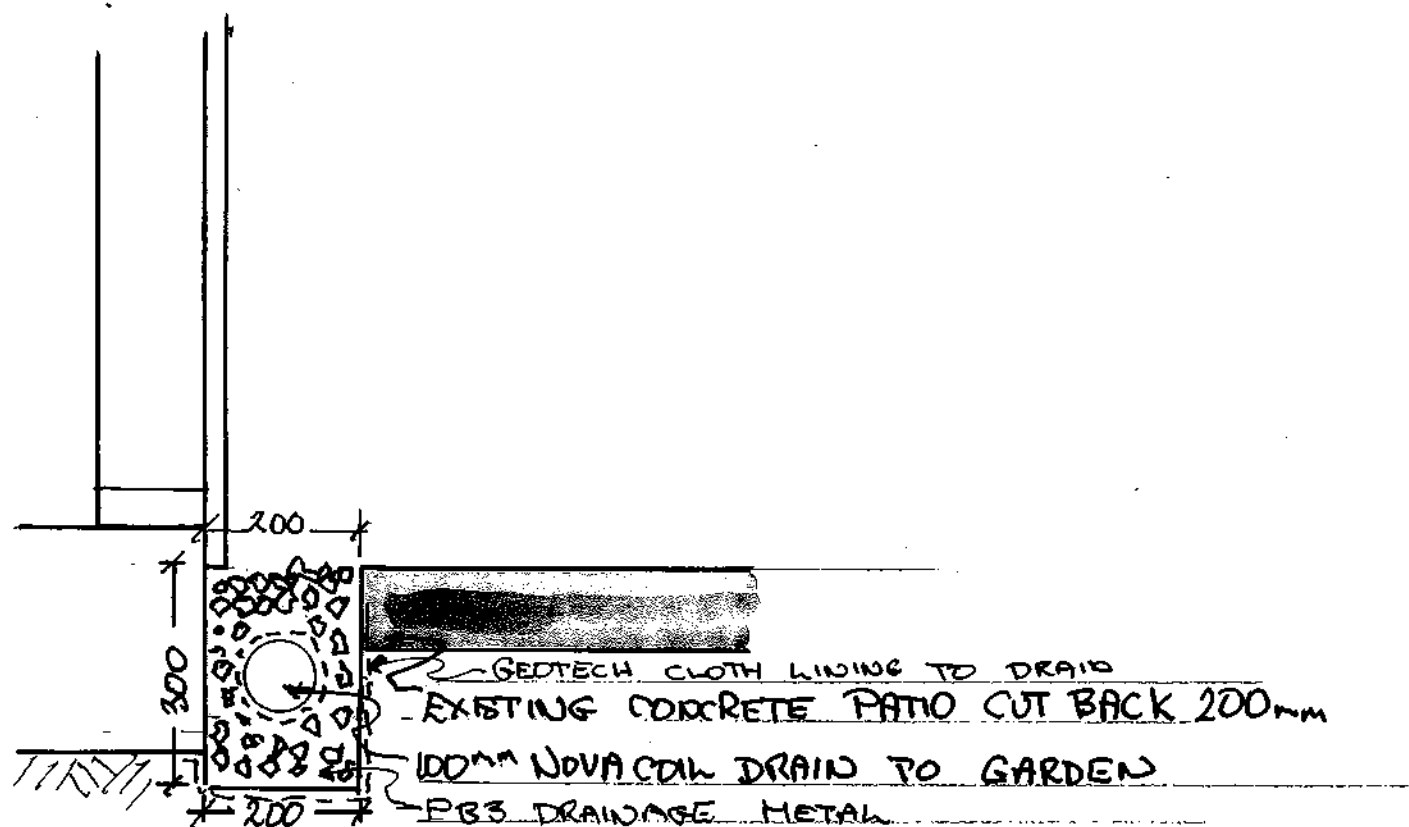
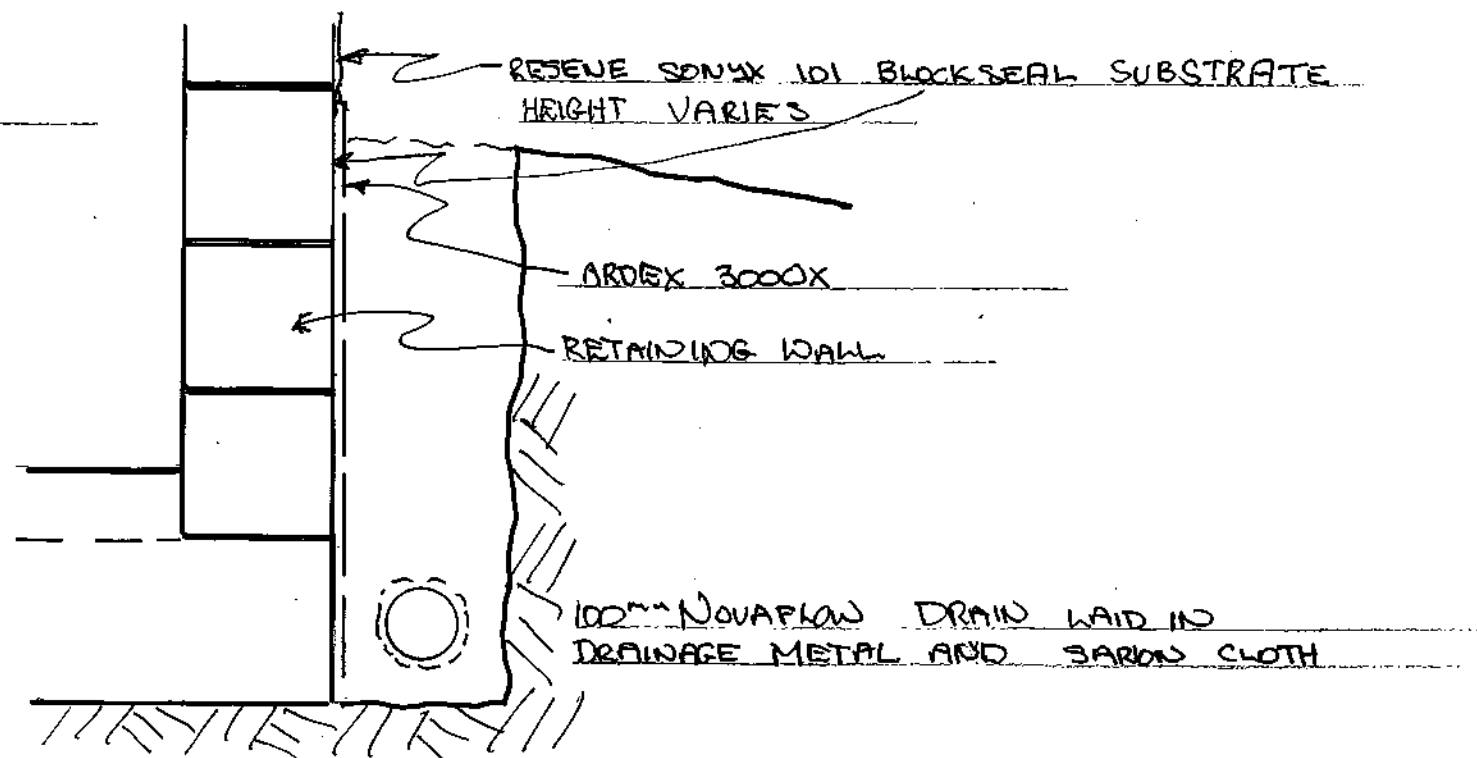
INTERNAL PLY - BLOCK DETAIL



EXTERNAL PLY - BLOCK DETAIL



LEVEL ENTRY DRAIN CONNECTION TO RETAINING WALL DRAIN



SECTION THRU LEVEL ENTRY DRAIN D1

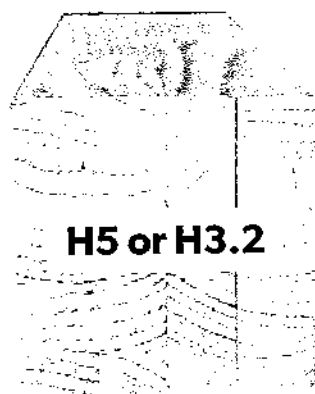
LAMINATED

POSTS
Pallet
LINTER

DETAILS
Details
DETAILS

5

Visual/Appearance A H5/ H3.2 KD Posts PLP – Prolam® Post



PLP8H5-100 / PLP8H3-100	88 x 88mm	
* PLP8H5-125 / PLP8H3-125	112 x 112mm	BAKONU POSTS
* PLP8H5-150 / PLP8H3-150	135 x 135mm	Lounge Post
PLP8H5-200 / PLP8H3-200	180 x 180mm	
PLP8H5-250 / PLP8H3-250	220 x 220mm	
PLP8H5-300 / PLP8H3-300	260 x 260mm	
PLP17H5-125 / PLP17H3-125	112 x 112mm	
PLP17H5-150 / PLP17H3-150	125 x 125mm	
PLP17H5-200 / PLP17H3-200	170 x 170mm	
PLP17H5-250 / PLP17H3-250	220 x 220mm	
PLP17H5-300 / PLP17H3-300	255 x 255mm	



Te Papa Tipu Innovation Park
49 Sala Street
Private Bag 3020
Rotorua
New Zealand
Telephone: +64 7 343 5899
Facsimile: +64 7 348 0952
www.scionresearch.com

4 June 2010

John Woodman
Prowood
283 Waiwhero Road
Motueka

The reason why AS/NZS 1604.5 does not include H5 treatment was because nobody on the standards committee believed any company was (or would be) treating glue laminated products to an H5 specification.

However, there is no technical reason why H5 is or should be excluded, so long as treatment meets penetration requirements for H4 and the preservative retention is at the H5 level, i.e. 0.95% TAE.

Current penetration requirements for H4 glue laminated products in AS/NZS 1604.5 are full sapwood penetration and a minimum of 10 mm heartwood penetration from the face and edge of each laminate.

Thus if treated to H5 retention and H4 penetration, the product would comply with NZS 3602 and the NZ Building Code B2, to meet the 50 year durability requirement for H5 treated products.

Yours sincerely

Mick Hedley B.Sc (Hons) Ph.D
Project Leader, Wood Preservation
Scion Wood and Biofibre Technologies



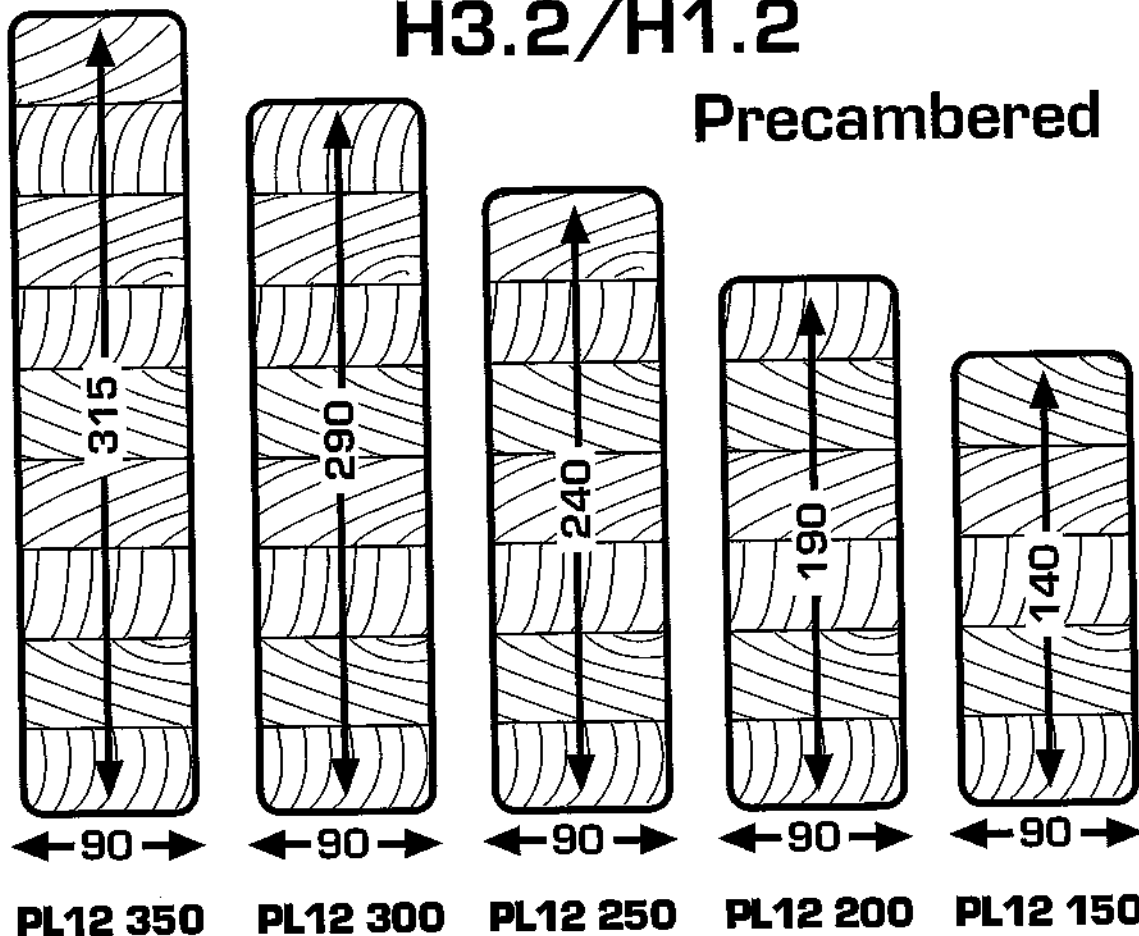
Prolam® On-line Calculator - www.prolamnz.com/specifiers
Ph 03 526 7436 E info@prowoodnz.com

STRUCTURAL BEAMS 90mm

PL12 - PROLAM GL12

H3.2/H1.2

Precambered



STOCK LENGTHS:	3.6, 4.2, 4.8, 5.4, 6.0, 7.2
GRADE:	GL12
TREATMENT:	CCA H3.2 KD/H1.2
FINISHES:	Dressed, Bandsawn,
OTHER LENGTHS:	8.4, 9.6, 10.8, 12.0
USES:	High Spanning Lintels Deck Bearers
ADVANTAGES:	Exterior Treatment High Spanning

Specifications

Description

Prolam® is engineered, precambered timber with unsurpassed performance, using CCA H5 and H3.2 treatments means it can be used in almost any situation. Prolam is made to standards AS/NZS 1328.1 and AS/NZS 1491 and treated to NZS 3640. Using Prolam eliminates the wide variations in solid timber, and allows wide openings to be spanned with ease, along with keeping the lintel depth to a minimum. Prolam is available in many different sizes/grades, meaning there's a beam for every application.

Design Criteria

Prolam is designed to comply with AS/NZS 1170.0, .1, .2, .3, and .5, structural design actions, NZS3603 Timber Structures, and to comply with the NZBC.

Fixings

Joist Hangers

Top mount hanger, full depth face mount hanger and partial depth face mount hanger. Nails and screws to manufacturer's technical literature requirements.

Steel Brackets - Straps

Mild steel galvanized or stainless steel straps and brackets to suit application. Refer to Prolam User Guide and Prolam Pro Calculator for fixing and support details.

Fixing Plates

Tylok plates to suit application. Refer to Prolam User Guide and Prolam Pro Calculator for fixing and support details.

Installation

Qualifications

Carry out the installation of the laminated engineered timber work with experienced and competent tradesmen familiar with the materials and techniques specified.

Deliver and Handle

Deliver and handle members so no structural damage occurs, corners and edges are not damaged, or surfaces marked or stained. Handle laminated timber products with nylon straps or similar to prevent damage.

Erection

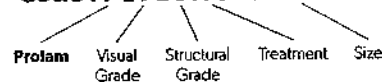
Carry out the erection of laminated and associated support framing for houses and similar structures to the requirements of NZS 3604. Comply with NZBC B1/VM1, 6.0 Timber. Refer to Prolam guidelines for the installation of laminated structural framing. Prop long length beams and lintels at the mid span until the moisture content has reached a suitable level for the application of internal linings.

Co-ordination

Refer to all drawings to ensure details and fixings required are provided for in the laminated structural work.

Sizes and Codes

Code : PLVL8H3-300100



Durability Statement

Prolam® products are manufactured to the requirements of AS/NZS 1328.1:1998, under an approved quality system based on the ISO 9000 series of standards. As such if the product is used in accordance with Prolam product literature, it will meet the durability clauses of the New Zealand Building Code B2.

Subfloor Applications

- Prolam may be used where approved practices for clearance and ventilation are used.

External Use

- Prolam is recommended for weather exposed applications if sealed and maintained in accordance with Prolam literature.

Preservative Treatment

- Prolam Beams are CCA H3.2 or H1.2 treated as defined by NZS 3640:2011, H3.2 must be used for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.
- Prolam Posts are CCA H5 treated as defined by NZS 3640:2011 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

Storage of Prolam

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

Branded Prolam

- Prolam is branded for your protection. Lookalike materials may not perform to the same standard.
- For your protection do not accept unauthorized substitution



Timber Properties in Used Span Table Calculations

Dry Use

Characteristic Stresses and Elastic Moduli for Prolam (Glulam Grades)

	PL Grade	Characteristic Strengths (MPa)				Elastic Moduli (MPa)	
		Bending	Tension parallel to grain	Shear in Beam	Compression parallel to grain	Short modulus of elasticity parallel to the end grain	Short duration modulus of rigidity for beams
Prolam	PL 17	42	21	3.7	35	16700	1100
Prolam	PL 12	25	12.5	3.7	29	11500	770
Prolam	PL 8	19	10	3.7	24	8000	530
Prolam	IVL 15	59	35	4.2	39	15000	775

For compression perpendicular to the grain, use 8.9 MPa dry and 5.3 MPa wet as per NZS 3603 for Radiata Pine for all PL grades.

Wet Use – (H3.2 treated)

Characteristic Stresses and Elastic Moduli for Prolam (Glulam Grades)

PL Grade	Characteristic Strengths (MPa)				Elastic Moduli (MPa)	
	Bending	Tension parallel to grain	Shear in Beam	Compression parallel to grain	Short modulus of elasticity parallel to the end grain	Short duration modulus of rigidity for beams
PL 17	33.6	16.8	2.5	28	13400	880
PL 12	20	10	2.5	23.2	9200	610
PL 8	15.2	8.0	2.5	19.2	6400	420

Note: Higher grades (i.e. GL10, PL12, etc) will give greater span and load carrying capability than PL8 for the same section size.

September 2017

PRODUCER STATEMENT

Tasman Consulting Engineers Ltd have been engaged by Prowood to prepare span tables and charts for the Prolam® lintels, beams and posts as presented in the Prolam® Post and Beam Manual.

The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and NZS3604:2011 using the timber properties for PL8, PL12 and PL17 glue laminated timber.

Tasman Consulting Engineers Limited
3/237 Queen St, PO Box 3631
Richmond, NELSON 7050

David King

MEIC(M) MPENZ (No.145511) CPEng IntPE

TC **TASMAN**
E **CONSULTING**
ENGINEERS
LIMITED

Selection Charts

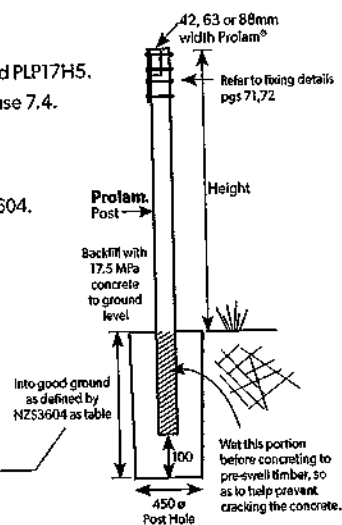
Table 14

Bracing units for Prolam® Posts. For use as Deck Piles PLP8H5 and PLP17H5.
Piles supporting timber deck constructed to NZS 3604:2011 Clause 7.4.

Deck Pile Bracing Units

Pile rated at 120 * BU's are equivalent to an anchor pile as per NZS3604.

Prelam Post Deck Pile	Pile/Post Height (m)	Bracing Units	Bearer / pile con- nection	Min footing depth @ 450 dia.(m)
PLP8H5-150 135x135	0.75	120 *	12 kN Kk	1.2
	1.00	53	6 kN Kk	1.1
	1.20	30	6 kN Kk	1.0
	1.50	19	6 kN Kk	1.0
	1.80	13	6 kN Kk	0.9
PLP17H5-150 125x125	2.10	10	6 kN Kk	0.9
	0.85	120 *	12 kN Kk	1.2
	1.00	80	12 kN Kk	1.2
	1.20	59	6 kN Kk	1.1
	1.50	35	6 kN Kk	1.1
	1.80	24	6 kN Kk	1.0
	2.10	17	6 kN Kk	1.0
PLP8H5-200 180x180	2.40	13	6 kN Kk	1.0
	1.00	120 *	12 kN Kk	1.3
	1.20	95	12 kN Kk	1.2
	1.50	60	6 kN Kk	1.2
	1.80	40	6 kN Kk	1.2
	2.10	30	6 kN Kk	1.2
	2.40	24	6 kN Kk	1.2
PLP17H5-200 170x170	2.70	19	6 kN Kk	1.2
	3.00	15	6 kN Kk	1.2
	1.40	120 *	12 kN Kk	1.3
	1.50	100	12 kN Kk	1.3
	1.80	70	12 kN Kk	1.2
	2.10	50	6 kN Kk	1.2
	2.40	40	6 kN Kk	1.2
PLP8H5-250 220x220	2.70	30	6 kN Kk	1.2
	3.00	25	6 kN Kk	1.2
	3.30	20	6 kN Kk	1.2
	3.60	17	6 kN Kk	1.2
	1.60	120 *	12 kN Kk	1.3
	1.80	95	12 kN Kk	1.3
	2.10	70	12 kN Kk	1.2
	2.40	54	6 kN Kk	1.2
	2.70	42	6 kN Kk	1.2
	3.00	34	6 kN Kk	1.2
	3.30	19	6 kN Kk	1.2
	3.60	24	6 kN Kk	1.2



PLP17H5-250 220x220	2.30	120 *	12 KN Klt	1.4
	2.40	110	12 KN Klt	1.4
	2.70	90	12 KN Klt	1.3
	3.00	70	12 KN Klt	1.3
	3.30	60	12 KN Klt	1.3
	3.60	50	6 KN Klt	1.2
	3.90	43	6 KN Klt	1.2
	4.20	37	6 KN Klt	1.2
	4.50	32	6 KN Klt	1.2
	2.25	120 *	12 KN Klt	1.4
PLP8H5-300 260x260	2.40	105	12 KN Klt	1.4
	2.70	80	12 KN Klt	1.3
	3.00	65	12 KN Klt	1.3
	3.30	55	12 KN Klt	1.3
	3.60	47	12 KN Klt	1.3
	3.90	40	6 KN Klt	1.3
	4.20	34	6 KN Klt	1.3
	3.10	120 *	12 KN Klt	1.5
	3.30	105	12 KN Klt	1.5
	3.60	90	12 KN Klt	1.4
PLP17H5-300 255x255	3.90	75	12 KN Klt	1.4
	4.20	65	12 KN Klt	1.4
	4.50	58	12 KN Klt	1.4
	4.80	50	12 KN Klt	1.4
	5.10	45	12 KN Klt	1.4
	5.40	40	12 KN Klt	1.4

These span tables apply only to Prolam products



Selection Charts

Table 15

Bracing units for Prolam® Posts. Verandah Posts PLP8H5 Treated.

Verandah Bracing Units

Prolam Post - Height measured from top of concrete to top of Post. Confirm post/post fixing from uplift requirements. Minimum 6kN fixing for posts rated under 60 bracing units. Minimum 12kN fixings for posts rated 60 bracing units and over.

Prolam Post Verandah Posts	Post Height (m)	Bracing Units	Min post depth @ 450 dia (m)	Prolam Post Verandah Posts	Post Height (m)	Bracing Units	Min post depth @ 450 dia (m)
PLP8H5-125 112x112	1.8	10	0.9	PLP17H5-200 170x170	1.8	115	1.4
	2.1	7	0.9		2.1	80	1.4
	2.4	5	0.9		2.4	60	1.4
PLP17H5-125 118x118	1.8	21	1.2		2.7	50	1.4
	2.1	15	1.2		3.0	40	1.4
	2.4	12	1.2		3.3	34	1.4
	2.7	9	1.2		3.6	28	1.4
PLP8H5-150 135x135	1.8	21	1.2	PLP8H5-250 220x220	2.1	110	1.4
	2.1	16	1.2		2.4	85	1.4
	2.4	12	1.2		2.7	65	1.4
	2.7	9	1.2		3.0	55	1.4
PLP17H5-150 125x125	1.8	33	1.2		3.3	45	1.4
	2.1	24	1.2	PLP17H5-250 220x220	3.6	35	1.4
	2.4	18	1.2		2.4	120	1.5
	2.7	14	1.2		2.7	120	1.5
	3.0	12	1.2		3.0	110	1.5
PLP8H5-200 180x180	3.3	10	1.2		3.3	95	1.5
	1.8	60	1.4		3.6	80	1.5
	2.1	50	1.4	PLP8H5-300 260x260	2.4	120	1.5
	2.4	35	1.4		2.7	120	1.5
	2.7	30	1.4		3.0	110	1.5
	3.0	30	1.4		3.3	85	1.5
	3.3	15	1.4		3.6	75	1.5
	3.6	12	1.4	PLP17H5-300 255x255	3.9	64	1.5
					2.4	120	1.5
					2.7	120	1.5
					3.0	120	1.5
					3.3	120	1.5
					3.6	120	1.5
					3.9	120	1.5

Footing Size:

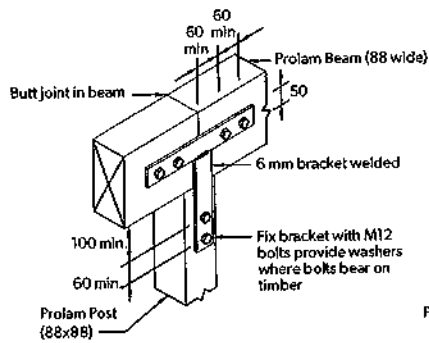
88 x 88, 112 x 112 & 135 x 135 – 900 deep x 450 diameter } 2 / M12 Bolts - Verandah beam
180 x 180 – 1200 deep x 450 diameter } to post connection

1 kN = 20 Bu's. Linear interpolation between the bracing values given is permitted for intermediate heights

Note: Bracing units have been determined from the lateral load required to give a maximum deflection at the top of the post of H/24.

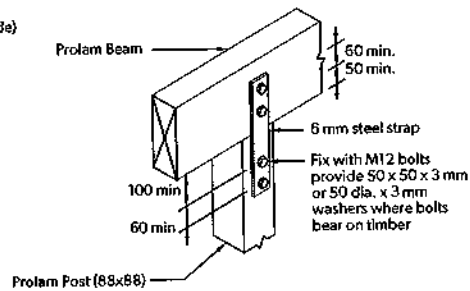
These span tables apply only to Prolam products

Prolam® Post Fixings



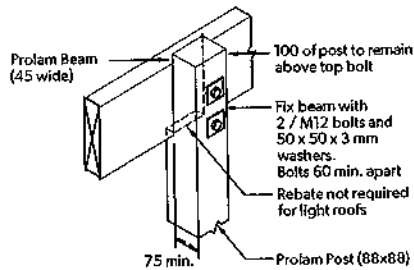
NOTE -
(1) Capacity 12.2 kN for 1 bracket.
(2) Capacity 25.5 kN for 2 brackets.

(A)



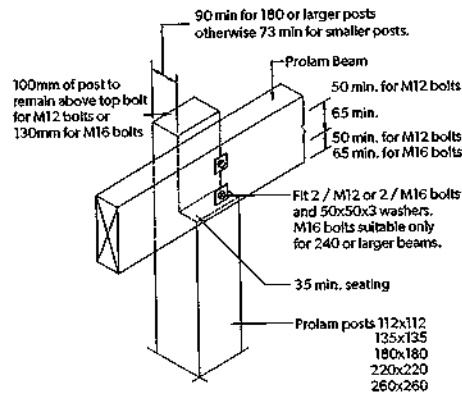
NOTE -
(1) Capacity 6.8 kN for 1 bracket.
(2) Capacity 13.7 kN for 2 brackets.

(B)



NOTE -
Capacity 6.8 kN.

(C)

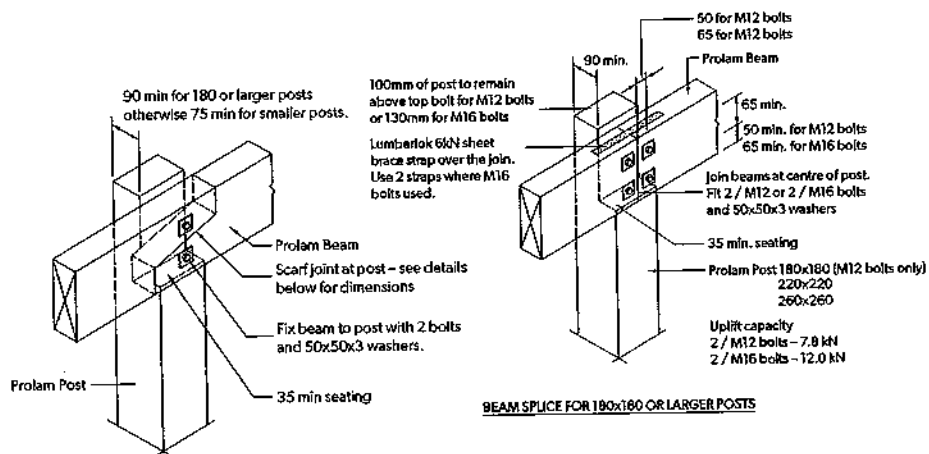


BEAM FIXING

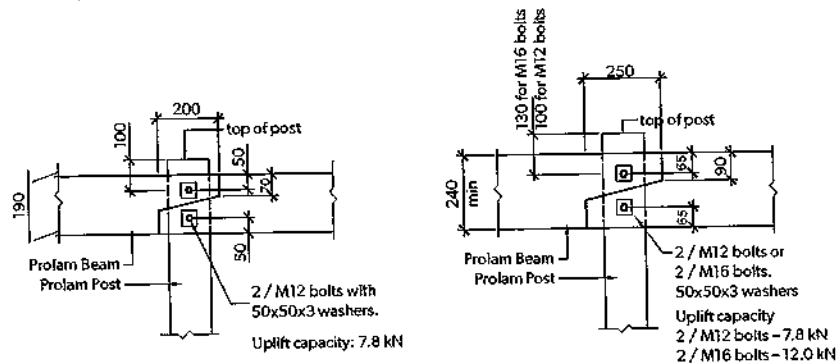
(D)

Uplift capacity
2 / M12 bolts - 7.8 kN
2 / M16 bolts - 12.0 kN

Prolam® Post Fixings



SCARF JOINT AT POSTS



Selection Charts

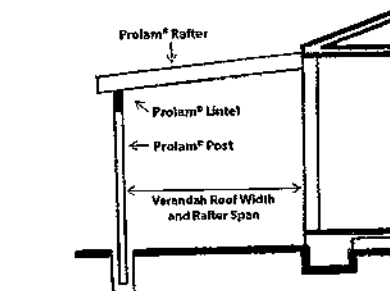
Table 8

Verandah Rafters. Light roof – with ceiling – snow loading 0.5 kPa – high wind zone – Glulam Grade PL8.

Perpda Rafter

Rafter Size	Maximum Rafter Span (m)				
	Rafter Spacing (m)				
	0.6	0.75	0.9	1.0	1.2
PLVL8H3-15075 140 x 63mm	3.80	3.50	3.30	3.20	3.00
PLVL8H3-20075 180 x 63mm	4.75	4.45	4.30	4.20	4.00
PLVL8H3-25075 240 x 63mm	5.15	4.75	4.50	4.35	4.10
PLVL8H3-30075 290 x 63mm	6.45	6.05	5.80	5.65	5.25
PLVL8H3-35075 315 x 63mm	7.25	6.80	6.25	5.95	5.45
PLVL8H3-15075 140 x 63mm	B	B	B	B	B
PLVL8H3-20075 180 x 63mm	B	B	B	C	C
PLVL8H3-25075 240 x 63mm	B	B	B	C	C
PLVL8H3-30075 290 x 63mm	B	C	C	C	C
PLVL8H3-35075 315 x 63mm	C	C	C	C	C

Rafter Size	Maximum Rafter Span (m)				
	Rafter Spacing (m)				
	0.6	0.75	0.9	1.0	1.2
PLVL8H3-10050 88 x 42mm	1.70	1.65	1.60	1.55	1.50
PLVL8H3-15050 140 x 42mm	3.25	3.00	2.85	2.70	2.50
PLVL8H3-20050 190 x 42mm	4.05	3.60	3.30	3.15	2.85
PLVL8H3-25050 240 x 42mm	4.40	3.90	3.55	3.40	3.10
PLVL8H3-30050 290 x 42mm	4.65	4.10	3.80	3.60	3.25
PLVL8H3-35050 315 x 42mm	5.00	4.45	4.10	3.90	3.65
PLVL8H3-10050 88 x 42mm	B	B	B	B	B
PLVL8H3-15050 140 x 42mm	B	B	B	B	B
PLVL8H3-20050 190 x 42mm	B	B	B	B	B
PLVL8H3-25050 240 x 42mm	B	B	B	B	B
PLVL8H3-30050 290 x 42mm	B	B	B	B	B
PLVL8H3-35050 315 x 42mm	B	B	B	B	C



Fixing type	End fixing to resist uplift
B	2/100 x 3.75 skewed nails and 1 wire dog or 2.7kN connection
C	2/100 x 3.75 skewed nails and 2 wire dog or 4.7kN connection

Codes for Structural or Visual	
Visual	PLVL, ie PLVL8H3-25075 250
Structural	PLL, ie PL8H3-25050

Rafter Size	Maximum Rafter Span (m)				
	Rafter Spacing (m)				
	0.6	0.75	0.9	1.0	1.2
PLVL8H3-150100 140 x 88mm	4.15	3.90	3.70	3.55	3.35
PLVL8H3-200100 190 x 88mm	5.15	4.85	4.65	4.55	4.35
PLVL8H3-250100 240 x 88mm	5.75	5.30	5.05	4.85	4.55
PLVL8H3-300100 290 x 88mm	7.00	6.60	6.35	6.15	5.90
PLVL8H3-350100 315 x 88mm	7.85	7.40	7.10	6.90	6.60
PLVL8H3-150100 140 x 88mm	B	B	B	C	C
PLVL8H3-200100 190 x 88mm	B	C	C	C	C
PLVL8H3-250100 240 x 88mm	B	C	C	C	C
PLVL8H3-300100 290 x 88mm	C	C	C	C	D
PLVL8H3-350100 315 x 88mm	C	C	D	D	D

These span tables apply only to Prolam products

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Prolam.

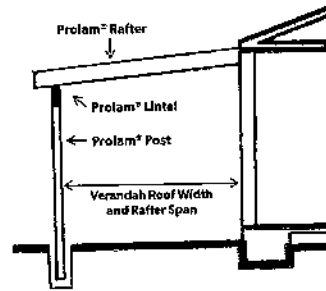
2.35
3.35
4.35
4.55

1.35 + .5 + .35
2.5 + .5 + .35
2.85 + 1.15 + .35
3.10 + 1 + .45

Selection Charts

Table 9

Verandah Lintels (Visual). Light roof – no ceiling & with ceiling – high wind zone. Rafters supporting verandah roof only – high wind zone.



LINTEL SIZE		Maximum lintel span (m)						
		Verandah roof width (m)						
		1.8	2.4	3.0	3.6	4.2	4.8	
No Ceiling	PLVL8H3-15075	140 x 63mm	3.20	3.00	2.85	2.70	2.60	2.50
	PLVL8H3-20075	190 x 63mm	4.10	3.95	3.80	3.65	3.50	3.35
	PLVL8H3-25075	240 x 63mm	4.90	4.60	4.40	4.30	4.10	3.90
	PLVL8H3-30075	290 x 63mm	5.06	5.30	4.90	4.50	4.30	4.00
	PLVL8H3-35075	315 x 63mm	6.10	5.50	5.10	4.70	4.40	4.20
	PLVL8H3-150100	140 x 88mm	3.55	3.35	3.20	3.05	2.90	2.80
	PLVL8H3-200100	190 x 88mm	4.50	4.30	4.10	3.95	3.85	3.75
	PLVL8H3-250100	240 x 88mm	5.30	5.00	4.80	4.70	4.50	4.40
	PLVL8H3-300100	290 x 88mm	6.10	5.80	5.60	5.40	5.20	5.10
	PLVL8H3-350100	315 x 88mm	6.80	6.50	6.20	6.00	5.80	5.70
With Ceiling	PLVL8H3-15075	140 x 63mm	2.65	2.50	2.40	2.30	2.20	2.10
	PLVL8H3-20075	190 x 63mm	3.50	3.35	3.15	3.05	2.90	2.80
	PLVL8H3-25075	240 x 63mm	4.40	4.10	3.90	3.80	3.60	3.50
	PLVL8H3-30075	290 x 63mm	5.20	4.90	4.70	4.50	4.30	4.20
	PLVL8H3-35075	315 x 63mm	6.00	5.70	5.40	5.20	5.00	4.80
	PLVL8H3-150100	140 x 88mm	2.95	2.80	2.65	2.55	2.45	2.35
	PLVL8H3-200100	190 x 88mm	3.90	3.70	3.50	3.35	3.25	3.15
	PLVL8H3-250100	240 x 88mm	4.80	4.50	4.30	4.20	4.00	3.90
	PLVL8H3-300100	290 x 88mm	5.70	5.40	5.20	5.00	4.80	4.60
	PLVL8H3-350100	315 x 88mm	6.60	6.30	6.00	5.80	5.60	5.40

Verandah lintel

These span tables apply only to Prolam products

BLOCK WATER MEMBRANE ARDEX 3000



ARDEX WPM 3000X

Shelterseal 3000X

Self adhesive SBS Waterproofing Membrane

Suitable for under asphalt

High tear resistance

Self Healing

High initial tack

Radon and Methane gas barrier

Resistance to most chemicals

Cold applied

Quick installation



BRANZ Appraised
Appraisal No.462 [2016]

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Fax: (03) 384 9779
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www.ardex.co.nz

ARDEX SHELTERSEAL 3000X

Bitumen based waterproofing membrane

PRODUCT DESCRIPTION

ARDEX Shelterseal 3000X is a "peel and stick" bituminous /asphalt damp proof membrane protected by a cross laminated high density polyethylene film.

ARDEX Shelterseal is made from two structural components:

Bitumen/asphalt compound modified with SBS and high tack resins

This special compound has been formulated to make the product easy to install. The membrane can be adjusted should it initially be placed in the wrong position, as the adhesive on the sheet achieves final adhesion only after a few minutes.

Protection film

This is hot laminated to the bituminous/asphalt compound and gives the membrane its mechanical and physical characteristic, such as heat stability, shape and chemical resistance.

FEATURES/BENEFITS

Cold Application: installed without the use of open flames. Ideal for installation in restricted spaces.

Chemical resistance: the protective polymer film is highly resistant to acids and alkalis pollutants.

Flexibility and adaptability: this membrane will adapt easily to irregularly shaped surfaces, and will stretch up to 9% without breaking or cracking.

Self sealing: the membrane self seals on contact maintaining its water tightness.

Constant thickness: the membrane is manufactured using high-tech machinery which constantly monitors its thickness to ensure that the films and synthetic materials are manufactured to the highest specifications and quality control requirements.

USES

ARDEX Shelterseal 3000X is used for planter boxes, foundations, below-ground applications, retaining walls, balconies, decks under cement screeds or other compatible hard coverings.

SUBSTRATES

- Concretes, renders and screeds,
- Fibre cement sheets
- Structural or marine plywood
- Polystyrene blocks

For further substrate types please consult ARDEX Technical Department.

SURFACE PREPARATION

Surfaces to which the ARDEX Shelterseal 3000X system is installed must be properly prepared prior to installation. All surfaces must be clean, dry, smooth, free of sharp edges, loose or foreign materials, oil, grease, and other materials that may damage the membrane. If concrete has moisture on the surface use a gas torch to dry and warm before priming.

INSTALLATION

Priming

Prior to the installation of the membrane all prepared surfaces must be primed with ARDEX WPM 240 Solvent based primer or ARDEX WPM 247 water based primer (Shelter Primer).

Starting at the lowest point, the membrane must be installed in accordance with the Technical Literature. Sheets edges must be overlapped a minimum of 60 mm as marked on the sheets. End laps must be a minimum of 100mm, with upper sheets lapped over lower sheets. Internal and external corners of single layer systems must be reinforced with an extra layer of membrane 300mm wide. Where two layer systems are specified lap joints must be staggered. Protection material must be installed before backfilling. Backfilling must commence immediately after the membrane is installed to ensure the membrane is not left exposed to sunlight or UV radiation.

Installation of the membrane must be completed by an ARDEX approved Applicator and who has experience in the application of self-adhesive membranes.

Note: A LBP is required to carry out Restricted Building Work. A LBP must do or supervise this work. They must work within the scope of their licence class.

Two Layer DPM System

In critical areas a specifier may require a second layer of ARDEX Shelterseal 3000X to be applied with laps staggered to the layer.

ARDEX Waterstops should be considered for use in all construction joints.

STORAGE

All rolls of ARDEX Shelterseal should be stored in a covered area protected against sunlight and UV radiation. Rolls should be stored in a vertical position on a smooth floor so as not to damage the edges.

PACKAGING

Roll size: 1m X 20m

Roll weight: Approximately 30kg

Other products: Shelter Primer water based and solvent based 5 litres and 20 litres

TECHNICAL DATA

The technical data shown is the average results of the Tests, Measurements and Trials carried out on ARDEX Shelterseal 3000X Waterproofing Membrane.

CHARACTERISTICS	TEST METHOD	UNITS	NOMINAL VALUE
Thickness	EN 1849-1	mm	1.5
Weight	UNI 8202	kg	1.6
Tensile Strength Longitudinal Transversal	EN 12311-1	N/50mm N/50mm	215 220
Elongation at Break Longitudinal Transversal	EN 12311-1	% %	324 238
Impact Resistance Method A Method B	EN 12691	mm mm	500 1000
Static Load Resistance Method A Method B	EN 12730	kg kg	10 15
Tear Resistance Longitudinal Transversal	EN 12310-1	N N	125 65
Peel Resistance of Joints	EN 12316-1	N/50mm	65
Shear Resistance of Joints Longitudinal Transversal	EN 12317-1	N/50mm N/50mm	180 200
Peel Resistance on Concrete at 23°C	ASTM D 1000	N/mm	2.9
Probe Tack	ASTM D 2979	N	7
Impermeability	EN 1928	>60 kPa	Pass
Vapour Transmission Rate	EN 1931	μ	90000
Water Absorption	ASTM D 570	%	0.09
Hydrostatic Test	DN 52123		>6 bar (24hrs)/no leakage at 3 bars for 1hr
Permeability to Radon Gas Institute	SP Swedish Nat. Testing & Research	m²/s	5.7 x 10-12
Permeability to Methane gas	CSI Method		<5 cc/m² x 24h x atm
Application Temperature			+5°C/+45°C
Service Temperature			-40°C/+80°C

Complying with EN 13969 types A and T: EN 14967
Volatile Organic Compound emissions (VOC): 250 µg/m³
Classification for transport: Not Applicable
Reaction to fire: E (EN 11925-2; EN 13501-1)

DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.

ARDEX WPM 3000X

Shelterseal 3000X

Self Adhesive SBS Membrane



PRODUCT DESCRIPTION

ARDEX WPM 3000X (Shelterseal 3000X) is a "peel and stick" bituminous/asphalt damp proof membrane protected by a cross laminated high-density polyethylene film.

ARDEX WPM 3000X (Shelterseal 3000X) is made from two structural components

Bitumen/asphalt compound modified with SBS and high tack resins

This special compound has been formulated to make the product easy to install. The membrane can be adjusted should it initially be placed in the wrong position, as the adhesive on the sheet achieves final adhesion only after a few minutes.

Protective film

This is hot-laminated to the bituminous/asphalt compound and gives the membrane its mechanical and physical characteristics, such as heat stability, shape, chemical resistance, etc.

FEATURES/BENEFITS

Cold Application: installed without the use of open flames. Ideal for installation in restricted spaces.

Chemical resistance: the protective polymer film is highly resistant to acids, alkalis and other pollutants.

Flexibility and adaptability: this membrane will adapt easily to irregularly shaped surfaces, and will stretch up to 9% without breaking or cracking.

Self sealing: the membrane self seals on contact maintaining its watertightness.

Constant thickness: the membrane is manufactured using high-tech machinery which constantly monitors its thickness, and ensures that the films and synthetic materials are manufactured to the highest specifications and quality control requirements.

ACCEPTABLE SUBSTRATES

- Concretes, renders and screeds
- Fibre cement sheets
- Structural or marine plywood
- Polystyrene blocks

For use over other substrates including existing membranes contact ARDEX.

TYPICAL APPLICATIONS

- Planter boxes
- Foundations
- Below-ground applications
- Retaining walls

BASIC APPLICATION INSTRUCTIONS

Surface Preparation

Surfaces to which the ARDEX WPM 3000X (Shelterseal 3000X) systems are installed must be properly prepared prior to installation. All surfaces must be clean, dry, smooth, free of sharp edges, loose or foreign materials, oil, grease, and other materials that may damage the membrane. If concrete has moisture on surface use gas torch to dry and warm before priming.

Priming

Prior to the application of the membrane all prepared surfaces (except polystyrene blocks) should be primed with ARDEX WPM 240 or WPM 247 (Shelter Primer) at a rate of 5-6m² per litre and allowed to dry.

Membrane Installation

Starting at the lowest point, the membrane must be installed in accordance with the Technical Literature. Sheet edges must be overlapped a minimum of 60mm as marked on the sheets. End laps must be a minimum of 100mm, with upper sheets lapped over lower sheets. Internal and external corners of single layer systems must be reinforced with an extra layer of membrane 300mm wide. Where two layer systems are specified lap joints must be staggered. Protection material must be installed before backfilling. Backfilling must commence immediately after the membrane is installed to ensure the membrane is not left exposed to sunlight or UV radiation.

Installation of the membranes must be completed by ARDEX approved applicator, who have experience in the application of self-adhesive membranes.

Two Layer DPM System

In critical areas a specifier may require a second layer of ARDEX WPM 3000X (Shelterseal 3000X) to be applied with laps staggered to the first layer.

PLASTERING OVER SHELTERSEAL

Coat affected area with ARDEX WPM 179 (Refer to page 45). Let coating dry then apply a second coat of ARDEX WPM 179. While still wet broadcast dry sand onto the surface. Let Dry. When dry, plaster area with normal plaster system.

This is to cover any Shelterseal that is finished above ground due to slope of site. It is not intended to cover roofing applications.

SAFETY DATA

ARDEX WPM 240 (Shelter Primer) is solvent based and classified as Dangerous Goods Class 3 Packaging Group II material. It is highly flammable and should be used with appropriate safety equipment. Avoid inhalation or contact with eyes.

First Aid: If swallowed do not induce vomiting, contact a doctor or Poisons Information Centre immediately. In case of contact with eyes rinse thoroughly with water.

Spills & Leaks: Restrict access to area. Prevent material entering sewers and restricted areas. If possible cover liquid with earth, sand or absorbent material. Flush area with water.

Fire: Eliminate all sources of ignition. Firefighters should wear full protective clothing and self contained breathing apparatus with full face mask. Use dry chemicals foam or carbon dioxide to extinguish fire.

STORAGE

All rolls of ARDEX WPM 3000X (Shelterseal 3000X) whether palletised or loose should be stored in a covered area protected against sunlight and UV radiation. Rolls should be stored in a vertical position on a smooth floor so as not to damage the edges.

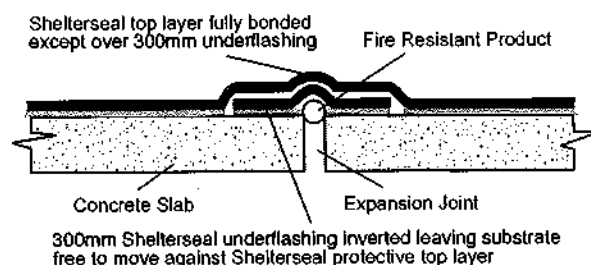
PACKAGING

Roll size: 1m x 20m Roll weight: Approx 30kg
Other products: Shelter Primer 5 litres and 20 litres

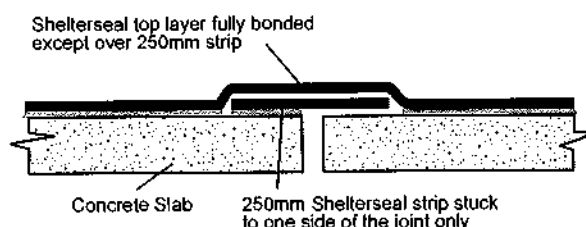
TECHNICAL PERFORMANCE DATA

Properties	Typical Values	Test Method
Thickness	1.5mm	UNI 8202
Weight	1.6kg	UNI 8202
Tensile strength long	4.35N/mm	ASTM D 638
Tensile strength trans	5.69N/mm	ASTM D 638
Longitudinal elongation of membrane	435%	ASTM D 638
Transverse elongation of membrane	380%	ASTM D 638
Tearing resistance long	83.01N	8202/9
Tearing resistance trans	73.74N	8202/9
Adhesion to primed concrete	4.9N/mm	ASTM D 1000
Adhesion to steel	5.8N/mm	ASTM D 1000
Puncture resistance	246N/65mm	ASTM E 154
Vapour transmission rate	0.3g/m/24hrs	ASTM E 96
Cold flexibility	-30°C	ASTM D 146
Environmental resistance	Conform	ASTM D 543

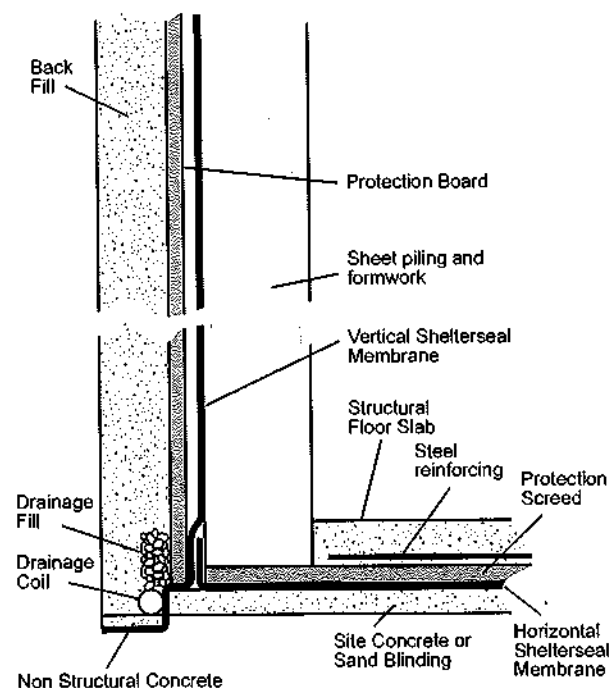
EXPANSION JOINT



CONSTRUCTION JOINT



BELOW GROUND DETAIL



Typical details do not indicate number of layers required

ARDEX WPM 5000HD

Shelterseal HD

Self Adhesive SBS Membrane



PRODUCT DESCRIPTION

ARDEX WPM 5000HD (Shelterseal HD) is an industrial strength "peel and stick" bituminous/asphalt membrane. ARDEX WPM 5000HD (Shelterseal HD) is reinforced with a layer of polypropylene mesh giving the product exceptionally high mechanical characteristics.

ARDEX WPM 5000HD (Shelterseal HD) is made from two structural components:

- Bitumen/asphalt compound modified with SBS and high tack resins
- A protective polypropylene mesh hot laminated to the bituminous/asphalt compound. This gives the membrane its mechanical and physical characteristics, such as heat and shape stability, chemical and puncture resistance

FEATURES/BENEFITS

Cold Application Installed without the use of open flames. Ideal for installation in restricted spaces.

High durability Polypropylene mesh reinforcement layer provides tough, puncture resistant finish.

Constant thickness The membrane is manufactured using the highest quality materials, standards and sheet manufacturing techniques.

Slip free surface Membrane provides an ideal, safe working surface.

ACCEPTABLE SUBSTRATES

- Concrete, renders and screeds
- Fibre cement sheets
- Structural or marine plywood

For use over other substrates including existing membranes contact ARDEX

TYPICAL APPLICATIONS

- Parking decks & car parks
- Vehicular traffic structures
- Expansion joints
- Underneath clay tiles or asphalt shingles
- Any applications where the waterproofing must have high mechanical characteristics

BASIC APPLICATION INSTRUCTIONS

Surface Preparation

Surfaces to which the ARDEX WPM 5000HD (Shelterseal HD) systems are installed must be properly prepared prior to installation. All surfaces must be clean, dry, smooth, free of sharp edges, loose or foreign materials, oil, grease, and other materials that may damage the membrane. If concrete has moisture on surface use gas torch to dry and warm before priming.

Priming

Prior to the application of the membrane all prepared surfaces except polystyrene block should be primed with ARDEX WPM 240 (Shelter Primer) at a rate of 5-6m² per litre and allowed to dry.

Membrane Installation

Starting at the lowest point, the membrane must be installed in accordance with the Technical Literature. Sheet edges must be overlapped a minimum of 60mm as marked on the sheets. End laps must be a minimum of 100mm, with upper sheets lapped over lower sheets. Internal and external corners of single layer systems must be reinforced with an extra layer of membrane 300mm wide. Where two layer systems are specified lap joints must be staggered. Protection material must be installed before backfilling. Backfilling must commence immediately after the membrane is installed to ensure the membrane is not left exposed to sunlight or UV radiation.

Installation of the membranes must be completed by tradespersons who have experience in the application of self-adhesive membranes.

Applying asphalt directly over ARDEX WPM 5000HD (Shelterseal HD)

The asphalt should be applied as soon as possible after the ARDEX WPM 5000HD (Shelterseal HD) membrane has been installed. ARDEX recommend applying a minimum 50mm compacted overlay for carpark areas. The topping should be applied at a temperature of between 120-150°C.

PLASTERING OVER SHELTERSEAL

Coat affected area with ARDEX WPM 179 (Refer to page 45). Let coating dry then apply a second coat of ARDEX WPM 179. While still wet broadcast dry sand onto the surface. Let Dry. When dry, plaster area with normal plaster system.

SAFETY DATA

ARDEX WPM 240 (Shelter Primer) is solvent based and classified as Dangerous Goods Class 3 Packaging Group II material. It is highly flammable and should be used with appropriate safety equipment. Avoid inhalation or contact with eyes.

First Aid: If swallowed do not induce vomiting, contact a doctor or Poisons Information Centre immediately. In case of contact with eyes rinse thoroughly with water.

Spills & Leaks: Restrict access to area. Prevent material entering sewers and restricted areas. If possible cover liquid with earth, sand or absorbent material. Flush area with water.

Fire: Eliminate all sources of ignition. Firefighters should wear full protective clothing and self contained breathing apparatus with full face mask. Use dry chemicals foam or carbon dioxide to extinguish fire.

STORAGE

ARDEX WPM 5000HD (Shelterseal HD) is supplied in white cardboard cartons. All rolls should be stored in a vertical position, covered area protected against UV radiation.

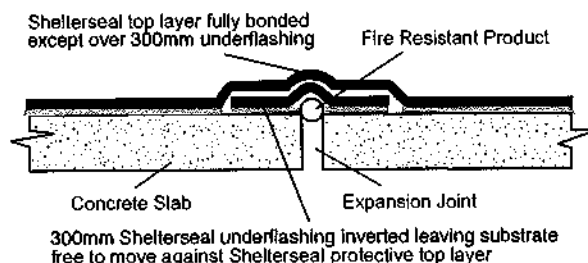
PACKAGING

Roll size: 1m x 20m Roll weight: Approx 30kg
Other products: Shelter Primer 5 litres and 20 litres

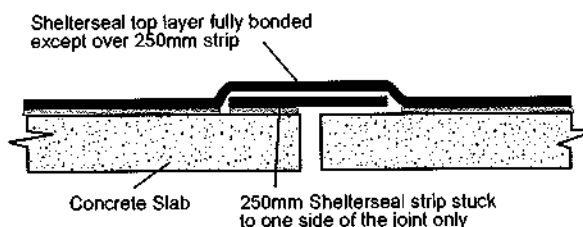
TECHNICAL PERFORMANCE DATA

Properties	Typical Values	Test Method
Thickness	1.5mm	UNI 8202
Weight	1.6kg	UNI 8202
Colour	Black	
Softening point	110°C	
Temperature resistance (maximum)	150°C	
Tensile strength (longitudinal)	152kg/8cm	
Tensile strength (transverse)	124kg/8cm	
Elongation (longitudinal)	32%	ASTM D638
Elongation (transverse)	21%	ASTM D638
Tearing (longitudinal)	350N	UNI 8202/9
Tearing (transverse)	300N	UNI 8202/9
Adhesion to primed concrete	4.9 N/mm	ASTM D1000
Adhesion to steel	5.8 N/mm	ASTM D1000
Puncture resistance	220 N/65mm	ASTM E 154
Vapour transmission rate	0.3g/m/24hrs	ASTM E 96
Cold flexibility	-30°C	ASTM D 146

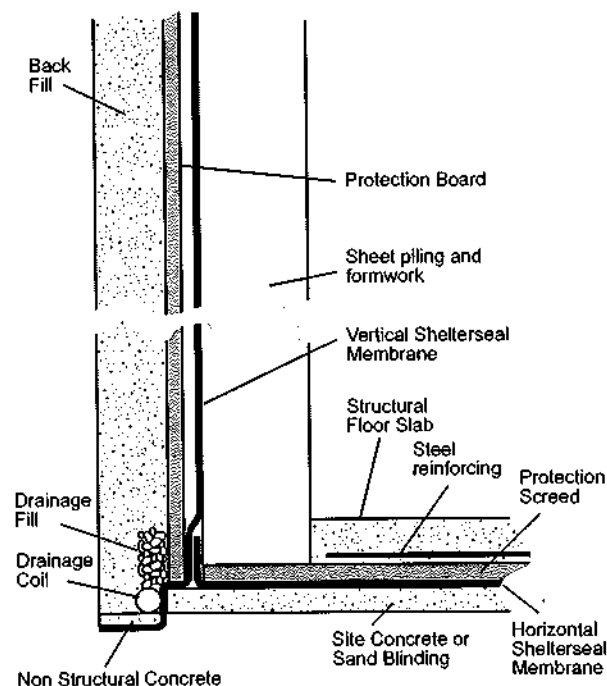
EXPANSION JOINT



CONSTRUCTION JOINT



BELOW GROUND DETAIL



Typical details do not indicate number of layers required

ARDEX WPM 195

SBS Torch-Applied Tanking Membrane

PRODUCT DESCRIPTION

ARDEX WPM 195 is a high performance Styrene-Butadiene-Styrene (SBS) bituminous compound modified with adhesive elastoplastomeric polymers its excellent quality is highlighted by two indicators: cold flexibility and high adhesiveness. ARDEX WPM 195 is suitable for application in all climatic zones, with excellent cold flexibility (-20° C) enables an easy application and allows the membrane to be ideally suited to be applied in areas with harsh climates.

The exceptional elongation properties of SBS combined with the strength and dimensional stability of the reinforcing provides an excellent waterproofing membrane in below ground applications. ARDEX WPM 195 is coated with a sanded polymeric film PE/PP, while the bottom surface is embossed and protected by a heat sensitive polythene film.

ARDEX WPM 195 also has the European CE certification for use as a tanking membrane.

FEATURES/BENEFITS

- Complies with BS EN 13969:2004
- European CE certification - GB06/69203
- CodeMark Certification (No. AQ-021216-CMNZ)
- Excellent resistance to atmosphere agents
- Excellent resistance to Geothermal Gas including Hydrogen Sulphide
- High flexibility during application at sub-zero temperature with no physical strains
- High malleability
- Accommodates structural movements
- Resistant to chemical attacks
- Withstand thermal shocks
- Proven performance in colder regions
- Good elongation and flexibility

USES

ARDEX WPM 195 is used as a single layer or multi-layer membrane in horizontal or vertical applications for waterproofing for below ground tanking. It is primarily applied to the outside of a sub-structure of a building, such as a foundation or basement to prevent water ingress.

Other forms of tanking where ARDEX 195 can be used include under floor slabs, behind masonry walls, the lining of substrates of in situ or precast concrete; retaining walls, lift shafts, tunnels, living roofs and planter boxes.

ARDEX WPM195 membrane must be protected from UV.

SURFACE PREPARATION

Substrates need to be clean, smooth, dry and free of sharp edges, loose or foreign materials, oil, grease and other materials that may damage the membrane. All surface voids greater than 5mm wide shall be properly filled with an acceptable fill material.

Confirm concrete structures are specifically engineered to meet the requirements of the NZBC B1/VM1, 3.0 Concrete.

Ensure concrete substrate has been allowed to cure for at least 28 days before commencing application. The relative humidity of concrete substrates must be 75% or less before membrane application to NZBC E2/AS1, 10.0 Construction moisture. Take a measurement using a hygrometer to verify concrete has sufficiently dried when necessary. This process is essential.

The above criteria do not apply if ARDEX WPM 195 is loose-laid on lean site concrete.

ARDEX do not recommend the use of curing compounds; however, when used ensure all traces of compound are gone or removed. Concrete to be finished to NZS 3114, U3 with a light trowel texture. The concrete to have all ridges and protrusions stoned flush.

INSTALLATION

The application of ARDEX WPM 195 should be carried out by an approved ARDEX Applicator.

Installation shall be undertaken in accordance with all relevant technical information related to the selected installation method, including information contained within the ARDEX specification.

Prior to the application of ARDEX WPM 195 the surface may require priming with ARDEX WPM 240 (Shelter Primer). Coverage of primer will depend on the porosity of the substrate.

ARDEX WPM 195 is normally fully bonded to the prepared substrate with side laps of 100mm and end laps of 150mm. Overlaps shall be sealed by torch.

ARDEX WPM 195 may be used in various combinations to produce a variety of specifications tailored to suit the individual waterproofing need.

The exact specification will depend on functional and economic requirements. Advice should be sought for suitable specification from ARDEX.

STORAGE

All rolls of ARDEX WPM195 should be stored in a covered area protected against sunlight and UV radiation. Rolls should be stored in a vertical position on a smooth floor so as not to damage the edges.

PACKAGING

Roll size: 1m x 8m

Roll weight: Approximately 40kg

Rolls per pallet: 25

ARDEX HYDRO STOP

Please refer to Ardex 1950 and Ardex 1955 for data sheets on standard and sea water activated Hydrophilic Rubber Water Stops.

ARDEX WPM 195

SBS Torch-Applied Tanking Membrane

TECHNICAL CHARACTERISTICS

CHARACTERISTIC	TEST METHOD	UNITS	NOMINAL VALUES	TOLERANCES
Visible defects	EN 1850-1	visible	Without defects	
Length	EN 1848-1	m	8 -1%	MLV
Width	EN 1848-1	m	1 -1%	MLV
Straightness	EN 1848-1	mm	20 mm x 8 m	MLV
Thickness	EN 1849-1	mm	4	±
Watertightness (A)	EN 1928	kPa	60	MLV
Shear resistance longitudinal / transversal	EN 12317-1	N/50 mm	650 / 450	± 20%
Water vapour transmission properties Method A	EN 1931	µ / Sd (m)	120.000 / 480	-20.000
Tensile Strength Longitudinal / Transversal	EN 12311-1	N/50 mm	750 / 550	± 20%
Elongation at break Longitudinal / Transversal	EN 12311-1	%	45 / 45	- 15 absolut
Resistance to impact	EN 12691	mm	900	MLV
Resistance to static loading Method A	EN 12730	Kg	15	MLV
Resistance to tearing (nail shank)	EN 12310-1	N	180 / 180	- 30%
Dimensional stability Longitudinal / Transversal	EN 1107-1 met. A	%	± 0,3 %	MLV
Flexibility at low temperature	EN 1109	°C	-20	MLV
Flow resistance at elevated temperature	EN 1110	°C	90	MLV
Durability of watertightness against artificial ageing	EN 1296 / EN 1928	kPa	60	MLV
Durability of watertightness against chemicals	EN 1847 / EN 1928	Kpa	60	MLV
Change in mass on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	0.29	MDV
Change in Tensile Strength on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	-9.6	MDV
Change in Elongation on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	7.2	MDV

TOLL FREE TECHNICAL SERVICES:

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ARDEX WPM 195

SBS Torch-Applied Tanking Membrane

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ARDEX WPM 196

SBS Torch-Applied Tanking Membrane

PRODUCT DESCRIPTION

ARDEX WPM 196 is a high performance Styrene-Butadiene-Styrene (SBS) bituminous compound modified with adhesive elastoplastic polymers its excellent quality is highlighted by two indicators: cold flexibility and high adhesiveness. ARDEX WPM 196 is suitable for application in all climatic zones, with excellent cold flexibility (-20°C) enables an easy application and allows the membrane to be ideally suited to be applied in areas with harsh climates.

The exceptional elongation properties of SBS combined with the strength and dimensional stability of the reinforcing provides an excellent waterproofing membrane in below ground applications. ARDEX WPM 196 is coated with a mineral chip - sand, polymeric film PE/PP, while the bottom surface is embossed and protected by a heat sensitive polythene film.

ARDEX WPM 196 also has the European CE certification for use as a tanking membrane.

FEATURES/BENEFITS

- Complies with BS EN 13969:2004
- European CE certification - GB06/69203
- CodeMark Certification (No. AQ-021216-CMNZ)
- Excellent resistance to atmosphere agents
- Excellent resistance to Geothermal Gas including Hydrogen Sulphide
- High flexibility during application at sub-zero temperature with no physical strains
- High malleability
- Accommodates structural movements
- Resistant to chemical attacks
- Withstand thermal shocks
- Proven performance in colder regions
- Good elongation and flexibility

USES

ARDEX WPM 196 is used as a single layer or multi-layer membrane in horizontal or vertical applications for waterproofing for below ground tanking. It is primarily applied to the outside of a sub-structure of a building, such as a foundation or basement to prevent water ingress.

Other forms of tanking where ARDEX WPM 196 can be used include under floor slabs, behind masonry walls, the lining of substrates of in situ or precast concrete; retaining walls, lift shafts, tunnels, living roofs and planter boxes.

SURFACE PREPARATION

Substrates need to be clean, smooth, dry and free of sharp edges, loose or foreign materials, oil, grease and other materials that may damage the membrane. All surface voids greater than 5mm wide shall be properly filled with an acceptable fill material.

Confirm concrete structures are specifically engineered to meet the requirements of the NZBC B1/VM1, 3.0 Concrete.

Ensure concrete substrate has been allowed to cure for at least 28 days before commencing application. The relative humidity of concrete substrates must be 75% or less before membrane application to NZBC E2/AS1, 10.0 Construction moisture. Take a measurement using a hygrometer to verify concrete has sufficiently dried when necessary. This process is essential.

The above criteria do not apply if ARDEX WPM 196 is loose-laid on lean site concrete.

ARDEX do not recommend the use of curing compounds; however, when used ensure all traces of compound are gone or removed. Concrete to be finished to NZS 3114, U3 with a light trowel texture. The concrete to have all ridges and protrusions stoned flush.

INSTALLATION

The application of ARDEX WPM 196 should be carried out by an approved ARDEX Applicator.

Installation shall be undertaken in accordance with all relevant technical information related to the selected installation method, including information contained within the ARDEX specification.

Prior to the application of ARDEX WPM 196 the surface may require priming with ARDEX WPM 240 (Shelter Primer). Coverage of primer will depend on the porosity of the substrate.

ARDEX WPM 196 is normally fully bonded to the prepared substrate with side laps of 100mm and end laps of 150mm. Overlaps shall be sealed by torch.

ARDEX WPM 196 may be used in various combinations to produce a variety of specifications tailored to suit the individual waterproofing need.

The exact specification will depend on functional and economic requirements. Advice should be sought for suitable specification from ARDEX.

STORAGE

All rolls of ARDEX WPM 196 should be stored in a covered area protected against sunlight and UV radiation. Rolls should be stored in a vertical position on a smooth floor so as not to damage the edges.

PACKAGING

Roll size: 1m x 8m

Roll weight: Approximately 40kg

Rolls per pallet: 25

ARDEX HYDRO STOP

Please refer to Ardex 1950 and Ardex 1955 for data sheets on standard and sea water activated Hydrophilic Rubber Water Stops.

ARDEX WPM 196

SBS Torch-Applied Tanking Membrane

TECHNICAL CHARACTERISTICS

CHARACTERISTIC	TEST METHOD	UNITS	NOMINAL VALUES	TOLERANCES
Visible defects	EN 1850-1	visible	Without defects	
Length	EN 1848-1	m	8 -1%	MLV
Width	EN 1848-1	m	1 -1%	MLV
Straightness	EN 1848-1	mm	20 mm x 8 m	MLV
Thickness	EN 1849-1	mm	4	*
Watertightness (A)	EN 1928	kPa	60	MLV
Shear resistance longitudinal / transversal	EN 12317-1	N/50 mm	650 / 450	± 20%
Water vapour transmission properties Method A	EN 1931	µ / Sd (m)	120.000 / 480	-20.000
Tensile Strength Longitudinal / Transversal	EN 12311-1	N/50 mm	750 / 550	± 20%
Elongation at break Longitudinal / Transversal	EN 12311-1	%	45 / 45	- 15 absolut
Resistance to impact	EN 12691	mm	900	MLV
Resistance to static loading Method A	EN 12730	Kg	15	MLV
Resistance to tearing (nail shank)	EN 12310-1	N	180 / 180	- 30%
Dimensional stability Longitudinal / Transversal	EN 1107-1 met. A	%	± 0,3 %	MLV
Flexibility at low temperature	EN 1109	°C	-20	MLV
Flow resistance at elevated temperature	EN 1110	°C	90	MLV
Durability of watertightness against artificial ageing	EN 1296 / EN 1928	kPa	60	MLV
Durability of watertightness against chemicals	EN 1847 / EN 1928	Kpa	60	MLV
Change in mass on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	0.29	MDV
Change in Tensile Strength on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	-9.6	MDV
Change in Elongation on exposure to Hydrogen Sulphide	EN 1847 - Cert No 10998	%	7.2	MDV

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ARDEX WPM 1500

WeldTec Below Ground Tanking Membrane

DESCRIPTION

ARDEX WPM 1500 is a fleece-lined, weldable tanking membrane for below ground applications.

USE

ARDEX WPM 1500 is used as a single layer or multi-layer membrane in horizontal or vertical applications for waterproofing for below ground tanking. It is primarily applied to the outside of a sub-structure of a building, such as a foundation or basement to prevent water ingress.

Other forms of tanking where ARDEX WPM 1500 can be used include under floor slabs, behind masonry walls, the lining of substrates of in situ or precast concrete; retaining walls, lift shafts, tunnels, living roofs and planter boxes.

ARDEX WPM 1500 must be protected from UV.

DURABILITY

ARDEX WPM 1500 when fixed according to ARDEX instruction will meet the New Zealand Building Code requirements of B2.3.1 (a) 50 years.

MATERIAL SPECIFICATIONS

ARDEX requirements for long term warranty necessitate that the ARDEX WPM 1500 meets these typical technical requirements listed below in Table 1.

GAUGES

Standard 1.5 mm

RESISTANCE

ARDEX WPM 1500 resists tearing, flex-cracking, bubbling and abrasion. It is extremely strong, has a long life and is versatile.

PACKAGING

ARDEX WPM 1500 is packaged in rolls of nominal 1.4 m width and 20 m long. Each roll is packed in a polythene wrapper trademarked ARDEX WPM 1500.

ADHESIVES FOR USE WITH ARDEX WPM 1500

ARDEX WA 98 - Solvent Based waterproofing adhesive.

INSTALLATION

The application of ARDEX WPM 1500 should be carried out by an approved ARDEX Applicator.

Installation shall be undertaken in accordance with all relevant technical information related to the selected installation method, including information contained within the ARDEX specification.

Acceptable substrates to which ARDEX WPM 1500 is to be installed must be properly prepared prior to membrane installation.

Physical Properties

Parameter	ARDEX WPM 1500	Test Method
Colour	Grey/Black	
Thickness	1.5 mm	
Width	1.40 m	
Roll Length	20 m	
Low Temperature Flexibility	Pass at -29°C	ASTM D1970
Elongation	500% typical	ASTM D412
Tensile Strength	8 MPa	ASTM D412
Puncture Resistance	600 N	ASTM E96 B
Peel Adhesion to Concrete	0.87 N/mm	ASTM D903 modified
Lap Peel Adhesion	7 N/mm	ASTM D1876
Permeance to Water Vapour Transmission	0.04 g/dm ²	ASTM E96 B
Radon Diffusion Coefficient	1.6 x 10 ⁻¹¹ m ² /s	K124/02/95
Water-Tightness to Liquid Water	Pass	EN 1928
Durability of Water-Tightness Against Chemicals	Pass	EN 1847 and EN 1928
Resistance to Tear (Nail Shank)	351 N	EN 12310-1
Bitumen Compatability	Pass	EN 1548 and EN 1928
Joint Strength	380 N/50mm	EN 12317-2
Lateral Water Migration Resistance	Max. 85 psi (60 m of hydrostatic head pressure)	STM D 5385 Modified1
Resistance to Hydrostatic Head	Pass at 100 psi (70 m of hydrostatic head pressure)	ASTM D 5385 Modified2

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane.
2. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a pressure of 100 psi which is the limit of the apparatus.

All surfaces must be dry, clean, smooth, and free of sharp edges, loose or foreign materials, oil, grease and other materials which may damage the membrane.

- A. Substrate examination: Examine substrates, areas, and conditions, with the applicator present, for compliance with requirements and other conditions affecting performance.
1. For applications over blinding, a concrete mud-slab, compacted subgrade or vertical soil retention system, verify that compacted sub-grade or concrete mud-slab is smooth and sound; and ready to receive the ARDEX WPM1500 below grade membrane.
2. Verify that vertical soil retention systems are prepared using drainage composite, plywood, shotcrete or other approved means to achieve a uniform, sound and continuous substrate ready to receive the ARDEX WPM 1500 below grade membrane.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

ARDEX WPM 1500 is normally fully bonded to the prepared substrate with side laps of 100mm and end laps of 150mm. Overlaps shall be sealed by using a Leister Triac S Hot Air Gun hand welder, or Leister Twinny Combi-Welder.

ARDEX WPM 1500 may be used in various combinations to produce a variety of specifications tailored to suit the individual waterproofing need.

The exact specification will depend on functional and economic requirements. Advice should be sought for suitable specification from ARDEX.

INSTALLATION - VERTICAL

Apply the membrane with the black side towards the substrate. Mechanically fasten the membrane vertically using flat headed fixings appropriate to the substrate. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten or fixing 50 mm below the top edge. Use fixings at typically 600 mm centres to secure the membrane flat against the substrate.

Fixings can be made through the selvedge; this allows firmly welded and rolled overlaps, which are covered by the subsequent sheet of ARDEX WPM 1500. Any exposed fixings should be patched by heat welding a patch of ARDEX WPM 1500 with a Leister Triac S Hot Air Gun.

REMOVAL OF FORMWORK

ARDEX WPM 1500 membranes can be applied to removable single and double sided formwork, slab perimeter formwork, pile caps, etc. Once concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to

develop the surface bond with ARDEX WPM 1500.

A minimum concrete compressive strength of 10 N/mm² is recommended prior to stripping formwork supporting WPM 1500 membranes. Premature stripping may result in loss of adhesion between the membrane and concrete.

Roll out ARDEX WPM 1500 and cut to the measured length. Smooth ARDEX WPM 1500 on contact to minimise air entrapment beneath the membrane.

Floor sheets of ARDEX WPM 1500 must extend up the wall at least 300mm. Make sure the ARDEX WPM 1500 is laid tightly into all corners. Wall sheets of ARDEX WPM 1500 should overlap the 300mm upstand. Weld seams and laps with the Leister Triac S Hot Air Gun or Leister Twinny Combi-Welder. Roll with a rubber roller to ensure seams and laps are secure.

PROTECTION

ARDEX WPM 1500 is not suitable as a trafficable surface. It is the responsibility of the main building contractor to ensure all sub-trades likely to be working in the vicinity of the membrane are aware that a waterproofing membrane has been installed and all care must be taken to protect the membrane from damage.

SAFETY PRECAUTIONS

ARDEX WPM 1500 is not classified as dangerous goods

ARDEX HYDRO STOP

Please refer to Ardex 1950 and Ardex 1955 for data sheets on standard and sea water activated Hydrophilic Rubber Water Stops.

ARDEX HYDROSTOP SW WPM 1950

Polymeric Hydrophilic Rubber Joints

DESCRIPTION

Thanks to its particular chemical composition, ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint remains unaltered over time even at maximum expansion, is dimensionally stable even after numerous hydration and de-hydration cycles while maintaining its ability to increase its volume.

In its maximum expansion, in all its sections, ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint is mechanically strong and elastic. The swelling process is controlled and designed to be compatible with fresh concrete.

The expansion is due to the increase in volume of the ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint components, such as butyl rubber, polyethylene aggregated by high cohesion polymeric binders.

APPLICATION INSTRUCTIONS

ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint must be applied to the support with nails or cement adhesives to remain attached to the support in the early stages of concrete casting. For maximum performance ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint should be placed between the reinforcing bars or in a support with raised edge of at least 8/10 cm. The joints are realized by matching sideways the rubber strip for at least 5 cm, while avoiding overlapping. The application surface should be clean, compact, properly vibrated and free of any irregularities.

BENEFITS

ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint is non-greasy, non-sticky, odorless and non-toxic. Thanks to its ductility it can be used in all conditions and, apart from the nails or adhesive, needs no additional support also in the vertical laying.

PACKAGING

Normally the ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint is protected in impermeable packs in cardboard boxes with 6 rolls 8mt long in a box, giving a total of 48 lineal meters. Profiles and sizes are those normally used in the construction site; profiles with particular sections are available on request:

SW WPM 1950 20mm x 10mm x 8mt roll. 6 rolls per carton equals 48 lineal metres per box

LIMITATIONS

In case of contact with high salt content water, ARDEX Hydrostop SW WPM 1950 hydrophilic rubber joint, preliminary expansion tests must be carried out. For further information please contact our technical service.

SAFETY PRECAUTIONS

There is no health hazards associated with ARDEX Hydrostop SW WPM 1950 in normal use.

Technical Data

Specific weight	ISO 1183	1,26 kg/dm ³
Operating temperature	ISO 458/2	about +4 °C
Max. expansion		% 350
Hardness	ISO 868	60 shore A
Load at break	ISO 527	25 N/mm ²
Elongation at break	ISO 527	300 %
Durability		unlimited
Sections	various	

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ARDEX HYDROSTOP SEA WPM 1955

Polymeric Hydrophilic Rubber Joints

DESCRIPTION

Thanks to its particular chemical composition, ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint remains unaltered over time even at maximum expansion, is dimensionally stable even after numerous hydration and dehydration cycles while maintaining its ability to increase its volume.

USED IN APPLICATIONS IN BRACKISH AND MARINE WATER

In its maximum expansion, in all its sections, ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint is mechanically strong and elastic. The swelling process is controlled and designed to be compatible with fresh concrete. First expansion occurs after 6/12 hours, while second expansion occurs after 24/36 hours.

COMPOSITION

The expansion is due to the increase of volume in the ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint components, such as butyl rubber, polyethylene aggregated by high cohesion polymeric binders.

APPLICATION INSTRUCTIONS

ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint, whose standard section size is 10x20mm, but can also be supplied in different sizes, must be applied to the support with nails or cement adhesives to remain attached to the support in the early stages of concrete casting. For maximum performance ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint should be placed between the reinforcing bars or in a support with raised edge of at least 8/10 cm. The joints are realized by matching sideways the rubber strip for at least 5 cm, while avoiding overlapping. The application surface should be clean, compact, properly vibrated and free of any irregularities.

BENEFITS

ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint is non-greasy, non-sticky, odorless and non-toxic. Thanks to its ductility it can be used in all conditions and, apart from the nails or adhesive, needs no additional support also in the vertical laying.

PACKAGING

Normally the ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint is protected in impermeable packs in cardboard boxes with 6 rolls 8mt long in a box, giving a total of 48 lineal meters. Profiles and sizes are those normally used in the construction site; profiles with particular sections are available on request:

SEA WPM 1955 20mm x 10mm x 8mt roll. 6 rolls per carton equals 48 lineal metres per box.

Guarantees

ARDEX Hydrostop SEA WPM 1955 hydrophilic rubber joint in its various sections is manufactured with the best materials available on the market to obtain a top quality product.

All information reported on this data sheet correspond to our present level of technical and scientific knowledge studied in laboratory and tested on the site.

There can be changes attributable to environmental or application differences, or to the particular state of the material where to install the joint.

Therefore, information given in this sheet is not a guarantee on results, just warranty on the product quality.

SAFETY PRECAUTIONS

There is no health hazards associated with ARDEX Hydrostop SEA WPM 1955 in normal use.

Technical Data

Specific weight	ISO 1183	1,27 kg/dm ³
Operating temperature	ISO 458/2	about +3 °C
Max. expansion		% 350
Hardness	ISO 868	45 shore A
Load at break	ISO 527	30 N/mm ²
Elongation at break	ISO 527	500 %
Expansion		200 %
Sections	various	

DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them. © ARDEX New Zealand Ltd. All aforementioned products are the trade marks of ARDEX New Zealand Ltd.

Sonyx 101 CoolColour™ waterborne semi-gloss

Surface preparation

Clean down thoroughly to remove all dirt, dust and loose material. Ensure surface is free from oil, grease, mould and release agents. Any timber that has been exposed to weather for more than one week requires thorough sanding of the surface or treatment with Resene TimberLock (see Data Sheet D48).

If moss and mould are present, treat with Resene Moss & Mould Killer (see Data Sheet D80). Waterblasting at 21,000 kps (3000 psi) is the best surface preparation method prior to painting weathered cementitious surfaces or galvanised steel.

Prime as per the following:

Exterior timber

Resene Wood Primer (see Data Sheet D40) then a coat of Resene Quick Dry (see Data Sheet D45) for optimal CoolColour effect.

Fibre board, particle board, Matai, Spotted Gum, Totara

Resene Quick Dry (see Data Sheet D45).

G.R.C, glossy concrete

Resene Quick Dry (see Data Sheet D45).

Leaking blockwork

Resene X-200 CoolColour (see Data Sheet D62C).

New galvanised steel, Zincalume

Resene Galvo-Prime (see Data Sheet D402).

Old galvanised steel, Zincalume

Resene Galvo One (see Data Sheet D41).

Sanding dust from old lead or chromate based paints or old building materials containing asbestos may be injurious to the health if inhaled or ingested. Seek expert advice if the presence of these materials is suspected.

Application

Apply by brush, synthetic fibre roller, speed brush or spray. Prepare surface and prime as above. Apply two to three coats of Resene Sonyx 101 CoolColour allowing two hours between coats.

Precautions

1. Ensure correct primer and/or sealer is used.
2. Fill all nailholes and cracked timber after priming.
3. Galvanised steel and Zincalume must be primed before application of Resene Sonyx 101 CoolColour.



Sonyx 101 SDS

Please ensure the current Data Sheet is consulted prior to specification or application of Resene products. View Data Sheets online at www.resene.com/datasheets. If the surface you propose to coat is not referred to by this Data Sheet, please contact Resene for clarification.

In Australia
PO Box 924, Beenleigh, Qld 4207
Call 1800 738 383, visit www.resene.com.au
or email advice@resene.com.au

Resene
the paint the professionals use

In New Zealand
PO Box 38242, Wellington Mail Centre, Lower Hutt 5045
Call 0800 RESENE (737 363), visit www.resene.co.nz
or email advice@resene.co.nz

Resene

Sonyx 101

CoolColour™

waterborne
semi-gloss

Resene Sonyx 101 CoolColour is a member of a new generation family of waterborne coatings optimised for superior toughness, durability and adhesion, combined with superb flowing good looks.

Resene CoolColour technology performs optimally on dark colours that are the most susceptible to heat build-up.

exterior

Typical uses

- Block and brickwork
- Concrete
- Fibre cement
- G.R.C. panels
- Primed galvanised steel
- Primed timber
- Solid plaster

Vehicle type	Physical properties
Pigmentation	(Aliphatic acrylates) 100% acrylic
Solvent	Titanium dioxide/extenders
Finish	Water
Colour	Semi-gloss
	Selected colours from the Resene Total Colour System
Dry time (minimum)	45 minutes at 18°C
Recoat time (minimum)	2 hours
Primer required	Yes, dependent on surface
Theoretical coverage	12 sq. metres per litre
Dry film thickness	38 microns at 12 sq. metres per litre
Usual no. of coats	2; some colours may require an additional coat
Abrasion resistance	Very good
Chemical resistance	Good
Heat resistance	Thermoplastic
Solvent resistance	Fair
Durability	Excellent
Thinning and clean up	Water
VOC	c. 59 grams per litre (see Resene VOC Summary)

Performance

Performance and limitations

1. Reflects heat improving the life of paint finish and substrate and improving interior conditions inside the painted structure.
2. Ideal coating for exterior cementitious substrates.
3. Excellent intercoat adhesion.
4. Excellent adhesion to Resene primers - refer schedule overleaf.
5. Excellent durability in high U.V. environments.
6. An Environmental Choice approved product.

Limitations

1. Do not apply at temperatures below 10°C or when it is liable to drop below 10°C during the drying period.
2. Not designed for direct to metal applications.
3. Will not penetrate chalky and powdery surfaces.
4. Not normally used on opening sashes and doors (use Resene Lustacryl CoolColour - see Data Sheet D310C).

Please ensure the current Data Sheet and Safety Data Sheet are consulted prior to specification or application of Resene products. View Data Sheets online at www.resene.com/datasheets. If in doubt contact Resene.



Silicone Sealants

Brick & Concrete Silicone



A neutral (non acid) curing, one-part silicone sealant with low modulus for sealing joints in walls, patios and floors.

Uses

This sealant for joints in walls, patios, floors, fencing, windows and expansion joints in concrete. Optimum adhesion is achieved on bricks, concrete, ceramics, fibreglass, stone, marble, stone, metals, wood and most plastics.

Product Range

Product Code: 9300697114983

- Size & Pack Type: 415 g cartridge
- Color: Grey

Technical Features

- High flexibility to withstand building movement
- Adhesion to sound concrete and similar materials is excellent
- Low modulus results in less strain on concrete
- Forms a durable seal
- Does not shrink when drying
- UV resistance
- Low odour during application
- Non corrosive neutral cure formulation
- Remains flexible – will not shrink, crack, crumble or dry out
- Weather resistant

Application Tips

- Can't be painted over
- Not recommended for below waterline applications
- Do not use in below ground applications
- For deep cracks use a backer rod such as closed cell polyethylene foam or similar, so sealant depth is between 6-12mm
- Damaged sealant can be repaired by applying new sealant directly, after cleaning the damaged area
- For a cleaner appearance mask both sides of joint prior to sealing. Remove tape before sealant skins
- For a better finish complete painting prior to use of sealant as it can not be painted over
- For a smooth finish use a spatula dipped in detergent solution

Technical Details and Performance

For more information only, not to be used for setting specifications.

Consistency (as applied)

Non-slump, solvent free paste

Curing Mechanism

It rapidly develops rubber consistency by reaction with moisture from the air

Curing Rate

1mm depth per day

Curing Forming Time

15 minutes (depending on weather conditions)

Elongation

Approx. 500% (ASTM D412)

Service Temperature

-30°C to +150°C

Joint Movement Capability

±5% of original joint width when applied in properly designed joint*

Clean Up

Remove all excess sealant from equipment before it cures with a cloth dampened with mineral turpentine or acetone. Once cured sealant is extremely difficult to remove and must be abraded or trimmed with a knife.

Cured sealant can also be removed with Selleys Silicone Remover.

A properly designed joint refers to the accepted concept of correct sealant dimensions, i.e. sealant depth equal to half sealant width and sealant applied over a suitable backing material to which the sealant will not adhere or which does not limit the free movement of the sealant.

- [Brick & Concrete Silicone Product Brochure](#)
- [MSDS](#)

Related Products



Selleys Light Speed Caulking Gun

An easy to use, light-weight yet high strength caulking gun providing total comfort and control.



Silicone Sealants

Pro-Spec® Flexi-Seal Roof & Gutter Silicone Sealant



PRO-SPEC FLEXI-SEAL ROOF & GUTTER SILICONE SEALANT is a general purpose translucent silicone sealant suitable for metal, aluminium, galvanised iron, copper, brass, zinc, rigid PVC, glass and masonry. It is non-acid (neutral) cure, medium modulus silicone sealant. PRO-SPEC FLEXI-SEAL ROOF & GUTTER SILICONE SEALANT meets most sealing requirements of plumbing, roofing and building tradesmen.

Uses

PRO-SPEC FLEXI-SEAL ROOF & GUTTER SILICONE SEALANT can be used for sealing lap joints in roofing, flashings, ridge caps and gutters. Sealing rivet heads, ridge caps, seams and joints (galvanised iron, glazed tiles, rigid PVC, copper, brass, zinc). Seals old gutters to new, weatherproofs skylights, vents and flashings and can be used to weatherproof caravans and truck bodies.

Product Range

Product Code: 9300697116970

- Size & Pack Type: 300g cartridge
- Color: Clear

Technical Features

- Excellent tradesman's grade general purpose sealant. Will not attack zinc or zinc-containing metals or cementitious surfaces. (Note: acid releasing silicone sealants attack these surfaces, which leads to poor adhesion).
- Excellent flexibility (joint movement capability 30% total or $\pm 15\%$)
- Service temperature range -50°C to $+150^{\circ}\text{C}$
- Good adhesion to most building materials. (Pre-testing to confirm adhesion is advised for critical jobs and for plastics.)

Application Tips

- Not recommended as a plug or caulk for burst pipes or rusted guttering
- Complete painting before applying sealant. Sealant can not be successfully painted over.
- Not suitable for aquariums or potable water containers
- Not recommended for structural or "fin" glazing applications
- Not suitable for seals below water or in areas of high abrasion, e.g. walkways
- Not for use in contact with bituminous materials

Technical Details and Performance

indicative information only, not to be used for setting specifications.

Consistency

(as applied) Non-slump, soft paste, easily extruded with cartridge gun

Curing Mechanism

rapidly develops rubber consistency by reaction with moisture from the air

Curing Rate

mm depth per day

Skin Forming Time

10 minutes (depending on weather conditions)

Thickness (when cured)

Approximately 17 (Shore A, Instantaneous)

Expansion

Approximately 400% (ASTM D412)

Service Temperature

-40°C to +150°C

Joint Movement Capability

±50% of original joint width. When applied in properly designed joint.*

Application

10 metres of a 5mm bead

*Properly designed joint refers to the accepted concept of correct sealant dimensions, i.e. sealant depth equal to half sealant width and sealant applied over a suitable backing material which the sealant will not adhere to or which does not limit the free movement of the sealant.

- [Pro-Spec® Flexi-Seal Roof & Gutter Silicone Sealant Product Brochure](#)
- [MSDS](#)

Related Products



Light Speed Caulking Gun

Selleys Light Speed Caulking Gun is a durable, innovative tool that is easy to use and leaves no mess. Selleys Light Speed Caulking Gun is ideal for professionals using caulking guns on a regular...

Rinnai**INFINITY VT series**

continuous flow gas hot water heaters

PTS

01:17

Compliance with the NZ Building Code

If specified, installed and maintained in accordance with all Rinnai requirements the INFINITY VT series will comply with the below provisions of the NZ Building Code. AS/NZS 5601.1 is an acceptable solution within the NZBC for gas installations as per NZBC G11/AS1 9.0.1.

Code clause	Evidence of compliance
B1.3.1 B1.3.2 B1.3.3 (a, b, c, h, , m)	The INFINITY VT units are certified to AS/NZS 4552, a series of standards for safety, performance and energy efficiency in gas fired water heaters for hot water supply and/or central heating.
B.2.3.1 (c)	In service history.
C2.2 and C2.3	Certification of continuous flow gas water heaters to AS/NZS 4552.
E2.3.2	Achieved by following E2/AS1
G4.3.3 (f, i)	Achieved as long as the building complies with G4/AS1
G9.3.1 (a, b, c, d, f), G9.3.3	G9/AS1 as required by Rinnai installation guidance
G10.3.1 (a, b, c, d), G10.3.2, G10.3.3, G10.3.4, G10.3.5, G10.3.6	G10/AS1 (NZS 5442 natural gas) and (NZS 5435 LPG)
G11.3.1, G11.3.2, G11.3.3, G11.3.4	G11/AS1 (AS/NZS 5601.1) as required by Rinnai installation guidance
H1.3.4	Certification of continuous flow gas water heaters to AS/NZS 4552.2 (Minimum energy performance standards for gas water heaters).

Additional evidence to support the above statements

Energy Safety Supplier Declaration of Compliance:

- INFINITY VT16: Declaration number - 970820094
- INFINITY VT20: Declaration number - 971020094
- INFINITY VT24: Declaration number - 971220094
- INFINITY VT26: Declaration number - 12409201012

Special conditions - installation requirements

Full appliance information can be found at www.rinnai.co.nz.

Limitations: To be installed in accordance with all Rinnai installation requirements and by a licensed gasfitter/plumber, and electrician. Upon completion of the installation, a final inspection and test to demonstrate that the gas appliance has been installed in accordance with Rinnai's instructions and in accordance with Gas (safety and measurement) Regulations 2013 is required by the installer. The gasfitter is to issue a certificate of compliance.

Special conditions - maintenance requirements

For reliable operation Rinnai INFINITY units should be serviced every two years. Installation, servicing and repair shall be carried out only by authorised personnel.



Experience our innovation

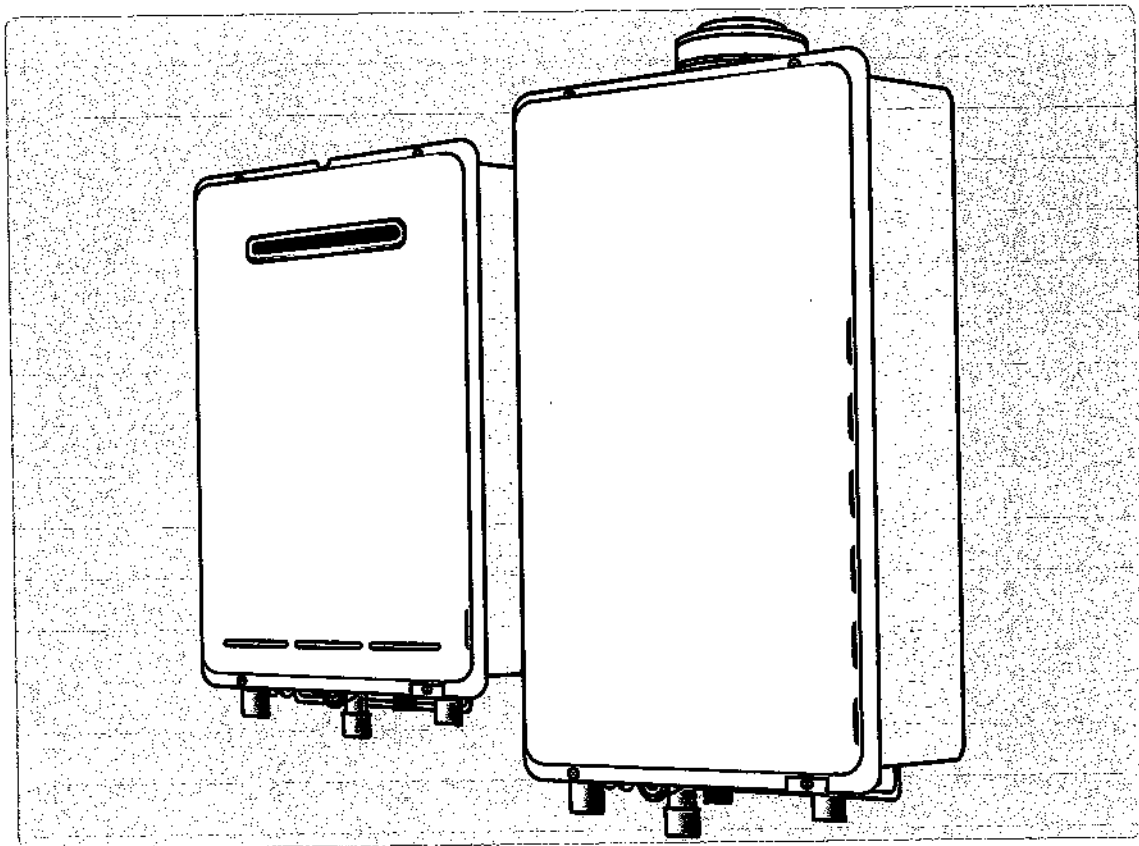
Rinnai.co.nz | 0800 746 624
<http://www.youtube.com/rinnainz>

Rinnai

Installation guide

Continuous flow water heaters

Models: VT16-26, HD200, HDi200, HD250, EF24, EF250, EFi250



Important:

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS3000, AS/NZS3500, AS/NZS 5601.1 and G12/AS1
- Local regulations and municipal building codes

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Rinnai continuous flow internal water heaters
(‘I’ models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624)

Rinnai New Zealand Limited
105 Pavilion Drive, Mangere, Auckland
PO Box 53177, Auckland Airport, Auckland 2150

Phone: (09) 257 3800, Fax: (09) 257 3899
Email: info@rinnai.co.nz
Web: www.rinnai.co.nz, www.youtube.com/rinnainz

Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds. Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination.

Damage and repair due to corrosive compounds in the air is not covered by warranty.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor (internal) water heaters

- DO NOT install in areas where contaminated air is present.
- Consider, before installation, where air has the ability to travel within the building.
- Where possible, install the heater in a sealed closet so that it is free of contaminated indoor air.

Outdoor (external) water heaters and vent terminations of indoor (internal) water heaters

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible

from air inlet vents—corrosive fumes may be released through these vents when air is not being run through them

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of

AS/NZS 5601.1 are satisfied.

An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to AS/NZS 5601.1 for details.

Catch pan



It is important that a suitably drained catch pan is fitted where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

This appliance **MUST** be used with the appropriate Rinnai flue system.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237FFUD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

External models



External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

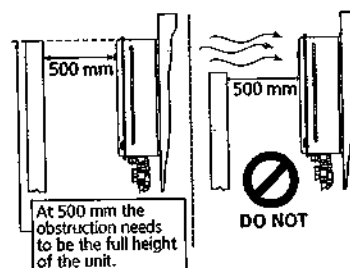
They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

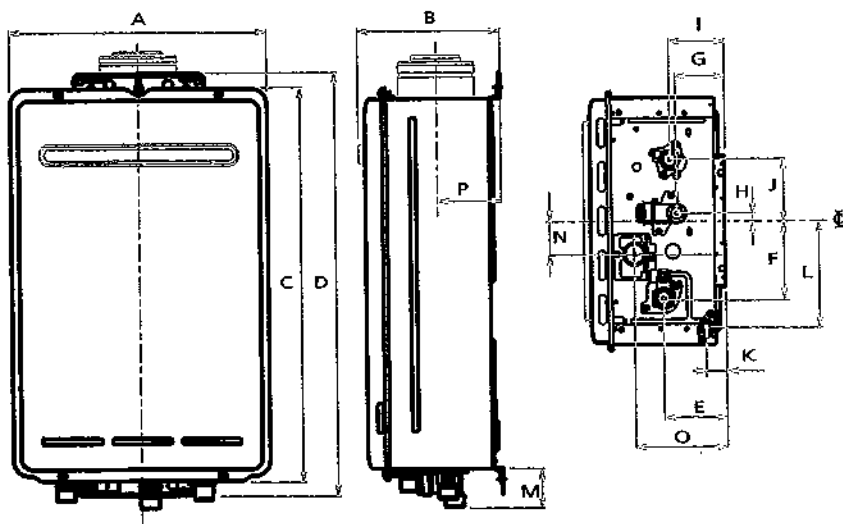
Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

Horizontal obstructions

AS/NZS 5601 stipulates a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing flue gases back into the flue terminal.



Dimensions: VT and HD models



Dimensions table (mm)		VT16 external (REU-VR1620WG)	VT20 external (REU-VR2024WG)	VT24 external (REU-VR2426WG)	VT26 external (REU-VR2626WG)	HD200 external (REU-VRM2632WC)	HD200 internal (REU-VR2632FUG)	HD250 external (REU-VR3237WC)
A	Width	350	350	350	350	350	350	470
B	Depth	194	194	194	194	250	235-275	244
C	Height - unit	530	530	530	530	600	600	600
D	Height - including brackets	571	571	571	571	636	641	644
E	Hot water outlet (from wall)	87	87	87	87	95	91-131	115
F	Hot water outlet (from centre)	105	105	105	105	110	110	61
G	Cold water inlet (from wall)	68	68	68	68	74	70-110	99
H	Cold water inlet (from centre)	10	10	10	10	27*	27*	52
I	Gas connection (from wall)	77	77	77	77	103	99-139	61
J	Gas connection (from centre)	83	83	83	83	89	89	110
K	Condensate outlet (from wall)	-	-	-	-	-	-	-
L	Condensate outlet (from centre)	-	-	-	-	-	-	-
M	Gas: Length gas connection (from base)	40	40	40	40	41	41	41
	Cold: Length of cold water inlet (from base)	50	50	50	50	51	51	51
	Hot: Length of hot water outlet (from base)	39	39	39	39	42	42	42
N	Electrical connection (from centre)	45	45	45	45	21**	21**	2**
O	Electrical connection (from wall)	128	128	128	128	160	160-200	100
P	Flue spigot centre line (from wall)	-	-	-	-	-	95-135	-
* This measurement is to the left of the centre line								
** This measurement is to the right of the centre line								
HD200, height of flue spigot from base of unit approx. 85 mm								

Commissioning



The appliance operation must be tested after installation. Ensure building occupants do not have access to the hot water outlets during this procedure.

Testing

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (ULPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under

normal circumstances it does not need adjustment during installation.

8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation guide).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are entered in the customer operation guide (Installer details).

Gas pressure setting

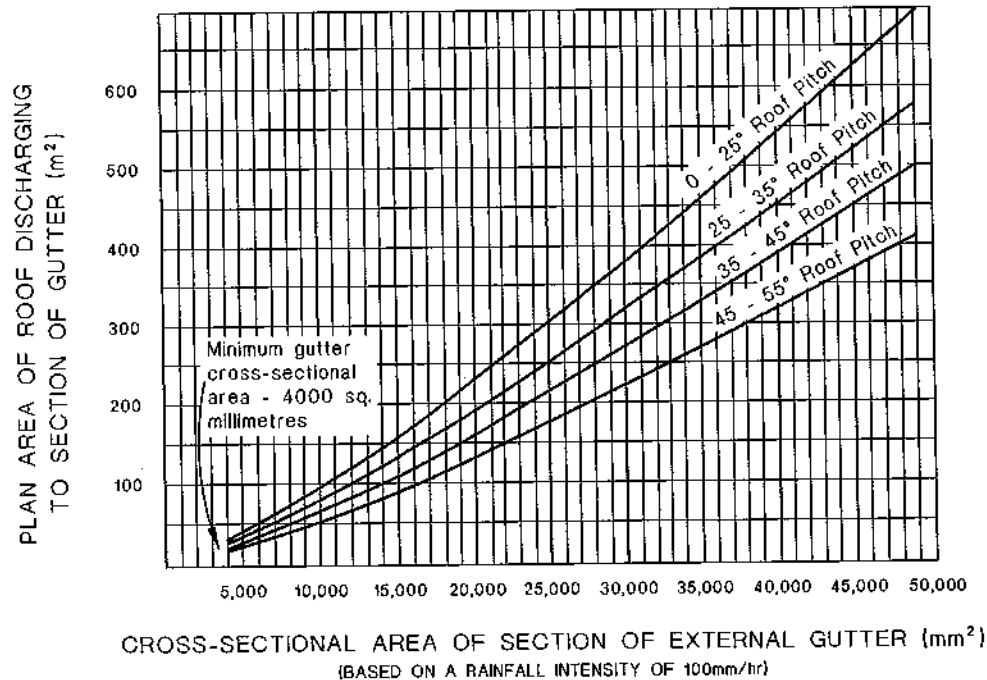
The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (inside front cover of appliance). Ensure you leave the completed checklist with the customer.

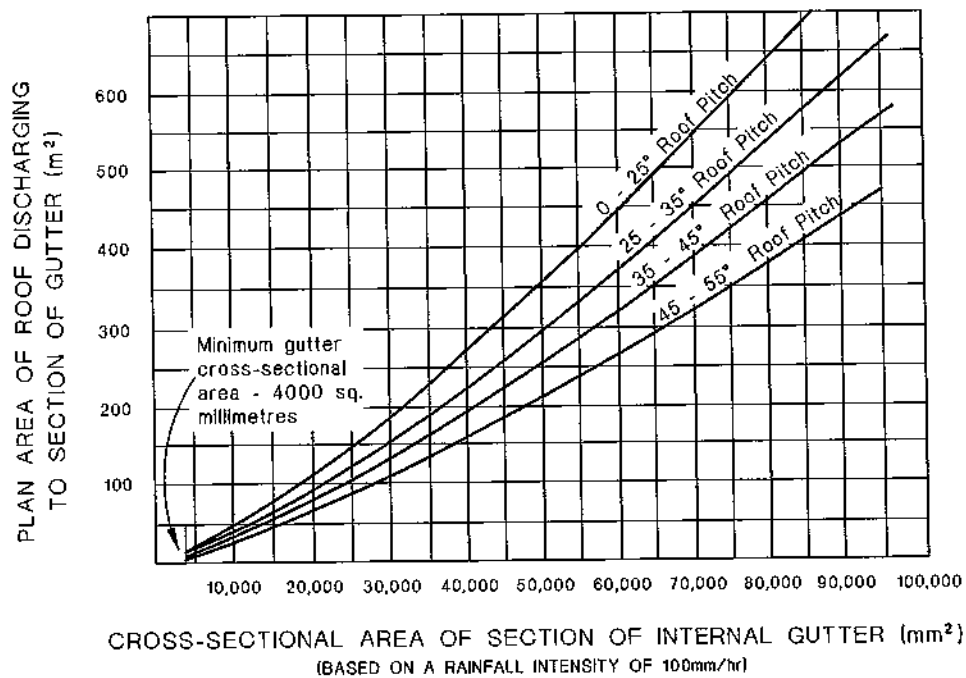
If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

Figure 15: Cross-sectional Area of External Gutter
Paragraphs 5.1.2 and 5.1.3



Amend 1
Sep 1993

Figure 16: Cross-sectional Area of Internal Gutter
Paragraphs 5.1.2 and 5.1.3



Erratum 1
Sep 2010
Amend 1
Sep 1993

Amend 1
Sep 1993

5.1.4 In no case shall the cross-sectional area of any gutter be less than 4000 mm².

5.2 Materials

5.2.1 Roof gutter materials shall comply with the standards stated in Table 6.

COMMENT:

Proprietary membrane systems using bitumen, rubber or epoxy resins may also be acceptable.

Table 7: Thermal Expansion of 5 m length over 50°C
Paragraph 5.4.1

Material	Expansion (mm)
PVC-U	17.5
Zinc	5.0
Galvanised steel	2.5
Copper	4.5
Aluminium	5.8
Stainless steel	3.8

Amend 7
Sep 2010

Table 6: Acceptable Material Standards for Roof Gutters
Paragraph 5.2.1

PVC-U	AS 1273
Galvanised steel	AS 1397
Copper	BS 2870
Aluminium	AS/NZS 1734
Stainless steel	NZS/BS 970
Zinc aluminium	AS 1397

Amend 2
Aug 1994Amend 7
Sep 2010

5.3 Gradients

5.3.1 Roof gutters shall fall to an outlet.

5.4 Thermal movement

5.4.1 Allowance shall be made for the thermal expansion and contraction of gutters. Table 7 shows for different materials the change in length of 5.0 m of guttering when subjected to a 50°C change in temperature.

COMMENT:

The provision of expansion joints is particularly important where both ends of a gutter are restrained against movement, and on PVC-U guttering due to its relatively high rate of thermal expansion.

Amend 7
Sep 2010

5.5 Overflow outlets

5.5.1 All internal gutters shall be fitted with overflow outlets which drain to the exterior of the *building*. The top of the outlet shall be set at least 50 mm below the top of the gutter. The cross-sectional area of the outlet shall be no less than the cross-sectional area of the downpipes (determined by Paragraph 4.2.1) serving the gutter.

COMMENT:

An internal gutter overflow outlet should be located to give an early, conspicuous warning to the *building* occupier that maintenance is required.

5.5.2 External gutters do not require overflow outlets but shall be installed to ensure any overflow from the gutter spills to the outside of the *building*.

COMMENT:

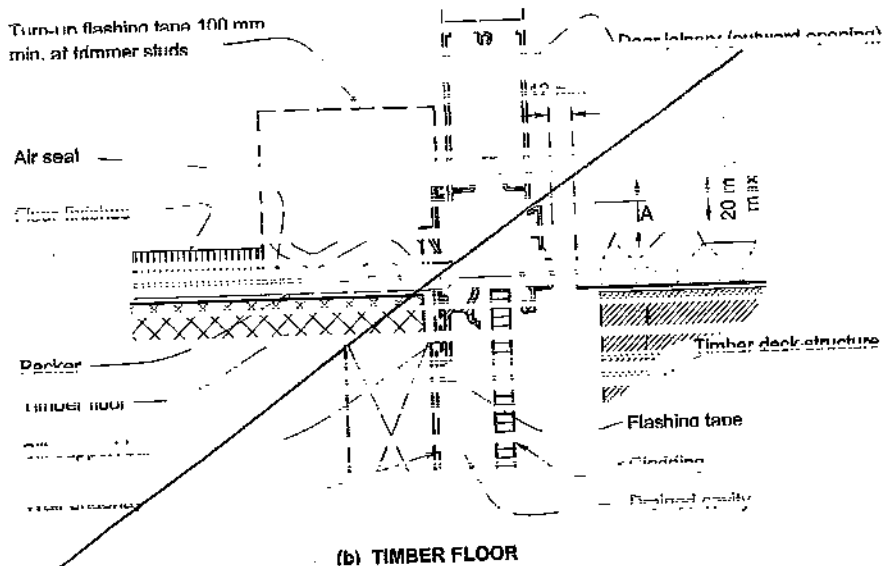
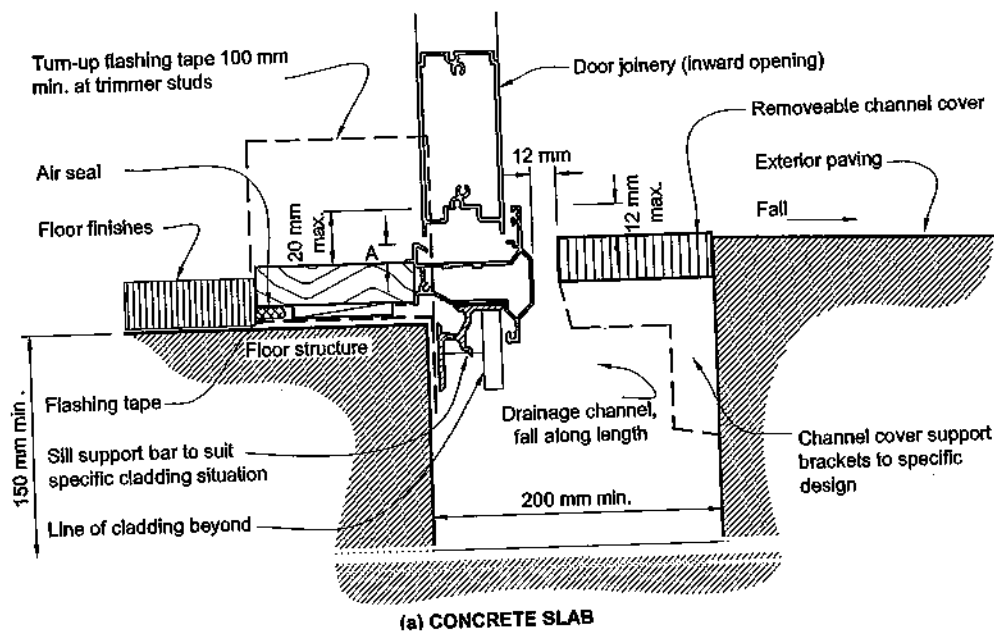
Although specific overflow provision is not necessary it is nevertheless important to ensure any overflowing water cannot track back inside the *building* where it could cause problems.

Amend 9
Feb 2014

Figure 17B: Level thresholds for ground level
Paragraph 7.3 and Figure 17A

NOTE:

- (1) Detail (a) is suitable for use with concrete floor slabs - refer Paragraph 7.3.2.1 for requirements.
- (2) Detail (b) is suitable for use with timber floors. It may also be adapted for timber decks on upper storeys as per Paragraph 7.1.1 b), or for enclosed decks, with removable panels or decking as shown in Figure 17A.
- (3) Both details may be adapted for inward or outward opening doors.
- (4) Exposure to wind-driven rain must be specifically taken into account when using these details, and shelter to doors and joinery provided where local conditions warrant.

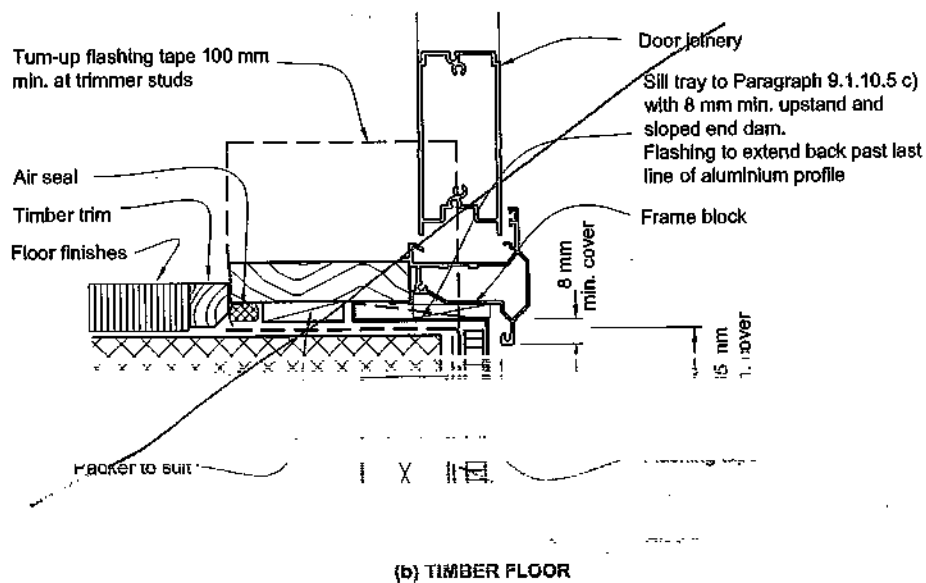
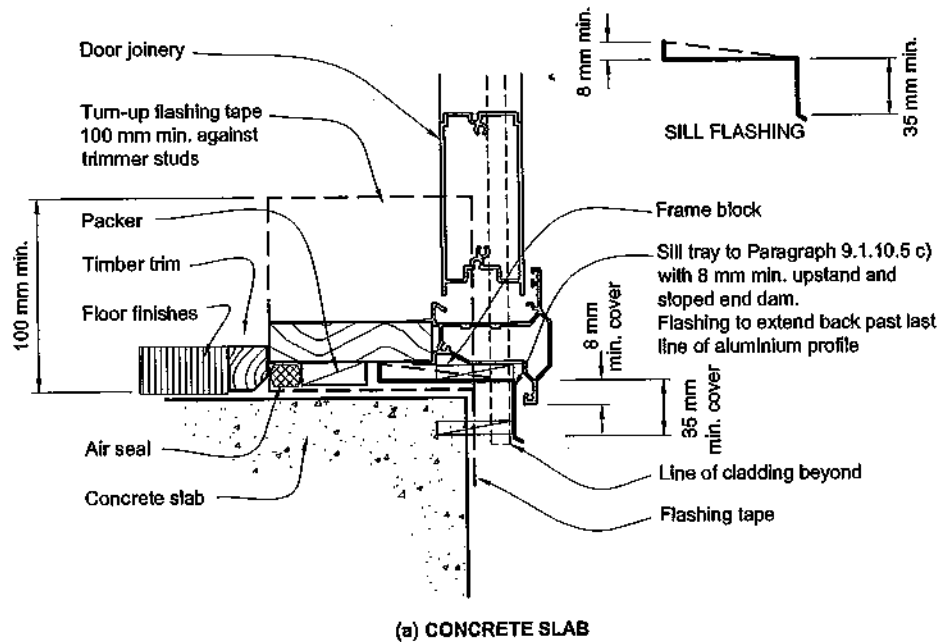


flank or deck to manufacturer's requirements, and to keep sill upstand height to less than 20 mm

Errata 2
Dec 2011

Amend 5

Figure 17D: Door sills for direct fix
Paragraph 9.1.10.5, Figures 81, 82, 83, 84, 90, 95 and 115



TIMBER GRADES

SH/AS1

SIMPLE HOUSE

2.7 Timber

2.7.1 Grade, species and treatment

The timber grade, species and preservative treatment for timber and timber products in this *Acceptable Solution* shall be in accordance

with Table 2.7. Where not otherwise specified, they shall comply with NZS 3602. All timber preservative treatments shall be in accordance with NZS 3640. Timber grading shall comply with NZS 3622.

Table 2.7 Timber – grade, species, preservative treatment Paragraph 2.7.1				
Timber member	Paragraph	Grade	Species	Treatment – minimum
Timber pile	3.3.1.2, 3.4.4	to NZS 3605 and branded	Radiata pine	H5
Anchor pile	3.3.5	to NZS 3605 branded "A"	Radiata pine	H5
Timber subfloor framing – protected from weather	3.3.1.2	VSG 8 or MSG 8	Radiata pine or Douglas fir	H1.2
Timber subfloor framing – exposed to weather	3.3.1.2	VSG 8 or MSG 8	Radiata pine	H3.2
Flooring – particleboard	3.3.15.1	to AS/NZS 1859, CD grade		none
Flooring – plywood UNDER BUTYROL	3.3.15.1	to AS/NZS 2269, CD grade		H3 treated to AS/NZS 1604
Wet area flooring – plywood	3.3.15.1	to AS/NZS 2269, CD grade		H3 treated to AS/NZS 1604
Perimeter baseboard	3.3.16	Dressing	Radiata pine	H3.2
Timber deck and barrier	3.4.2	VSG 8 or MSG 8	Radiata pine	H3.2
Timber decking	3.4.2		Merchantable Radiata pine	H3.2
Wall framing	Section 4	VSG 8 or MSG 8	Radiata pine or Douglas fir	H1.2
Wall bracing – plywood	4.6.3.3	to AS/NZS 2269, DD grade		H3 treated to AS/NZS 1604
Purlin	5.1.4.1	VSG 8 or MSG 8	Radiata pine or Douglas fir	H1.2
Tile batten	5.1.4.1	No 1 Framing and free from knots	Radiata pine or Douglas fir	H1.2
Roof framing	Section 5	VSG 8 or MSG 8	Radiata pine or Douglas Fir	H1.2
Roof truss	5.2	VSG 8 or MSG 8	Radiata pine or Douglas Fir	H1.2
Skillion roof framing	5.3	VSG 8 or MSG 8	Radiata pine or Douglas Fir	H1.2
Verandah framing	5.4	VSG 8 or MSG 8	Radiata pine or Douglas Fir	H1.2
Verandah post, not in ground contact	5.4.2	VSG 8 or MSG 8	Radiata pine	H3.2
Timber joinery reveal	6.1.3.4	Select	Radiata pine	H1.2
Weatherboard, paint protected	6.2.1.2, 6.3.1.2	Dressing or finger-jointed	Radiata pine	H3.1
Exterior finishing timber, cover or corner board, cover battens, etc, paint protected	6.2.6, 6.3.7, 6.5.2.2	Dressing or finger-jointed	Radiata pine	H3.1
Plywood wall cladding	6.5.2	to AS/NZS 2269 CD grade		H3 treated to AS/NZS 1604
Timber door jamb	6.7.5	Select A	Radiata pine	H3.2
Valley board	7.1.7, 7.2.4.10, 7.3.4, 7.4.5	Merchantable	Radiata pine	H1.2
Anti-ponding board	7.4.4	to AS/NZS 2269, DD grade		H3 treated to AS/NZS 1604

BOTTOM PLATE FIXING DETAIL

SIMPLE HOUSE

SH/AS1

4.1 Bottom Plates

4.1.1 Materials

The grade, species and preservative treatment for *bottom plates* in wall framing shall be in accordance with Table 2.7.

Bottom plates shall be the same width as the *studs*.

Bottom plates shall be a minimum of 45 mm thick when continuously supported by either joists, solid *blocking* or a concrete slab or when used in conjunction with a light roof. When a *bottom plate* is not continuously supported and is used in conjunction with a heavy roof, the *bottom plate* shall be a minimum of 70 mm thick.

4.1.2 Protection of timber

All timber framing shall be separated from the concrete slab by a damp-proof course (DPC).

4.1.3 Fixing bottom plates – external walls

External wall bottom plates shall be fixed to:

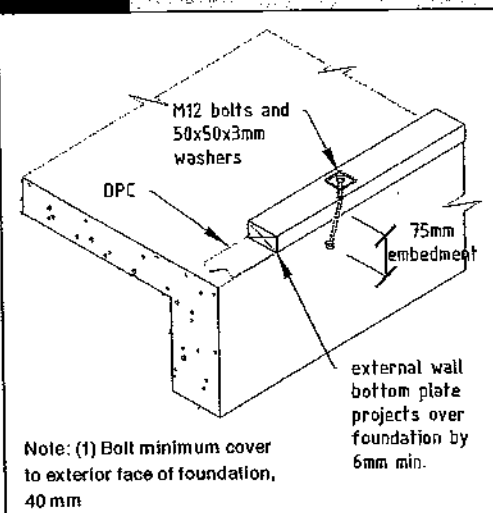
- a slab-on-ground floor using bolts and washers as per Paragraph 4.1.3.1, or *proprietary fasteners* as per Paragraph 4.1.3.2
- a timber suspended floor structure using 2/100 x 3.75 mm hand driven nails at 600 mm centres or 3/90 x 3.15 mm power driven nails at 600 mm centres.

4.1.3.1 Bolt fixings and washers

Bolt fixings to slab-on-ground floors shall be M12 bolts set not less than 75 mm into the concrete and projecting sufficiently to allow for a 50 x 50 x 3 mm square washer and fully threaded nut above the timber in accordance with Figure 4.1. Bolt fixings shall include washers to spread the load. Bolts shall be located not more than 300 mm from the end of the *bottom plate* at corners of the slab and at not more than 1.4 m centres along the length of the *plate*.

Figure 4.1

Fixing of perimeter wall plates (OSH)
Paragraph 4.1.3.1



4.1.3.2 Proprietary fasteners – external walls

Proprietary fasteners may be used to fix external *bottom plates* to slab-on-ground floors provided they have a minimum capacity, when tested in accordance with the definition of *proprietary fasteners*, as follows:

- horizontal loads in the plane of the wall: 5 kN
- horizontal loads out of plane with the wall: 4 kN
- vertical loads in axial tension of the fastener: 8 kN.

Proprietary fasteners shall be located not more than 150 mm from each end of the *bottom plate* and at not more than 900 mm centres along the length of the *plate*.

Where header (concrete masonry) block perimeter foundations are used, fixings shall have a minimum embedment of 150 mm into the concrete foundation.

4.1.4 Fixing bottom plates – internal walls

4.1.4.1 Fixing bottom plates to concrete slab

For internal walls, other than wall bracing elements, *proprietary fasteners* securing *bottom plates* to slab-on-ground floors shall be used, provided they have a minimum capacity when tested as follows:

LINTEL SIZE - SPAN TABLES

SIMPLE HOUSE

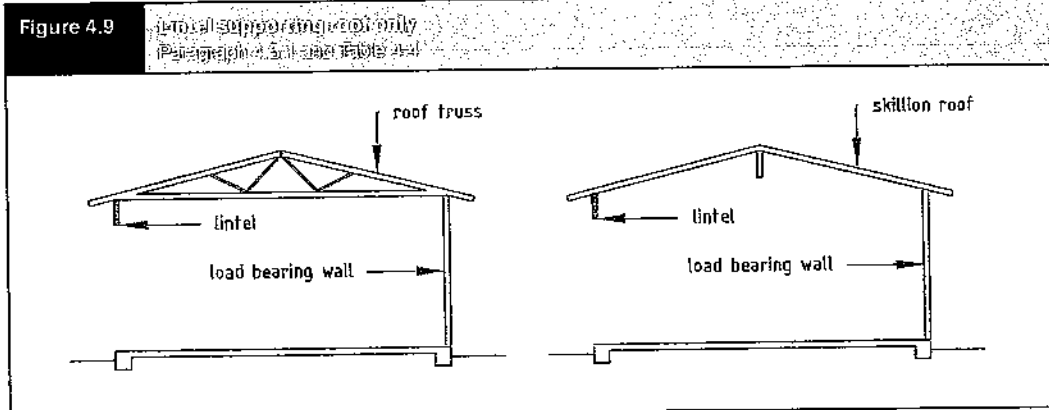
SH/AS1

Roofing	Loaded dimension of lintel (m)	Maximum span for lintel sizes listed below (m)				
		2/90 x 45 or 90 x 90 mm	2/140 x 45 or 140 x 90 mm	2/190 x 45 or 190 x 90 mm	2/240 x 45 or 240 x 90 mm	2/290 x 45 or 290 x 90 mm
Profile metal or metal tile	3	1.1	1.8	2.5	3.1	3.7
	4	1.0	1.6	2.3	2.9	3.2
	5	1.0	1.5	2.1	2.7	2.7
	6	0.9	1.5	2.0	2.2	2.2
Masonry tile	3	0.9	1.4	2.0	2.5	3.0
	4	0.8	1.3	1.8	2.3	2.8
	5	0.8	1.2	1.7	2.2	2.6
	6	0.7	1.2	1.6	2.0	2.5

Note:

- 2/45 thick members shall be laminated in accordance with Paragraph 2.7.3.
- For lintels supporting roofs with 1 kPa snow load the span shall be multiplied by a factor of 0.8.

Figure 4.9

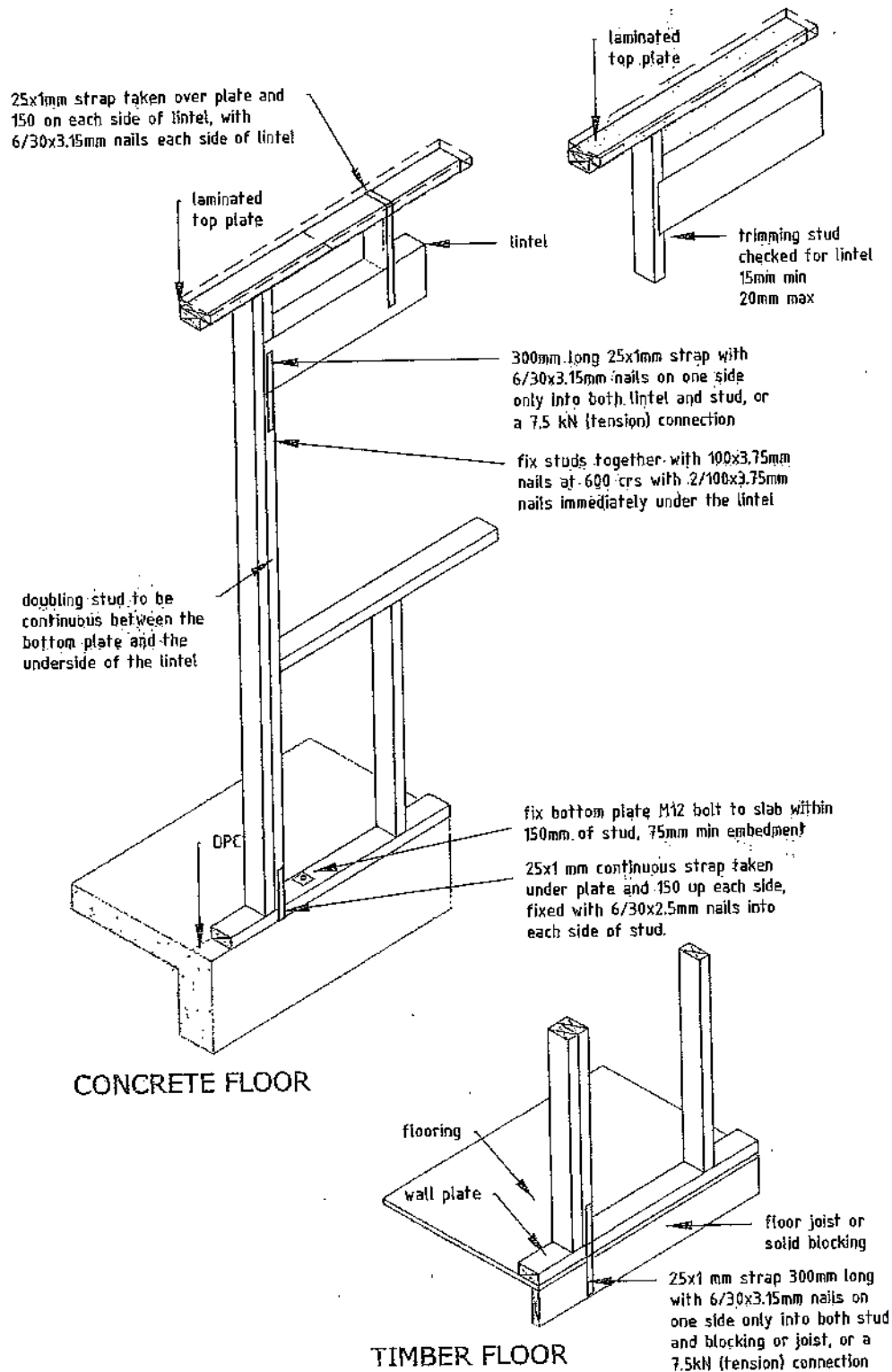


4.5.1.3 Timber *lintels* shall be supported at each end for the full thickness of the *lintel* by the minimum seating dimensions of (see Figure 4.10):

- for *lintels* not exceeding 140 mm deep: a *trimming stud* checked not less than 15 mm, nor more than 20 mm
- for *lintels* not exceeding 240 mm deep: a 35 mm thick doubling *stud*
- for *lintels* not exceeding 290 mm deep: a 45 mm thick doubling *stud*.

4.5.1.4 Timber *lintels* supporting *rafters* or *trusses* of *roofs* shall be secured against uplift at each end in accordance with Figure 4.10 or with a *proprietary fastener* of 7.5 kN capacity in tension along the line of the *trimming stud*.

Figure 4.10 Fixing of lintels to concrete or timber
Paragraphs 4.5.1.3, 4.5.1.4 and Table 4.5



TOP PLATE CONNECTION DETAILS,

SH/AS1

SIMPLE HOUSE

Figure 4.4

connecting top plates
Paragraph 4.4.3

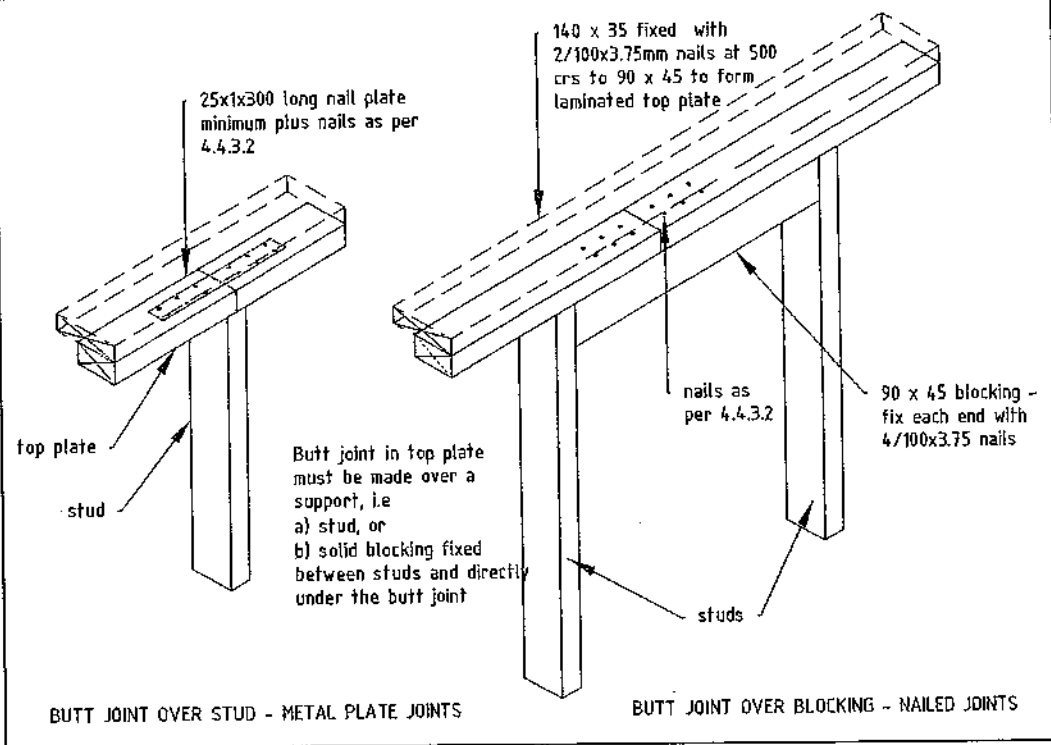
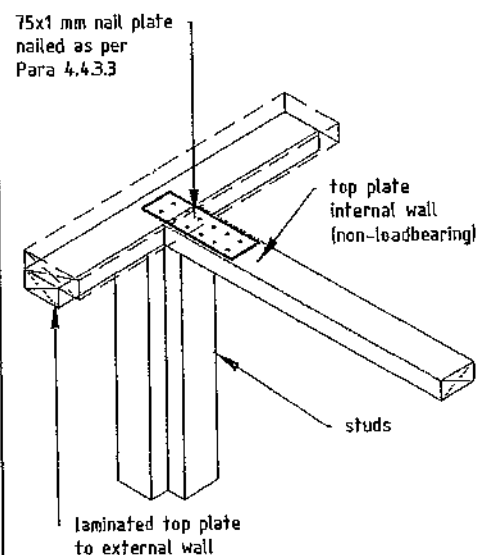


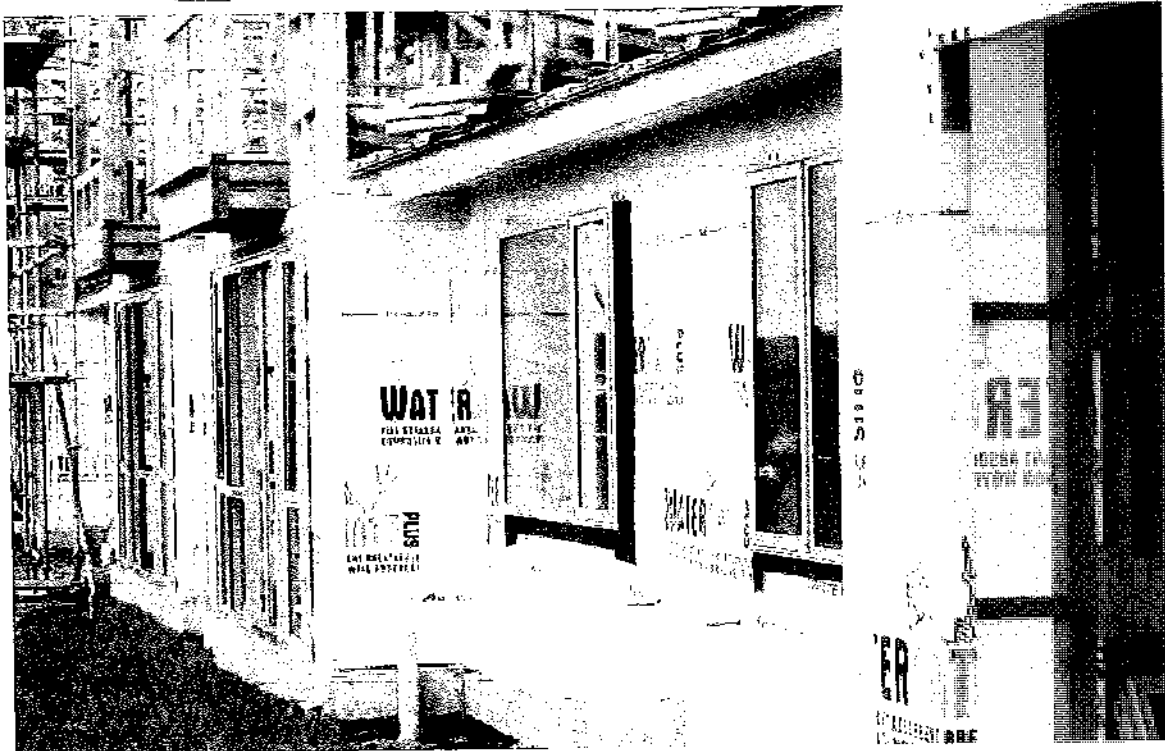
Figure 4.5

connecting top plates over wall
walls at right angles - walls
containing bracing
Paragraph 4.4.3.3



4.4.3.3 Each wall that contains one or more *wall bracing elements* shall be connected at *top plate level*, either directly or through a *framing member* in the line of the wall, to *external walls* at right angles to it. *Top plate fixing(s)* of the *capacity* in tension or compression along the line of the *wall bracing element* are given as follows. For each wall containing *wall bracing elements* with a total *bracing capacity* of:

- (a) not more than 125 *bracing units* to at least one *external wall* by a 75 mm x 1 mm (minimum cross section) metal nail plate of 240 mm minimum length with 6/30 x 3.15 mm nails per side in accordance with Figure 4.5 or a *proprietary fastener* with a *capacity* in tension and compression of 6 kN



WATERGATE PLUS

SYNTHETIC WALL UNDERLAY

The ultimate wrap, all walls, all systems

Watergate Plus 295 is a fire retardant, absorbent, breathable wall underlay. It is a white composite Non-woven polypropylene, specifically designed as a wall underlay behind exterior wall cladding. Watergate Plus 295 also offers a high degree of water resistance, with a high level of water vapour permeability.

ADVANTAGES

- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding direct fixed to framing.
- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding installed over an 18mm minimum drained cavity.
- » Is suitable for use in all Wind Zones of NZS 3604 up to, and including, "Very High", when used as standalone flexible underlay, and Extra High when used as a flexible underlay over a rigid wall underlay.
- » Will provide temporary weather protection during construction. (Max 60 Days).
- » Can be used as a non-rigid backing material for Stucco Plaster.*
- » May be used as a slip layer over rigid backing for Stucco Plaster.*
- » Is fire retardant.*
- » Unaffected by LOSP treated timber.
- » Is suitable as an air barrier in unlined walls.

* Refer technical specifications



BRANZ Appraised
Appraisal No.696 (2017)



For additional details and latest specifications www.thermakraft.co.nz or scan QR code.

Thermakraft Watergate Plus 295 – Technical Specification

Fire Retardant | Breathable | Absorbent | Non Woven | Wall Underlay

Thermakraft Watergate Plus 295 can be used as a wall underlay on timber and steel framed buildings within the following scope:

- » The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area; and,
- » With absorbent wall claddings directly fixed to timber and steel framing; and,
- » With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- » With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity;
- » With masonry veneer in accordance with NZS 3604, NZBC Acceptable Solution E2/AS1 for timber framed buildings, or specific engineering design for steel framed buildings; and,
- » Situated in NZS3604 Building Wind Zones up to, and including 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- » Can be used as a non-rigid backing material for Stucco Plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 9.3.5.1. The Underlay must be supported with 75mm galvanized mesh, or Thermakraft Stud Strap at 150mm centres run across cavity battens to limit deflection to a maximum of 5mm.
- » May also be used as a slip layer over rigid backing for Stucco Plaster in accordance with the requirements of NZBC E2/AS1 Paragraph 9.3.3(b).
- » Refer BRANZ Appraisal No 695 (2010) for full details.
- » May be used with LOSP treated timber.
- » Is suitable as an air barrier in unlined wall spaces.
- » Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- » Is suitable for direct fixing behind metal cladding.

Flammability Index

Thermakraft Watergate Plus 295 Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Limitations

- » Must not be used as a roof underlay.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing

- » It is not damaged.
- » Installed in accordance with instruction guide.
- » Is not left exposed for more than 60 days.
- » Installed by or under guidance of Licensed Building Practitioners.
- » Is compatible with cladding system used.

Table 1: NZBC E2/AS1 wall underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 100gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 20mm	Pass
Air Resistance	≥ 0.1 MN.s/m²	295 can be used as an air barrier

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M²
1370	18.5	25
1370	37.0	50
1370	73.0	100
2740	18.5	50
2740	36.5	100

*M² is the roll size for actual coverage, allow for laps and joins.



BRANZ Appraised
Appraisal No.695 [2017]



For additional details and latest specifications www.thermakraft.co.nz



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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.

TUFFPLY WALL CLADDING DURABILITY STATEMENT

IPL Tuffply Bracing

Design Information

Structure

Framing that complies with NZS 3604:2011 will meet the requirements of the Building Code. Studs are at a maximum of 600mm centre - dwangs are not necessary for effective bracing but may be used.

As 7mm IPL Tuffply Bracing is structural plywood manufactured to AS/NZ 2269:2012, it is suitable for design of earthquake and wind bracing for timber framed buildings in accordance with design codes NZS 3603 and AS/NZ 1170. This has been confirmed by EWPA sponsored testing.

Durability

As IPL Tuffply Bracing is an integral part of the building structure it must be durable in each application i.e. have at least 50 years durability rating. In interior dry applications (i.e. 18% moisture content or less) untreated IPL Tuffply Bracing is acceptable for use.

However, in applications where IPL Tuffply Bracing may be subject to wetting, dampness or condensation (basically where the moisture content may exceed 18% for prolonged periods) IPL Tuffply Bracing must be preservative treated to at least H3.2 hazard rating and fixed with non-corrosive fasteners (i.e. stainless steel or silicone bronze).

Exposure during construction

IPL Tuffply Bracing will withstand rain exposure for at least 3 months. The possible wetting may cause slight buckling of panels but generally, after drying, there is close to full recovery.

Elements using BRANZ P21 test as per NZ3604:2011. The below values can be used with any IPL plywood stamped with AD, SD, CD, DD grade that are a minimum of 7mm thickness.

Bracing Ratings for IPL Plywood Bracing

Type	Lining	Min Length (mm)	Wind (BUs/m)	Earthquake (BUs/m)
TP1	7mm Tuffply one side	600	110	125
TP2	7mm Tuffply two sides	600	140	155
TP3	7mm Tuffply one side 10mm GIB® Standard Plasterboard other	400	98	112
TP4	7mm Tuffply one side 10mm GIB® Standard Plasterboard other	1200	169	156

BRANZ P21 test carried out in Winstone Wallboard Laboratory Auckland.

Installation, Sheet Fasteners and Connections

IPL Tuffply Bracing is to be installed and fixed as per the building design. As plywood dimensions can vary with changes in ambient humidity and wetting during construction it is recommended to allow expansion gaps between adjacent panel edges of at least 2mm.

The minimum fastener requirement in New Zealand is 50mm x 2.8mm dia hot dip galvanised structural clouts.

Treated IPL Tuffply Bracing must be fixed with non corrosive fasteners - a minimum of 50mm x 2.8mm dia stainless steel annular grooved flat head nails or hot dipped galvanised.

Refer to GIB HandiBrac® installation instructions for correct installation of galvanised steel angle brackets and bolt types to be used for concrete and timber floors.

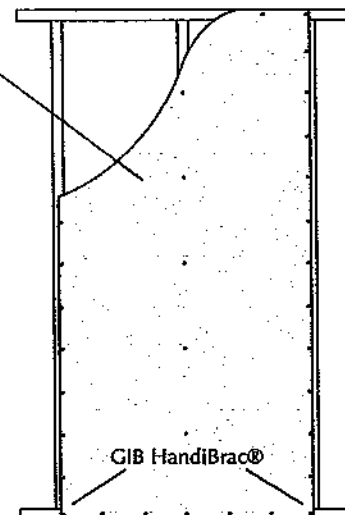
Please note that IPL Tuffply Bracing is not to be installed in contact with the ground.

Compliance with Standards

IPL Tuffply Bracing is manufactured in accordance with AS/NZ 2269. The panels are to be installed in accordance with the building design code.

The Engineered Wood Products Association of Australasia (EWPA or PAA) audits our production processes to ensure we meet the requirements of the product Standard. This third party audited, process based, quality assurance scheme meets the requirements of an ISO Type 5 system for production certificate. The EWPA is an accredited body to JAS - ANZ under registration No. Z1460695AB.

7mm Tuffply fixed with 50 x 2.8mm flat head nails at 150mm centres around perimeter at no less than 7mm from sheet edge. 300mm centres to intermediate studs



IPL Tuffply Bracing

CCA wood preservative

Recently certain New Zealand media has questioned the health and safety aspects of using CCA as a wood treatment. CCA (Chromated Copper Arsenate) preservative has been used in New Zealand for over 50 years and has proved to be the most reliable and cost effective form of timber preservation.

The New Zealand Environmental Risk Management Authority (ERMA) reviewed CCA and the risk of health-related issues in 2003, commissioning Dr Deborah Read, a public health physician, to prepare a report, which was subsequently peer-reviewed by a number of health professionals (Read 2003). In the report, Dr Read stated:

"There are no epidemiological studies or human case reports involving disease related to direct contact with CCA-treated wood, and the low level exposures that most of the general population will experience from contact with CCA-treated wood are extremely unlikely to result in acute health effects. CCA-treated wood has also been in use for many years without discernible adverse health effects suggesting that if there is a true risk it is very small."

A second review was done by Dr. Bruce Graham (2009) continuing to support the stance by ERMA, NZ in response to the Read report.

"Background exposures to arsenic from food and water sources are significantly higher than from estimated exposure to CCA timber. The combined intake of arsenic from all these sources falls well below the World Health Authority tolerable daily intake for arsenic."

Temple and Di Marco (2003)

IPL offers ACQ preservative as an alternative to CCA

ACQ (Alkaline Copper Quaternary) is a water-based preservative system developed in the USA.

The formulation contains copper oxide which is the primary fungicide and insecticide and a quaternary ammonium compound which provides additional fungicide and insect resistance properties.

For further information and pricing contact IPL.

Product Details

Thickness and Tolerance

IPL Tuffply Bracing is 7mm in thickness +/- 7%.

Sheet Size

2400mm x 1200mm. The dimension tolerance for untreated plywood is +/- 1.5mm.

There may be some variation from these parameters on CCA treated plywood because during the treatment process the sheet expands and contracts during drying.

Stress Grading

IPL Tuffply Bracing plywood is rated at F8.

Bonding

All IPL construction plywood is bonded with phenol formaldehyde resin (dark red in colour). This results in a permanent bond which after manufacture will not part. This is the same bonding material used in Marine type plywood.

Formaldehyde emissions in IPL plywood are very low and rated as Super EO - less than 0.3mg/l AS/NZ Standard 2098:11.

Branding

Back of all sheets marked:

DD	The back of all sheets marked with sheet face and grade
IPL	Company name
A bond	Bond type
F8	Stress grade
AS/NZ 2269	Structural Plywood Standard
914	Engineered Wood Products Association mill number
7-24-3	Construction code



INTERNATIONAL PANEL & LUMBER (WEST COAST) LTD
3 Trickies Road, Greymouth, New Zealand, PO Box 179
Telephone 03-762 6759, Facsimile 03-762 6789,
Freephone 0800 650 801, Freefax 0800 650 802, Email tuffply@xtra.co.nz

Table 24: Fixing selection for wall claddings (continued)

Joint	Length (mm) x diameter (mm) and type	Minimum framing penetration	Fixing pattern	Requirements
Horizontal rusticated	75 x 3.15 JH nail	35 mm	Single fixing 10 mm above top of lower board	
Timber weatherboards: stained or bare finish				
DIRECT FIXED				
Horizontal bevel- back	65 x 3.2 RH annular grooved nail	30 mm	Single fixing 10 mm above top of lower board	
Horizontal rebated bevel-back	50 x 3.2 RH annular grooved nail	30 mm	as above	
Horizontal rusticated	50 x 3.2 RH annular grooved nail	30 mm	as above	
Vertical shiplap	50 x 3.2 RH annular grooved nail	30 mm	Single fixing 10 mm from side lap (40 mm from edge of board)	Dwangs at maximum 480 mm centres
Board and batten: board	60 x 3.2 RH annular grooved nail	30 mm	Single fixing in centre of board	as above
Board and batten: batten	75 x 3.2 RH annular grooved nail	30 mm	as above	as above
Timber weatherboards: stained or bare finish				
OVER CAVITY				
Horizontal bevel- back	85 x 3.2 RH annular grooved nail	30 mm	Single fixing 10 mm above top of lower board	
Horizontal rebated bevel-back	70 x 3.2 RH annular grooved nail	30 mm	as above	
Horizontal rusticated	70 x 3.2 RH annular grooved nail	30 mm	as above	
Vertical profiled metal:				Refer Paragraph 9.6.6
DIRECT FIXED				
Horizontal profiled metal:				Refer Paragraph 9.6.6
OVER CAVITY				
Plywood sheet: paint finish DIRECT FIXED				
Plywood to stud or batten	50 x 2.8 FH nail	30 mm	150 mm centres to sides, 300 mm centres in middle	
External cover batten	65 x 3.2 RH annular grooved nail	30 mm	300 mm centres in centre of batten	
Plywood sheet: paint finish OVER CAVITY				
Plywood	60 x 2.8 FH nail	30 mm	150 mm centres to sides, 300 mm centres in middle	
Cover batten	60 x 2.8 JH nail	To cavity battens only	300 mm centres in centre of batten	
Plywood sheet: stained or bare finish DIRECT FIXED				
Plywood to stud or batten	50 x 2.8 FH nail	30 mm	150 mm centres to sides, 300 mm centres in middle	
External cover batten	65 x 3.2 RH annular grooved nail	30 mm	300 mm centres in centre of batten	
LEGEND:				
RH rose head	JH jolt head	FH flat head		
NOTE: Nail lengths are designed for minimum penetration of framing. If thickness of the batten or cladding or underlay is varied, length shall be adjusted accordingly.				

Amend 5
Aug 2011

Amend 2
Jul 2005

Amend 5
Aug 2011

Amend 2
Jul 2005

Amend 5
Aug 2011

9.8 Plywood Sheet

Amend 5
Aug 2011

Plywood-sheet claddings shall be either *direct fixed* to framing over a wall underlay or fixed over a *drained cavity* as per Paragraph 9.1.8.

Based on the *risk score* for an *external wall*, calculated as per Paragraph 3.1, the sheet cladding may require the inclusion of a *drained cavity*.

9.8.1 Limitations

This Acceptable Solution covers plywood panel claddings with vertical battened joints and flashed horizontal joints.

Figure 118 deleted

Amend 6
Aug 2011

9.8.2 Materials

Amend 6
Aug 2011

Batten-jointed panels shall have weather-grooved timber battens as shown in Figure 119.

Plywood panels shall be:

- Manufactured to AS/NZS 2269, grade CD,
- A minimum of 5 ply,
- A minimum of 12 mm in thickness, and
- Treated as required by NZS 3602.

9.8.3 Installation

A wall underlay, as specified in Table 23, shall be installed behind plywood sheet claddings.

COMMENT:

Refer to Paragraph 1.5 for qualification of installers.

Amend 5
Aug 2011

9.8.3.1 Fixings

Plywood sheets shall be fixed through the wall underlay into the wall framing with fixings as required in Table 24.

Amend 5
Aug 2011

9.8.3.2 Joints

All joints shall:

Errata 2
Dec 2011

- Be made only over supports, and
- If horizontal, incorporate a 10 mm expansion gap, and be fitted with a *flashing*, as shown in Figure 121, or
- If vertical, have battened joints – refer to Figure 119.

Amend 5
Aug 2011

Figure 119: Battened joints for plywood sheet
Paragraphs 9.8.2 and 9.8.3.2

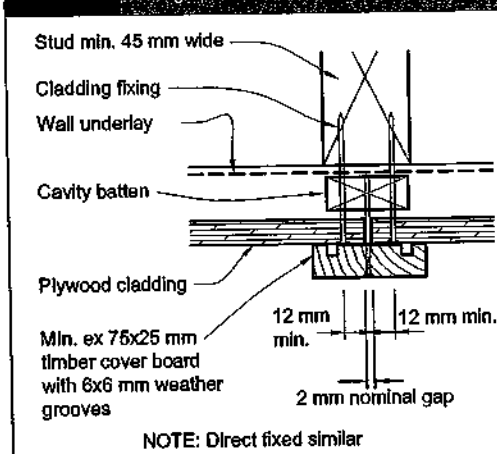
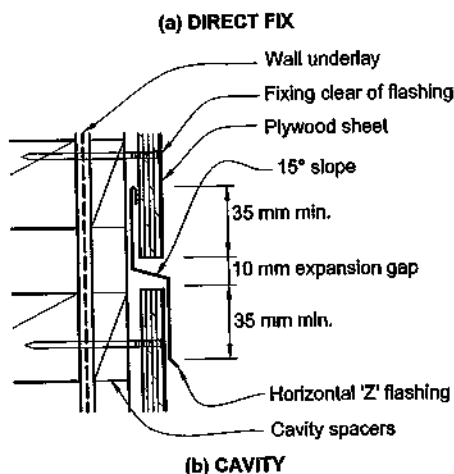
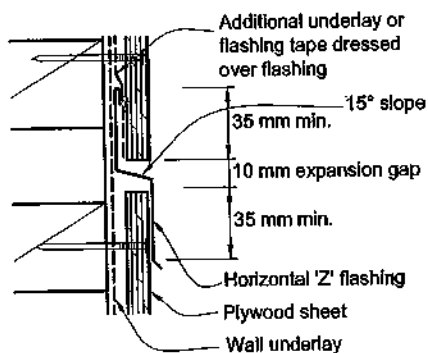


Figure 120 deleted

Amend 5
Aug 2011

Figure 121: Horizontal joints for plywood sheet
Paragraph 9.8.3.2

NOTE: (1) Detail is only suitable for drained cavities not exceeding 2 storeys or 7 metres in height.
(2) For drained cavities over 2 storeys or 7 metres in height - refer Figure 70.



Amend 5
Aug 2011

9.8.4 Corners

9.8.4.1 External corners

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External corners shall be fitted with *flashings* or timber battens, as shown in Figure 122.

9.8.4.2 Internal corners

Internal corners shall be as shown in Figure 123 and have:

- Flashings* and timber battens for direct fix
- Timber battens for cavity fix.

Amend 5
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9.8.5 Flashing material

Flashings shall be metal selected in accordance with Table 20 to Table 22 and Paragraph 4.3.

Amend 5
Aug 2011

9.8.6 Soffit details

Soffits shall be as shown in Figure 8A and Paragraph 5.3.

Amend 5
Aug 2011

9.8.7 Parapets and enclosed balustrades

Parapets and *enclosed balustrades* shall be capped with metal, butyl or EPDM membrane. *Cappings* shall comply with the requirements of Paragraph 4.0.

- Parapets* shall be in accordance with Paragraph 6.0
- Enclosed balustrades* shall be in accordance with Paragraph 7.4.

Amend 5
Aug 2011

9.8.8 Windows and doors

Windows and doors shall be installed in accordance with Paragraph 9.1.10.

9.8.8.1 Windows and doors: direct fixed

Windows and doors shall be detailed as shown for fibre cement sheet *cladding* – refer to Figure 115.

Amend 5
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9.8.8.2 Windows and doors: with cavity

Windows and doors shall be detailed as shown for fibre cement sheet *cladding* – refer to Figure 116.

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COMMENT:

The same principles of window installation apply to both fibre cement and plywood sheet *cladding*.

9.8.9 Finishes

A solution of 12.5% copper naphthenate in white spirits, or mineral turpentine, shall be brushed on to any edges cut after treatment.

Direct fixed plywood *cladding* used as bracing requires a minimum 50-year *durability*, and shall be treated to H3, painted on all edges and the outer face with a latex exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730.

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Amend 5
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COMMENT:

Plywood for *cladding*, treated to H3, does not require painting.

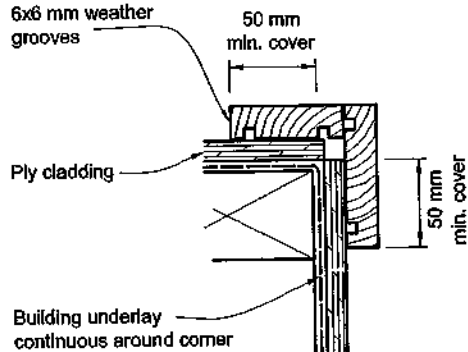
While H3 plywood can be left unpainted, it is likely to develop checking and mould growth on the surface.

Plywood used as bracing requires painting and regular maintenance of the paint finish to ensure the 50-year *durability* is achieved.

Figure 122: External corners for plywood sheet
Paragraph 9.8.4.1

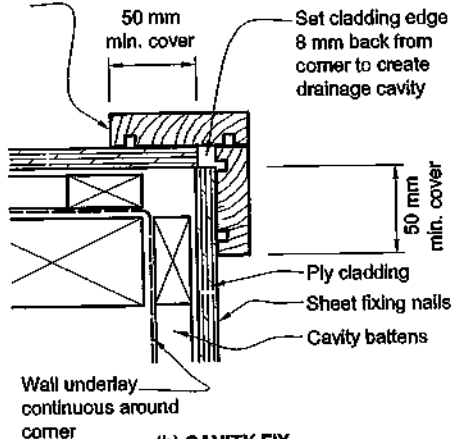
NOTE: Corner battens shall be sized to provide 50 mm minimum cover over *cladding*.

Ex 25 mm min. timber cover boards with 6x6 mm weather grooves



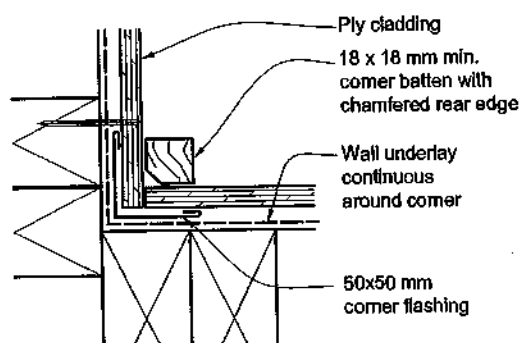
(a) DIRECT FIX

Ex 25 mm min. timber cover boards with 6x6 mm weather grooves

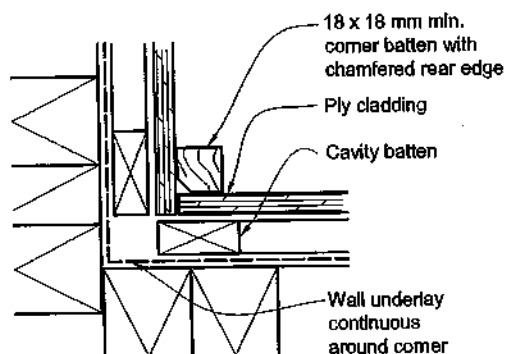


(b) CAVITY FIX

Figure 123: Internal corners for plywood sheet
Paragraph 9.8.4.2

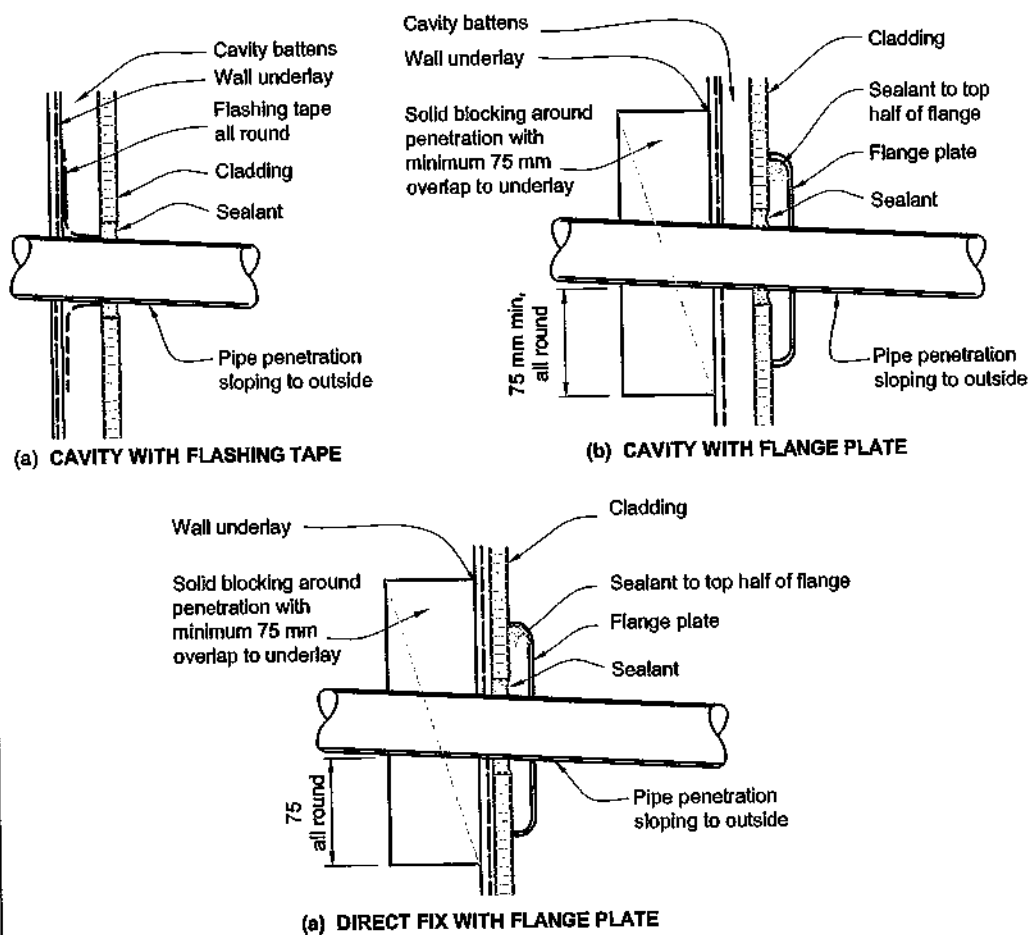


(a) DIRECT FIX



(b) CAVITY

Figure 68: General pipe penetration
Paragraph 9.1.9.3, Figure 126



Amend 5
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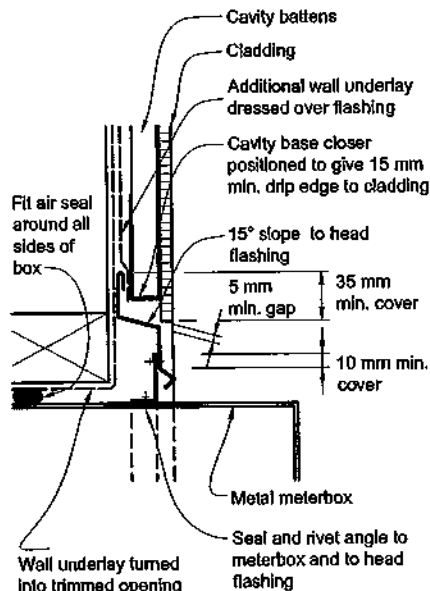
Amend 5
Aug 2011

COMMENT:

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

Amend 5
Aug 2011

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



NOTE:

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

Amend 5
Aug 2011

9.1.9.4 Inter-storey junctions

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

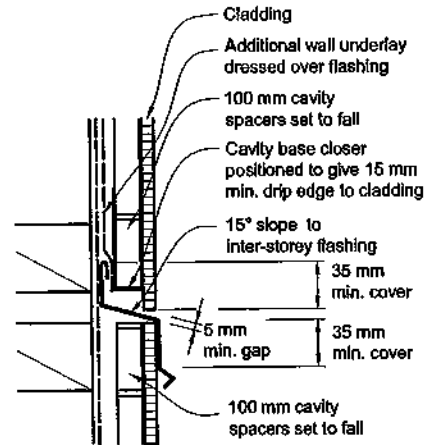
- a) Up to a maximum of two storeys or 7 metres in height, as shown for the specific wall claddings in Paragraph 9.2 to Paragraph 9.9, or
- b) Over two storeys or 7 metres by using an inter-storey flashing bridging the drained cavity as shown in Figure 70.

COMMENT:

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

Amend 5
Aug 2011

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



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

Amend 5
Aug 2011

9.1.10 Windows and doors

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

Amend 5
Aug 2011

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

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

Amend 5
Aug 2011

9.1.10.1 Scope

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

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

Amend 5
Aug 2011

Amend 2
Jul 2005

COMMENT:

Sloped heads require specifically designed *kick-out flashings* at bottom edges of head flashings.

Where width outlined in Paragraph 9.1.10.1 are beyond the limits for sill and head trimmer *framing* in NZS 3604 specific engineering design of the *framing* is required.

Certain aluminium joinery sections and installation requirements may not be able to meet the details of this Acceptable Solution, especially in regard to window facing cover, sill support, window fixing, and sill *flashing* requirements. The window details in these cases require *specific design*.

Amend 5
Aug 2011

9.1.10.2 Treatment of opening

- Treatment of the window openings for *direct fixed wall claddings* shall be as shown in Figure 72A.
- For *direct fixed claddings*, windows and doors shall have a 5 mm stand-off of the flange to the *cladding* to allow for air intrusion to the trim cavity for pressure equalisation. Note that this gap is sealed or trimmed down the jambs, but left open along the sill.
- Window openings for *wall claddings over drained cavities* shall be as shown in Figure 72B. Note there shall be no sill *flashing*.
- For cavity fixed *claddings*, windows and doors shall finish against the *cladding*, except for flat fibre cement and ply *claddings* that require a 5 mm stand-off to allow for sealant weather seals between facings and *cladding* – eg, Figure 116.
- Materials for *flashings* shall be selected from Paragraph 4.0, Table 7, and Table 20.

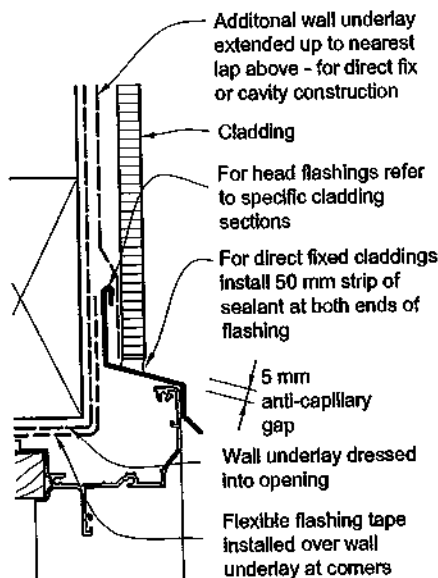
9.1.10.3 Window and door heads

Windows and doors shall include head *flashings*, finished to the *wall underlay* as shown in Figure 71, by either using *flexible flashing tape*, or lapping an additional layer of *wall underlay* over the upstand. The additional *wall underlay* shall extend to the top of the wall, or to the nearest lap above, and be lapped under the top layer.

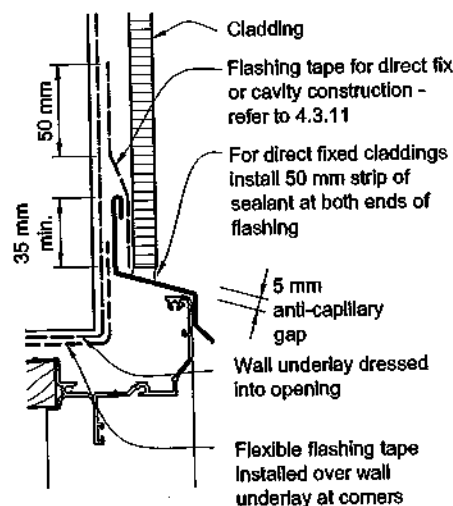
Amend 5
Aug 2011

Figure 71: General sealing of head flashing
Paragraphs 9.1.7, 9.1.10.3 and 9.1.10.4

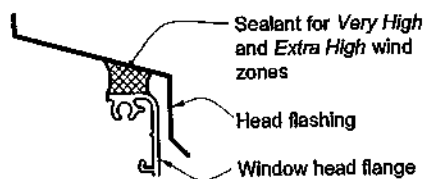
NOTE: May also use *wall underlay* lapped over flashing upstand in lieu of *flexible flashing tape*. Refer cladding window details, for example Figure 115.



(a) METAL HEAD FLASHING - WITH ADDITIONAL UNDERLAY OPTION



(b) METAL HEAD FLASHING WITH FLASHING TAPE OPTION



(c) METAL HEAD FLASHING SEALANT FOR VERY HIGH AND EXTRA HIGH WIND ZONES

Amend 5
Aug 2011

9.1.10.4 Head flashings

Head *flashings* shall be in accordance with Paragraph 4.6.1.6 and Table 7, unless specifically shown otherwise, and shall:

- a) Direct water to the outside of the *wall cladding*, and
- b) Finish to the window head with clearance dimensions shown in Figure 71
- c) For *direct fixed claddings*, have 50 mm bead of sealant installed between *cladding* and each end of the head *flashing*
- d) For *wall claddings* on cavity walls:
 - i) incorporate 10 mm turn-ups as *stop-ends*, terminating at the inside face of the *cladding* so they do not pass through the *cladding*, and
 - ii) permit ventilation of the *drained cavities* above, by the installation of cavity base closers as shown in Figure 66.
- e) For Very High and Extra High *wind zones*, have sealant installed between underside of head *flashing* and top edge of window head flange – refer Figure 71 (c) .

COMMENT:

Stopends are useful to prevent water moving past the ends of head *flashings*. However, additional problems of weatherproofing occur where the *stopend* penetrates the *cladding*.

9.1.10.5 Window and door sills

- a) *Direct fixed claddings* shall have
 - i) sill tray *flashings* as shown in Paragraphs 9.2 to 9.9 for each *cladding* type. The sill *flashing* shall extend back past the condensation channel of the window. Ensure flat sill trays do not slope backwards. The 5 mm gap between the window facing and sill tray must not be sealed.
 - ii) *direct fixed* door sills, installed as for windows, and as shown in Figure 17D.
- b) *Claddings* over a *drained cavity* shall have:
 - iii) window sills as shown in Paragraphs 9.2 to 9.9, without sill *flashings*
 - iv) door sills as shown in Figure 17C.

- v) Sill support bars and mechanisms for all doors, and for windows with a trim opening wider than 600 mm. Support bars and mechanisms shall comply with BRANZ Evaluation Method EM6, E2/VM1 and B2/AS1. Support bars and mechanisms must be installed prior to installation of the window or door.

COMMENT

Support bars and mechanisms are rated for their capacity to support the total weight of a joinery unit when installed at given offsets from the frame depending on *cladding* type. Designers select the an appropriate complying support mechanism for the joinery weight. Manufacturers provide build-in instructions for support bars and mechanisms.

- c) Mitred aluminium window and door sills, for both *cavity* and *direct fixed*, shall have a corner soaker fitted to the back of the sill/jamb joint and installed at point of manufacture. The soaker will be designed to act as a secondary device to prevent water ingress to the *building* in support of the primary mitre seals. Soaker materials shall be either uPVC, aluminium, polypropylene, high impact styrene or other semi rigid moulded polymeric material.

Sill support bars and mechanisms must be designed to not impede the possible drainage of water from surfaces of sill *flashing* tape, and permit an air passage (of at least 1000 mm²/m sill width) from the *drained cavity* to the window/door trim cavity.

9.1.10.6 Window and door jambs

Jamb *flashings* shall be installed as shown in Paragraphs 9.2 to 9.9.

Where required, jamb *flashings* shall overlap sill *flashings*, and direct moisture to the outside face of the *cladding system*.

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Amend 5
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Amend 5
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9.1.10.7 Closed cell foam tape

Compressible foam tape shown behind window facings and *cladding* joints shall be closed cell PVC foam, with:

- Hardness 55-60 to ASTM D2240 Scale OO,
- Grade VE-43 to ASTM D1667,
- Compression set of 20% maximum to ASTM D1667, and
- UV weathering in UV Weatherometer for 1500 light hours to ASTM G154 or ASTM G155 with no visible deterioration in appearance.

9.1.10.8 Attachments for windows and doors

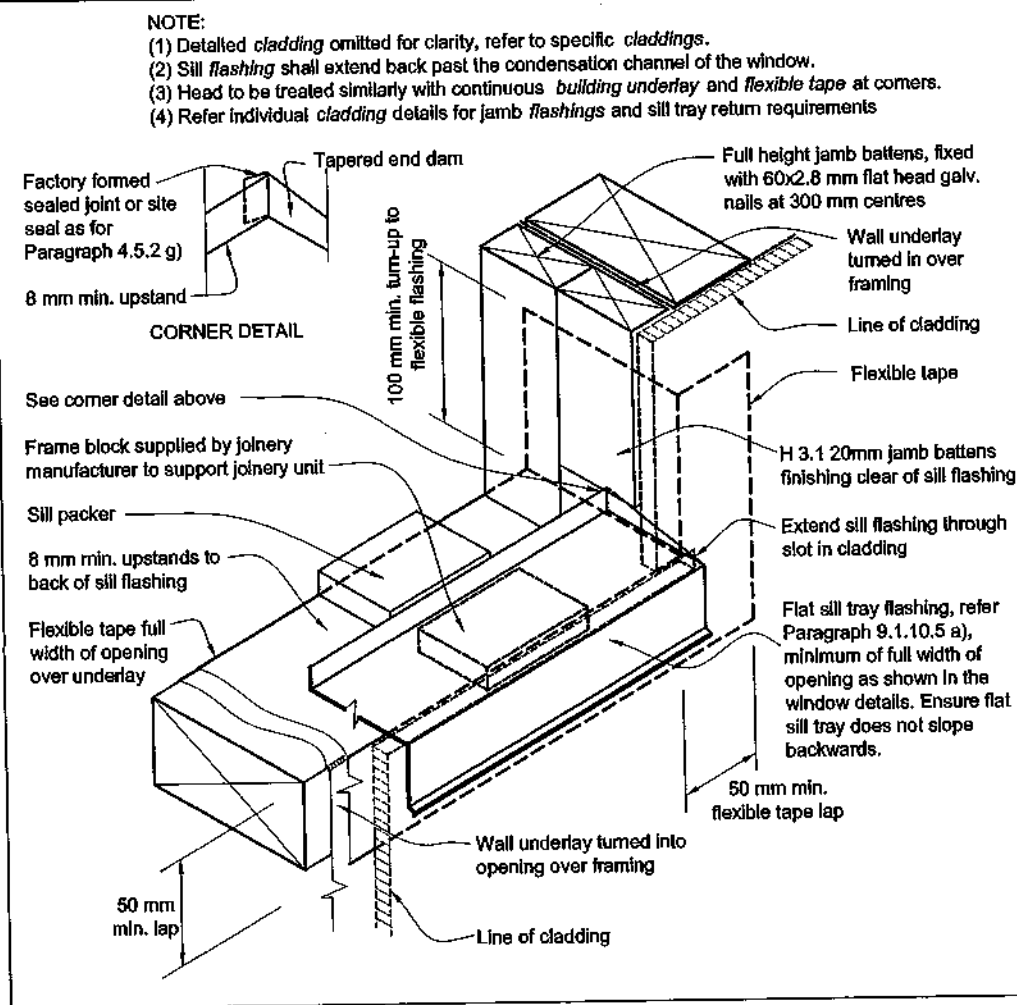
Install windows and doors using pairs of minimum 75 x 3.15 galvanised jolt head nails or 8 gauge x 65 mm stainless steel screws, through reveals into surrounding *framing* at:

- Maximum 450 mm centres along sills, jambs and heads, and
- Maximum 150 mm from reveal ends.

Install packers between reveals and *framing* at all fixing points, except between head reveals and lintels.

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Figure 72A: General window and door opening for direct fixed
Paragraphs 9.1.5, 9.1.10.2, Figures 81, 82, 83, 84, 90, 95 and 115



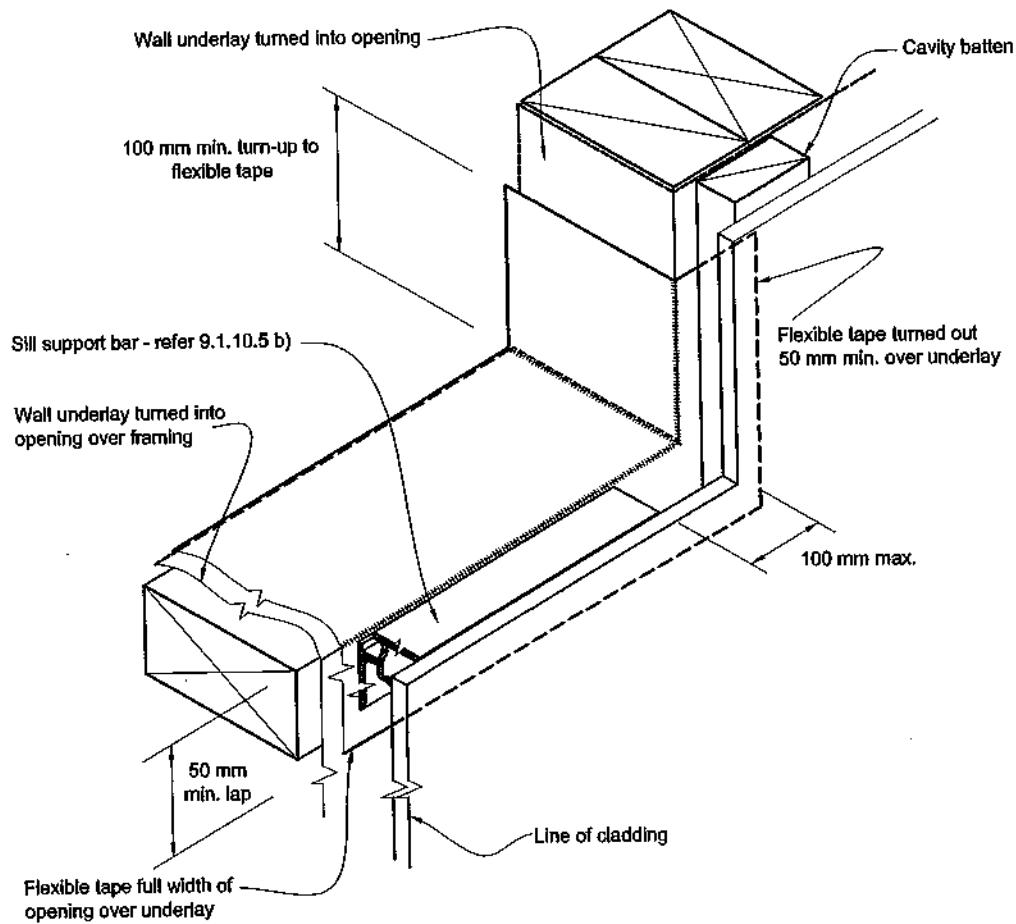
Errata 2
Dec 2011

Amend 5
Aug 2011

Figure 72B: General window and door opening with drainage cavity
 Paragraphs 9.1.5, 9.1.9.3, 9.1.10.2, Figures 73C, 78, 85, 86, 91, 99, 116 and 128

NOTE:

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



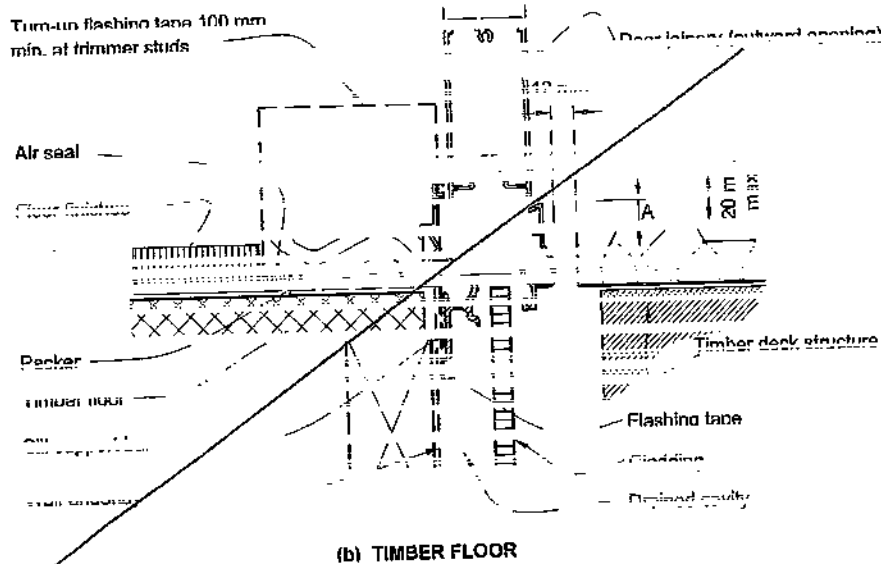
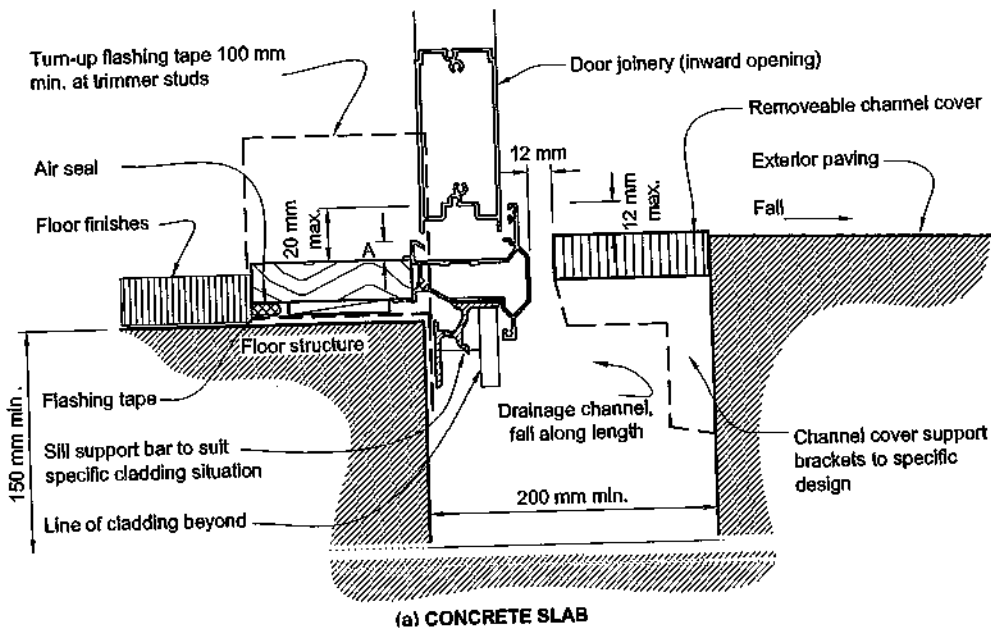
Errata 2
Dec 2011

Amend 5
Aug 2011

Figure 17B: Level thresholds for ground level
Paragraph 7.3 and Figure 17A

NOTE:

- (1) Detail (a) is suitable for use with concrete floor slabs - refer Paragraph 7.3.2.1 for requirements.
- (2) Detail (b) is suitable for use with timber floors. It may also be adapted for timber decks on upper storeys as per Paragraph 7.1.1 b), or for enclosed decks, with removable panels or decking as shown in Figure 17A.
- (3) Both details may be adapted for inward or outward opening doors.
- (4) Exposure to wind-driven rain must be specifically taken into account when using these details, and shelter to doors and joinery provided where local conditions warrant.

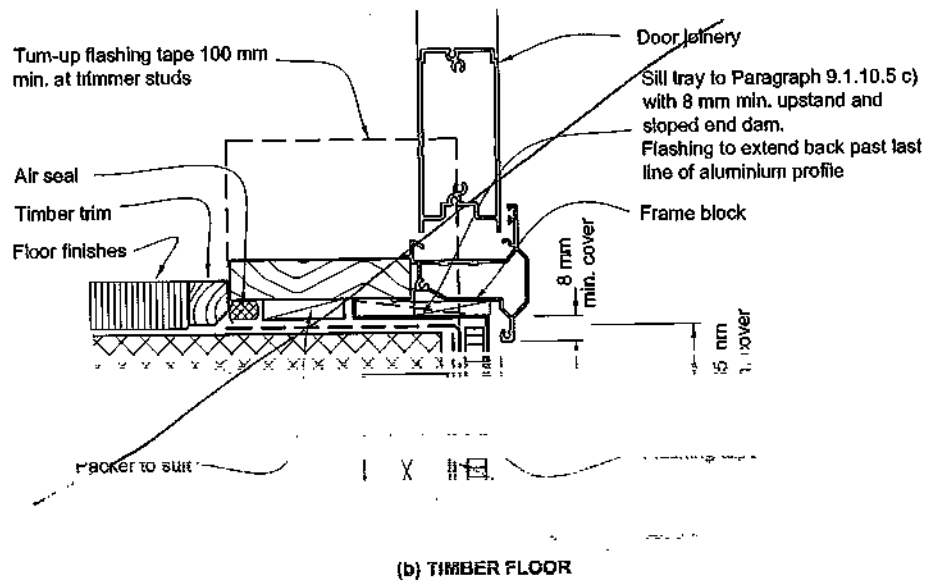
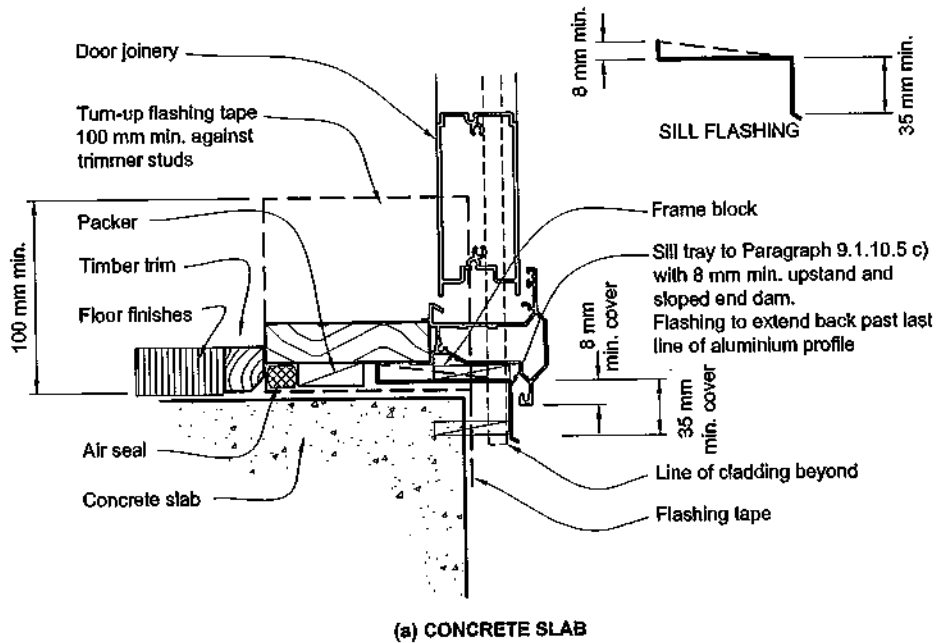


floor or deck to manufacturer's requirements, and to keep sill upstand height to less than 20 mm

Amend 5

Figure 17D: Door sills for direct fix

Paragraph 9.1.10.5, Figures 81, 82, 83, 84, 90, 95 and 115



SIMPLE HOUSE

SH/AS1

Table 5.1.1

	Size (mm x mm)	Max span (mm)	Max Spacing (mm)	Fixing – main roof		Fixing – periphery (refer to Paragraph 5.1.4.3)	
				Capacity (kN)	Type Table 5.1.2	Capacity (kN)	Type (refer to Table 5.1.2)
Purlin	70 x 45	900	900	1.3	C	2.0	C
	70 x 45	900	1200	1.8	C	2.6	C
	70 x 45	900	1400	2.0	C	3.1	D
	70 x 45	1200	800	1.6	C	2.3	C
	90 x 45	1200	1000	2.0	C	2.9	D
Battens for metal tiles	50 x 40	900	400	0.7	B	1.0	C
	50 x 50	1200	400	0.9	C	1.3	C
Battens for masonry tiles	50 x 25	480	400	0.4	A	0.4	A
	50 x 40	600	400	0.4	A	0.4	A
	50 x 50	900	400	0.4	A	0.4	A

Table 5.1.2






























Fixing description	Type
1/100 x 3.75 mm nail or 1/90 x 3.15 mm power driven nail	A
2/100 x 3.75 mm skewed nails or 2/90 x 3.15 mm power driven nails	B
2/100 x 3.75 mm skewed nails + 1 wire dog or 2/100 x 3.75 mm skewed nails + 1/14 g Type 17 screw to AS 4566	C
2/100 x 3.75 mm skewed nails + 2 wire dogs or 2/100 x 3.75 mm skewed nails + 2/14 g Type 17 screws to AS 4566	D
If screw fixed, screws shall be sufficiently long so as to penetrate <i>rafter</i> by at least 50 mm.	

Rafter Span Details Bedroom — Bathroom 4M Span

Design Deflection Limits:

DL LL Dynamic Criteria
SPAN/300 SPAN/360 2 mm/1 kN
OR 15 mm OR 9 mm

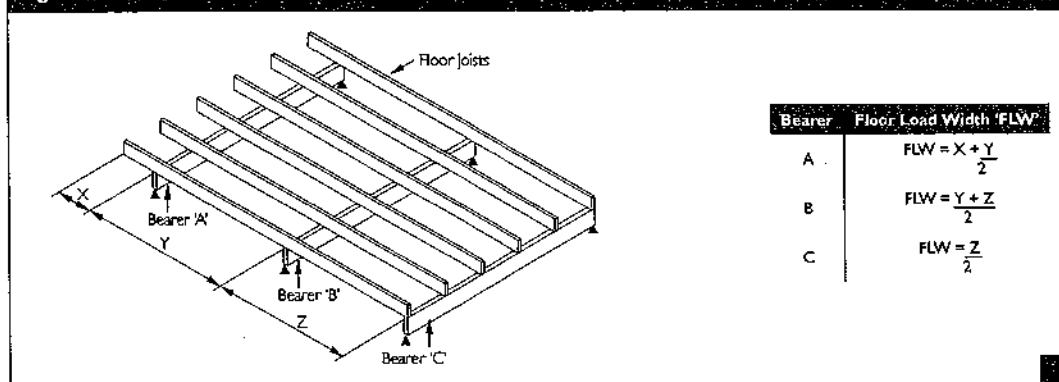
TABLE 11: FLOOR JOISTS

Floor Joists Section D x B (mm)	Product	Cross Section	Max hole diameter (mm)	Floor Joist Spacings (mm)							
				300		400		500		600	
				Maximum Single Span and Overhang 'O/H' (m)							
				Span	O/H	Span	O/H	Span	O/H	Span	O/H
90 x 45	hyCHORD*		20	2.0	0.5	1.7	0.4	1.6	0.4	1.6	0.3
140 x 45	hyCHORD		35	3.6	0.9	2.8	0.8	2.7	0.8	2.6	0.7
150 x 45	hySPAN*		35	4.0	1.0	3.3	0.9	3.1	0.9	3.0	0.8
170 x 45	hySPAN		40	4.4	1.2	3.8	1.1	3.6	1.0	3.4	0.9
HJ200 45	hyJOIST*		112	4.5	1.2	3.8	1.1	3.5	1.0	3.3	0.9
190 x 45	hyCHORD		44	4.6	1.2	4.1	1.1	3.8	1.1	3.6	1.0
200 x 45	hySPAN		50	5.0	1.4	4.6	1.2	4.4	1.2	4.1	1.1
HJ240 63	hyJOIST		152	5.4	1.5	5.0	1.4	4.9	1.3	4.5	1.2
240 x 45	hySPAN		50	5.7	1.6	5.3	1.5	5.1	1.4	4.8	1.3
HJ240 90	hyJOIST		152	6.0	1.7	5.6	1.5	5.4	1.5	5.0	1.4
HJ300 63	hyJOIST		212	6.2	1.7	5.7	1.6	5.5	1.5	5.1	1.4
300 x 45	hySPAN		50	6.7	1.9	6.3	1.8	6.1	1.7	5.7	1.6
HJ300 90	hyJOIST		212	6.8	1.9	6.3	1.8	6.1	1.7	5.7	1.6
HJ360 63	hyJOIST		272	6.9	1.9	6.4	1.8	6.2	1.7	5.7	1.6
HJ360 90	hyJOIST		272	7.6	2.1	7.0	2.0	6.8	1.9	6.3	1.8
360 x 45	hySPAN		50	7.7	2.2	7.2	2.0	7.0	2.0	6.5	1.8
HJ400 90	hyJOIST		312	8.1	2.3	7.5	2.1	7.2	2.0	6.7	1.9
400 x 45	hySPAN		50	8.3	2.4	7.8	2.2	7.5	2.1	7.0	2.0
Maximum Continuous Span and Overhang 'O/H' (m)											
90 x 45	hyCHORD		20	2.7	0.5	2.0	0.4	1.9	0.4	1.8	0.3
140 x 45	hyCHORD		35	4.2	0.9	3.5	0.8	3.2	0.8	3.0	0.7
150 x 45	hySPAN		35	4.6	1.0	4.2	0.9	3.8	0.9	3.5	0.8
170 x 45	hySPAN		40	5.1	1.1	4.8	1.0	4.4	1.0	4.0	0.9
HJ200 45	hyJOIST		112	5.1	1.2	4.7	1.0	4.3	1.0	3.9	0.9
190 x 45	hyCHORD		44	-	-	-	-	4.7	1.1	4.3	1.0
200 x 45	hySPAN		50	5.8	1.4	5.4	1.2	5.2	1.2	4.8	1.1
HJ240 63	hyJOIST		152	6.2	1.5	5.7	1.4	5.5	1.3	5.1	1.2
240 x 45	hySPAN		50	6.6	1.6	6.2	1.5	6.0	1.4	5.6	1.3
HJ240 90	hyJOIST		152	6.8	1.7	6.3	1.5	6.1	1.5	5.6	1.4
HJ300 63	hyJOIST		212	7.0	1.7	6.5	1.6	6.3	1.5	5.8	1.4
300 x 45	hySPAN		50	7.8	1.9	7.3	1.8	7.1	1.7	6.6	1.6
HJ300 90	hyJOIST		212	7.8	1.9	7.2	1.8	7.0	1.7	6.4	1.6
HJ360 63	hyJOIST		272	7.8	1.9	7.2	1.8	6.9	1.7	6.1	1.6
HJ360 90	hyJOIST		272	8.7	2.1	8.0	2.0	7.8	1.9	7.1	1.8
360 x 45	hySPAN		50	-	-	8.3	2.0	8.1	2.0	7.5	1.8
HJ400 90	hyJOIST		312	-	-	8.4	2.1	8.0	2.0	7.2	1.9
400 x 45	hySPAN		50	-	-	-	-	-	-	8.2	2.0

- Refer to section 6.3 or designIT[®] for houses software for permitted hole sizes and locations
- For solid LVL sections bearing at end supports as for NZS 3604, bearing at intermediate supports 60 mm minimum. For hyJOIST design considerations, refer to section 4: Design Considerations – hyJOIST
- Joists should be blocked at supports – refer to the Futurebuild LVL Residential Installation Guide.

6.7 DETERMINATION OF FLOOR LOAD WIDTH

Figure 15: Floor Load Width



6.8 LINTELS

Lintels are beams contained in walls required to support load over doors and windows. Their design includes stringent

limitations on deflection required in order to maintain clearance of non-structural joinery items below the lintels.

6.9 ROOF MASS

For most applications roof mass has been separated into four categories related to the type of roof cladding and whether or not a ceiling is included. The four categories together with the roof mass allowance for each case, are given in table 7 below.

A corrugated roof would be considered a light weight roof with a concrete tiled roof considered heavy.

For the rafter and verandah beam tables designers need to determine the applicable roof mass of framing and roof materials.

TABLE 7: ROOF MASS ALLOWANCES

Roof Type	Roof Mass Allowed
Light Roof	25 kg/m ²
Light Roof and Ceiling	40 kg/m ²
Heavy Roof	75 kg/m ²
Heavy Roof and Ceiling	90 kg/m ²

6.10 TECHNICAL SUPPORT

For further information on Futurebuild® LVL, guidance on the use of these tables or assistance with applications not included, please contact CHH Woodproducts.

Freephone: 0800 808 131
 Website: www.chhwoodproducts.co.nz
 Software: www.chhsoftware.com

For member types and other design options not in these tables use designIT® for houses software.

RAFTER SPAN TABLES LOUNGE 6M SPAN

Design Deflection Limits:

DL: LL:
SPAN/300 SPAN/250
OR 20 mm OR 20 mm

TABLE 21A: RAFTERS – HIGH AND VERY HIGH WIND EXPOSURE

Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span							
			600		900		1200		1500		1800		2100		2400			
			Maximum Rafter Span and Overhang 'O/H' (m) for Light Roofs and Ceilings = 40 kg/m²															
			Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H		
90 x 45	hyCHORD*	I	2.7	0.7	2.4	0.7	2.2	0.6	2.0	0.6	3.1	0.7	3.0	0.6	2.8	0.6	2.6	0.6
140 x 45	hyCHORD	I	4.0	1.1	3.7	1.0	3.3	1.0	3.0	1.0	-	-	-	-	4.4	0.9	4.1	0.9
150 x 45	hySPAN*	I	4.6	1.3	4.2	1.2	3.8	1.1	3.4	1.2	6.1	1.1	5.7	1.0	5.0	1.0	4.6	1.0
150 x 63	hySPAN	I	5.0	1.5	4.6	1.4	4.2	1.3	3.8	1.3	6.5	1.3	6.2	1.2	5.6	1.1	5.1	1.1
170 x 45	hySPAN	I	5.2	1.5	4.8	1.3	4.2	1.3	3.9	1.2	6.7	1.3	6.3	1.2	5.7	1.1	5.2	1.2
190 x 45	hyCHORD	I	5.4	1.5	5.0	1.4	4.4	1.4	4.1	1.3	-	-	-	-	-	-	-	-
HJ200 45	hyJOIST*	I	5.6	1.4	5.1	1.4	4.4	1.3	4.0	1.3	7.0	1.3	6.5	1.2	5.8	1.2	4.8	1.2
200 x 45	hySPAN	I	6.0	1.7	5.6	1.6	5.0	1.5	4.6	1.4	7.5	1.6	7.1	1.4	6.5	1.3	6.1	1.4
200 x 63	hySPAN	I	6.4	2.0	6.0	1.8	5.5	1.7	5.0	1.7	7.9	1.8	7.5	1.6	7.0	1.5	6.5	1.6
240 x 45	hySPAN	I	6.8	2.1	6.4	1.9	5.9	1.8	5.4	1.7	8.5	1.9	8.0	1.8	7.4	1.7	6.9	1.6
HJ240 63	hyJOIST	I	6.8	1.9	6.3	1.8	5.7	1.7	5.2	1.7	8.3	1.8	7.8	1.7	7.0	1.6	6.2	1.6
240 x 63	hySPAN	I	7.2	2.4	6.9	2.2	6.3	2.1	6.0	2.0	-	-	8.5	2.0	7.9	1.9	7.5	1.8
HJ240 90	hyJOIST	I	7.3	2.3	6.9	2.1	6.3	2.0	5.9	1.9	-	-	8.5	1.9	7.7	1.8	7.2	1.8
HJ300 63	hyJOIST	I	7.7	2.4	7.2	2.2	6.6	2.1	6.1	2.0	-	-	-	-	8.0	1.9	7.4	1.9
300 x 45	hySPAN	I	7.9	2.8	7.5	2.5	6.9	2.3	6.5	2.0	-	-	-	-	8.6	2.1	8.1	2.0
300 x 63	hySPAN	I	8.3	3.2	8.0	2.9	7.4	2.7	7.0	2.5	-	-	-	-	-	-	8.7	2.4
HJ300 90	hyJOIST	I	8.3	2.8	7.8	2.6	7.2	2.4	6.7	2.3	-	-	-	-	-	-	8.2	2.2

TABLE 21B: RAFTERS – HIGH AND VERY HIGH WIND EXPOSURE

Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span							
			600		900		1200		1500		1800		2100		2400			
			Maximum Rafter Span and Overhang 'O/H' (m) for Heavy Roofs and Ceilings = 90 kg/m²															
			Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H
90 x 45	hyCHORD*	I	2.1	0.8	1.9	0.8	1.7	0.7	1.5	0.7	2.8	0.7	2.5	0.7	2.2	0.6	2.0	0.6
140 x 45	hyCHORD	I	3.2	1.3	2.9	1.2	2.6	1.1	2.3	1.1	4.3	1.1	3.9	1.0	3.5	1.0	3.1	1.0
150 x 45	hySPAN*	I	3.6	1.4	3.3	1.3	2.9	1.3	2.7	1.2	4.9	1.3	4.5	1.2	3.9	1.1	3.6	1.1
150 x 63	hySPAN	I	4.0	1.6	3.7	1.5	3.3	1.4	3.0	1.4	5.4	1.4	4.9	1.3	4.4	1.3	4.0	1.2
170 x 45	hySPAN	I	4.1	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.5	1.4	5.0	1.3	4.4	1.3	4.1	1.2
190 x 45	hyCHORD	I	4.3	1.7	3.9	1.6	3.5	1.5	3.2	1.5	-	-	-	-	4.7	1.3	4.3	1.3
HJ200 45	hyJOIST*	I	4.3	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.6	1.4	5.0	1.4	4.2	1.3	3.2	1.4
200 x 45	hySPAN	I	4.8	1.9	4.4	1.8	3.9	1.7	3.5	1.6	6.3	1.7	5.9	1.6	5.2	1.5	4.8	1.5
200 x 63	hySPAN	I	5.3	2.2	4.9	2.0	4.3	1.9	3.9	1.8	6.8	1.9	6.4	1.8	5.8	1.7	5.3	1.6
HJ240 63	hyJOIST	I	5.5	2.1	4.9	2.0	4.3	1.9	3.8	1.8	6.8	1.9	6.3	1.8	5.5	1.7	4.2	1.7
240 x 45	hySPAN	I	5.7	2.3	5.2	2.1	4.6	2.0	4.2	1.9	7.2	2.1	6.8	1.9	6.2	1.8	5.7	1.7
HJ240 90	hyJOIST	I	6.1	2.4	5.6	2.3	4.9	2.2	4.4	2.0	7.5	2.2	7.0	2.1	6.3	2.0	5.5	2.0
240 x 63	hySPAN	I	6.2	2.6	5.8	2.4	5.1	2.3	4.7	2.2	7.7	2.4	7.3	2.2	6.7	2.0	6.2	2.1
HJ300 63	hyJOIST	I	6.4	2.6	5.9	2.4	5.1	2.3	4.6	2.1	7.8	2.4	7.2	2.2	6.4	2.1	5.6	2.0
300 x 45	hySPAN	I	6.8	2.9	6.4	2.7	5.8	2.5	5.3	2.3	8.4	2.7	7.9	2.4	7.3	2.3	6.8	2.2
HJ300 90	hyJOIST	I	7.0	3.0	6.5	2.8	5.9	2.6	5.3	2.3	8.5	2.8	7.9	2.6	7.1	2.4	6.4	2.3
300 x 63	hySPAN	I	7.2	3.3	6.8	3.1	6.3	2.8	5.8	2.6	-	-	8.5	2.8	7.8	2.6	7.3	2.5

The following notes relate to TABLE 21A and TABLE 21B.

- Maximum overhangs (O/H) have been determined for the support conditions and a minimum backspan of twice O/H
- Bottom edge to be restrained by ceiling or ceiling battens at maximum 600 c/c

VERANDAH POST BEAM DETAILS

SIMPLE HOUSE

SH/AS1

Table 5.4.1 VERANDAH BEAMS Fixing spans 2.4, 3, 4, 5, 6 and Figure 7.2.2								
Beam size (width x thickness) (mm x mm)	Loaded dimension of verandah beam (m)							
	0.9		1.4		1.8		2.1	
	Span	Fixing type	Span		Span		Span	
	(m)		(m)		(m)		(m)	
Light roof								
140 x 45	1.9	CC	1.4	CC	1.3	DD	1.2	DD
190 X 45	2.3	CC	1.8	DD	1.6	DD	1.5	DD
240 X 45	2.5	CC	2.0	DD	1.8	EE	1.8	EE
290 X 45	2.7	CC	2.2	DD	2.0	EE	1.9	EE
140 X 90	2.4	CC	2.0	DD	1.8	EE	1.7	EE
190 X 90	3.3	DD	2.7	EE	2.5	FF	2.4	FF
240 X 90	4.2	DD	3.4	FF	3.1	FF	3.0	FF
290 X 90	6.5	FF	5.2	FF	4.8	FF	—	—
Heavy roof								
140 x 45	1.5	CC	1.2	CC	—	—	—	—
190 X 45	2.0	CC	1.5	CC	1.4	CC	1.3	DD
240 X 45	2.3	CC	1.8	CC	1.6	DD	1.5	DD
290 X 45	2.4	CC	1.9	DD	1.8	DD	1.7	DD
140 X 90	2.0	CC	1.6	CC	1.4	CC	1.4	DD
190 X 90	2.7	CC	2.1	DD	2.0	DD	1.9	DD
240 X 90	3.4	CC	2.7	DD	2.5	EE	2.4	EE
290 X 90	5.2	DD	4.1	FF	3.8	FF	3.7	FF
Fixing type	Fixing to resist uplift					Proprietary fastener capacity (kN)		
CC	6/100 x 3.75 mm nails					4.7		
DD	1/M12 bolt					6.7		
EE	1/M12 bolt					8.7		
FF	3/M12 bolts or 2/M16 bolts					18.6		
Note:								
1. This table includes provision for the rafters cantilevering a maximum of 750 mm beyond the verandah beam to support a soffit.								
2. Fixing for continuous spans shall have double the capacity to that listed in this table.								
3. Members 90 mm thick may be substituted with built-up, laminated members sized and nailed in accordance with Paragraph 2.7.3.								

5.4.5 Volume of concrete footing to resist uplift

The volume of the concrete *foundation* required to resist uplift shall be as given in Table 5.4.2.

Table 5.4.2 Post concrete footings to resist uplift Paragraph 5.4.5						
Volume of footing concrete (m ³) for area of roof supported (m ²)						
1 m ²	2 m ²	4 m ²	6 m ²	8 m ²	10 m ²	12 m ²
0.07	0.13	0.26	0.40	0.50	0.65	0.8

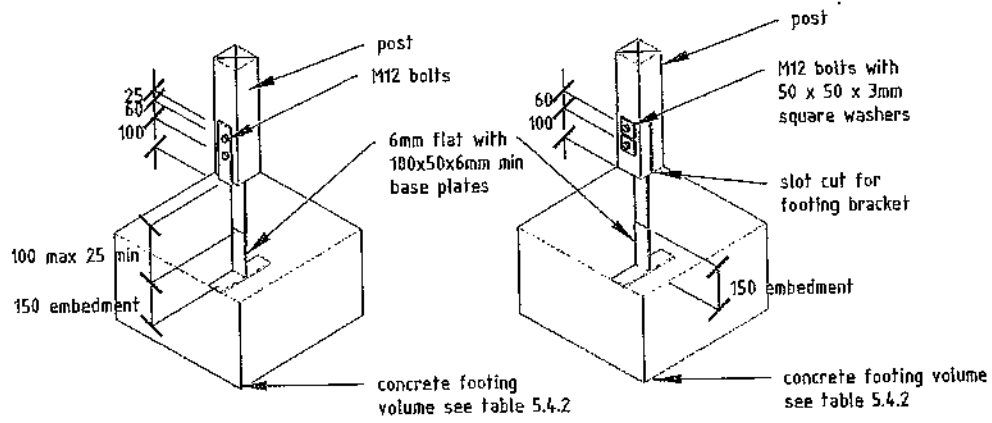
5.4.6 Connections

Each end of each a verandah post shall be provided with *proprietary fasteners* of the *capacities* as given by Table 5.4.3 or by connections as detailed in Figures 5.4.2 or 5.4.3. Refer to Paragraph 2.5 for durability requirements.

Table 5.4.3 Connections to posts and beams to resist uplift Paragraph 5.4.6 and Figure 5.4.1						
Capacity of post and beam connections (kN) for area (m ²) of roof supported						
1 m ²	2 m ²	4 m ²	6 m ²	8 m ²	10 m ²	12 m ²
2.0	4.0	0.7.9	11.9	15.8	19.8	23.8

Figure 5.4.2

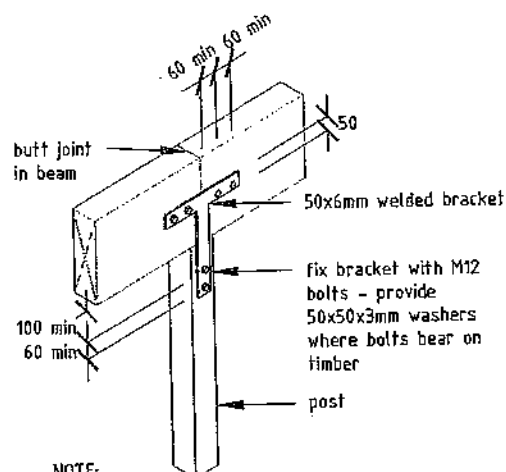
Post/footing connections
 (see table 5.4.1)



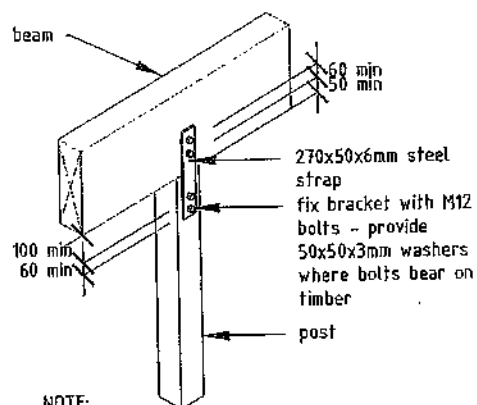
NOTE:

- 1) 1 bolt may be used when the footing volume is 0.2m^3 or less.
- 2) see Para 2.5 for durability requirements.
- 3) capacity 36.4kN.

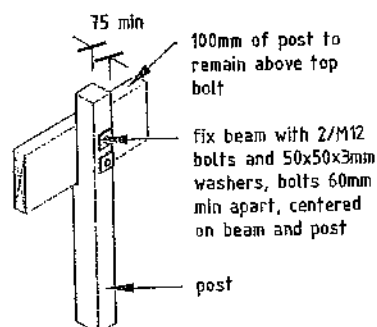
Figure 5.4.3
 Beam/Post Connections
 Region 3A



NOTE:
 1) see Para 2.5 for durability requirements.
 2) capacity 18.2kN for 1 bracket
 3) capacity 36.4kN for 2 brackets



NOTE:
 1) see Para 2.5 for durability requirements.
 2) capacity 9.8kN for 1 bracket
 3) capacity 19.5kN for 2 brackets



NOTE:
 1) see Para 2.5 for durability requirements.
 2) capacity 9.8kN

GIB CEILING BATTEN DETAILS.

4.4.2 STANDARD CEILING FIXING

This information applies to the general installation of GIB® plasterboard. If bracing, fire

or noise control is a consideration consult the relevant GIB® Systems literature.

Ceiling Framing

- ▶ If using timber ceiling battens timber moisture content must not exceed 18% prior to lining (see p. 30)
- ▶ Battens should all run in the same direction within a ceiling area. Additional nogs may be required to achieve this

- ▶ Single screw at 600mm maximum to the perimeter of the ceiling. See p. 66 for ceiling diaphragm installation
- ▶ Place fasteners no closer than 12mm from a taper sheet edge or 18mm from a cut sheet edge

Batten Spacing

- ▶ 10mm GIB® plasterboard – 450mm max.
- ▶ 13mm GIB® plasterboard – 600mm max.
- ▶ Winstone Wallboards recommends the use of 13mm GIB® plasterboard in ceiling applications for optimal performance

Adhesive

- ▶ Place daubs of GIBFix® adhesive at 200mm to intermediaries.
- ▶ Do not place adhesive at sheet edges or within 200mm of fasteners

Fasteners

Metal Battens

- ▶ Minimum 25mm x 6g GIB® Grabber® fine thread self tapping screws*

Timber Battens

- ▶ Minimum 32mm x 6g GIB® Grabber® high thread screws*

Lining

- ▶ Sheets should be touch fitted
- ▶ Sheets must be fixed at right angles to the ceiling framing unless otherwise specified in GIB® Performance System specifications

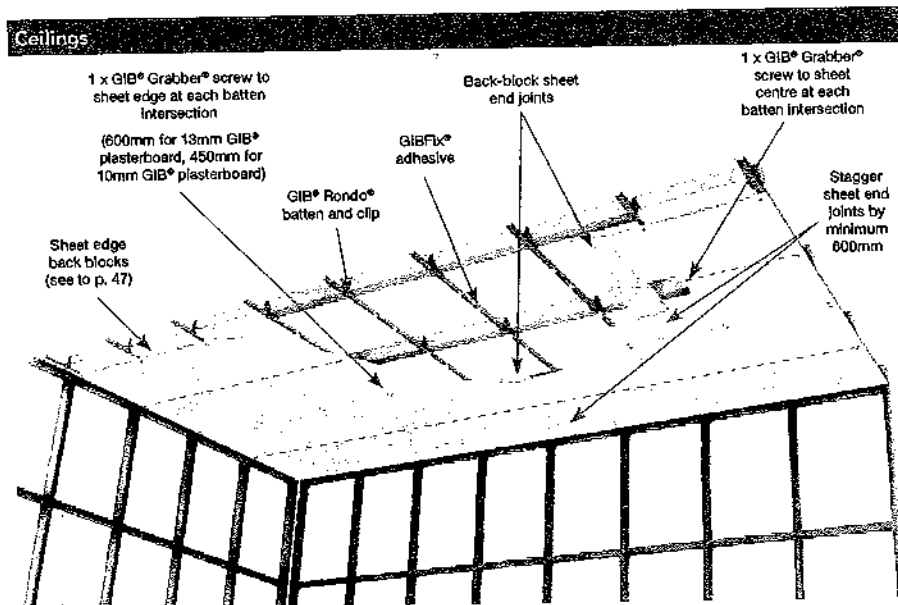
Stopping

- ▶ Refer to the Finishing System section of this guide

Fastener Spacings

- ▶ Single screws at the edges and centre of the sheet across the batten

*Some GIB® Performance Systems may require different fastener lengths and types. Refer to the applicable GIB® System literature for more information



4.3.7 REDUCING JOINTS WHEN USING GROOVED JAMBS

- ▶ Line the wall with the opening before lining any adjacent walls
- ▶ Joinery must be accurately installed to give 1.5–2mm clearance for sheet into the groove. (see p. 43)
- ▶ Groove depth should be 8mm minimum
- ▶ Cut lower sheet 20mm less than overall wall length
- ▶ Measure from wall or floor to outer edge of joinery frame (not into groove)
- ▶ Cut lower sheet as shown in Fig. 2
- ▶ Install sheet by placing against the wall and sliding and lifting into grooves as required
- ▶ Repeat the procedure for the upper sheet. Measure D from the top edge of the fixed lower sheet to the top outer edge of the window frame. Deduct 6mm from this measurement

Fig. 1

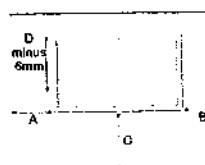
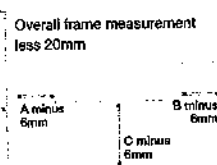


Fig 2. – Lower Sheet



4.4 INSTALLATION TO CEILINGS

4.4.1 GENERAL INSTALLATION

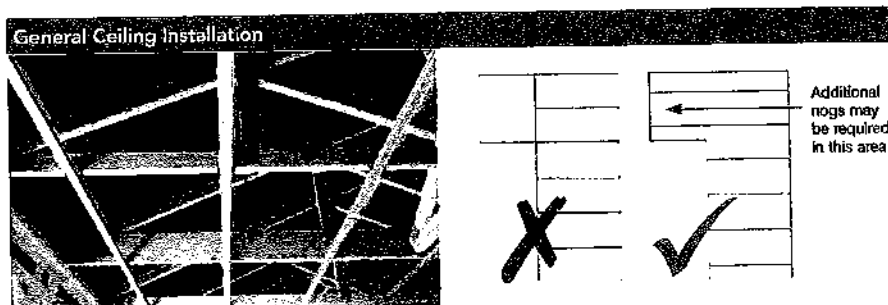
Truss dimensions and spacings must comply with NZS3604:2011

The use of GIB® Rondo® metal ceiling battens is strongly recommended. Timber battens can be prone to conditions that contribute to joint failure and popped fasteners. If the use of timber ceiling battens is unavoidable, additional care needs to be taken to ensure that the moisture content is 18% or less (see p. 30).

To limit sag in GIB® plasterboard ceilings, long term uniformly distributed loads such as that of fixtures and fittings and/or overlaid insulation shall not exceed 3kg/m² unless independently supported.

Winstone Wallboards recommends:

- ▶ 13mm GIB® plasterboard on GIB® Rondo® steel battens at 600mm centres. When batten, labour and board costs are taken into account this system is the most cost effective as well as being the least prone to finishing defects
- ▶ Ceiling battens are installed after the roof framing is complete and the roof has been loaded
- ▶ All ceiling sheets be fixed at right angles to the ceiling framing. Sheets must not be fixed in the same direction as the framing to which it is attached. All ceiling battens in a single area need to run in the same direction to enable this. Sometimes this will require additional nogs to be fitted between trusses. Failure to do this will result in a tapered edge/cut edge joint at a point that is highly susceptible to cracking.



WINDOW JOINERY COMPLIANCE

10 ALUMINIUM WINDOWS AND DOORS

This section deals with the manufacture, supply and installation of aluminium windows and doors and associated flashings.

10.1 RELATED SECTIONS

Refer to GLAZING for glazing for type and thickness.

10.2 DOCUMENTS

Documents referred to in this section are:

- NZS 3604: Timber framed buildings
- AS 3715: Metal finishing - Thermoset powder coatings for architectural applications
- NZS 4223: Code of practice for glazing in buildings
- WANZ Aluminium Window Handbook
- WANZ Specification for powder coatings on architectural aluminium products
- WANZ Installation code for aluminium joinery products

10.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are available from:

FAIRVIEW ALUMINIUM

ALUMINIUM SUITE: FAIRVIEW FLAT FACED SECTION, WITH THERMAL BREAK OR SIMILAR APPROVED, powder coat colour: to be selected.

10.4 PERFORMANCE

The structural and weather-tight performance of the completed window installation, the glazing and infill panels is the responsibility of the window manufacturer.

10.5 WINDOW AND DOOR SECTIONS

Form all aluminium members from extruded sections. Folded sections are restricted to flashings and concealed members only.

10.6 FLASHINGS GENERALLY

Material, grade and colour of head flashings to match the window frames. Ensure that materials used for head, jamb and sill flashings are compatible with the window frame materials and fixings and cladding materials.

10.7 WINDOW AND DOOR HARDWARE

Hardware from manufacturer's standard range, key alike all new doors.

10.8 GLAZING TAPE AND GASKETS

To the window manufacturer's requirements.

10.9 FIXINGS

Ensure all fixings and bracketing are compatible with aluminium. Do not use electroplated zinc fasteners or brass fastenings.

10.10 POWDER COATING FINISH

To AS 3715 and WANZ Specification for powder coatings on architectural aluminium products.

All finished surfaces to show uniformity of gloss and colour free of all coating defects.

10.11 EXECUTION

Execute all fabrication and installation work in accordance with the requirements of NZS 4211, WANZ Aluminium window handbook and WANZ Installation code for aluminium joinery products.

10.12 HARDWARE FITTING

Factory fit all required and scheduled hardware. Account for all keys and deliver separately to the site manager.

10.13 HANDLING

Avoid distortion of elements during transit, handling and storage. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site any elements which cannot be immediately unloaded into suitable conditions of storage.

10.14 CORROSION PROTECTION

Seal or suitably coat cut ends and holes drilled in aluminium before the frames are installed.

Before fixing, apply bituminous coatings, slips or underlays between dissimilar metals in contact, or aluminium in contact with concrete.

10.15 CONFIRM PREPARATION OF WALL OPENINGS

Confirm that wall openings have been prepared ready for the installation of all window and door frames. Do not proceed with the window and door installation until required preparatory work has been completed.

Required preparatory work includes the following:

- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames
- claddings neatly finished off to all sides of openings
- interior linings neatly trimmed ready for installation of jamb liners and completion of air seals to all sides of openings
- installation of flashings (those which are required to be installed prior to frames).

10.16 FIX FRAMES

Fix frames rigidly in place without distortion, to the window manufacturers and

WANZ

Aluminium window handbook requirements, plumb, true to line and face, weathertight and with all openings operating freely.

10.17 DRAINAGE

Provide anti-condensation channels to all sills. Sills to sashes and fixed lights to incorporate positive drainage to the exterior.

10.18 INSTALLATION

Fix to comply with the installation details including flashings, sill pans and bedding compounds, pointing sealants and weathering sealants.

10.19 INSTALL FLASHINGS

Install flashings to heads, jambs and sills of frames as supplied and required by the window manufacturer and as detailed on the drawings. Finish head flashings to match window finish.

Place all flashings so that the head flashing weathers the jamb flashings, which in turn weathers over the upstand of the sill flashing. Ensure that sill flashings drain to the outside air.

Except where window/door frames are recessed, ensure that head flashings over-sail jamb facings by 15 mm at each end.

10.20 COMPLETE AIR SEAL

Form an air-tight seal by means of proprietary expanding foam, compressible foam strips, or sealants used with backing rods, applied deep within the reveal to completely fill the gap between joinery and structural framing. Ensure that in combination with the internal linings a complete air seal is created.

10.21 SEAL FRAMES ON SITE

Seal frames to each other and to adjoining structure and finishes, all as required by the window manufacturer and to make the installation weather-tight. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.

10.22 PROTECTIVE COVERINGS

Retain protective coverings and coatings and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades. Remove protection on completion.

10.23 SAFETY

Indicate the presence of transparent glasses for the remainder of the contract period, with whiting, tape or signs compatible with the glass type. Indicators other than whiting must not be applied to the glass surface. Masking tape must not be used for this purpose.

10.24 CLEAN FRAMES

On completion clean down both sides of window and door frames using the methods required by the window and door manufacturer.

10.25 WIND ZONE

Building wind zone: MEDIUM

10.26 WINDOW AND DOOR JAMB LINERS: TIMBER

Timber species: PINUS RADIATA (note glb carried into openings in new extension, dining room, and main bedroom).
Finish: PAINTED

11 GLAZING

11.1 GENERALLY

All work shall comply with NZS 4223 Code of Practice for Glazing in Buildings and NZS 4666 Insulating Glass Units.

All rebates primed before glazing into wood sashes or frames. The Contractor is to ensure that the Painter has primed before glazing is carried out.

11.2 SCOPE

1. Glass to exterior and interior doors as scheduled on the drawings.
2. Mirrors for the bathroom and ensuite as shown on the drawings.
3. "Insulglass" or similar approved double glazing units to the all new windows and doors. The inside sheet of glass of these units shall be A grade safety glass where shown on the drawings. A guarantee is required for these units.

11.3 GLASS

All glass to be of proper thickness for its size and location and be in compliance in this respect to the recommendations of an approved authority.

11.4 DOUBLE GLAZING

Shall be "Insulglass" System as supplied by Metro Glass or similar but approved. The metal window manufacturer shall install these units in compliance with N.Z.S. 42231&2: 1985 Glazing in Buildings. Provide a ten (10) year manufacturers guarantee.

11.5 COMPLETION

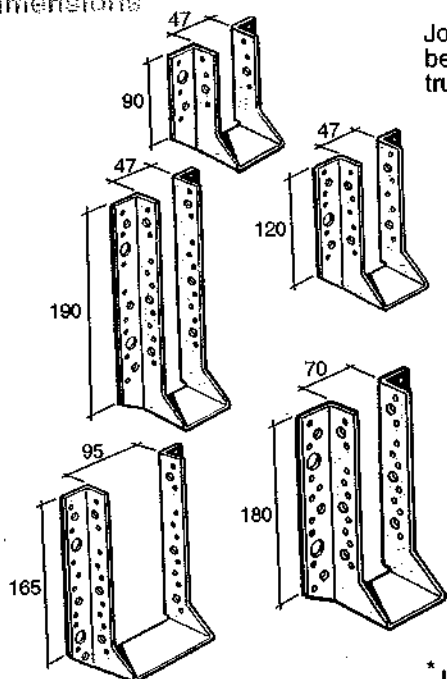
Replace any cracked or broken glass. Ensure that no leaking is occurring due to the glazing and clean the glass inside and out. Leave sound and perfect on completion.



JOIST HANGERS

**USE STAINLESS STEEL
OPTION IN
EXTERIOR SITUATIONS**

Dimensions



Joist Hangers are designed to be used where a strong rigid joint is required between members butting together at 90 degrees, e.g floor joist to beam, truss or rafter to beam/bearer

Joist Hangers to suit 50mm thick (nominal) timber are available in three sizes

***JH47 x 90 -** For use on gauged 47mm wide timber up to 150mm deep.

***JH47 x 120 -** Suitable for gauged 47mm wide timber up to 200mm deep.

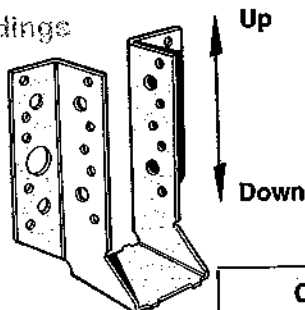
***JH47 x 190 -** For gauged 47mm wide timber up to 300mm deep.

JH70 x 180 - Joist Hanger to suit 75mm thick (nominal) timber. A special size joist hanger designed for gauged 69mm wide timbers.

JH95 x 165 - Joist Hanger to suit 100mm thick (nominal) timber. For use on gauged 94mm wide timber or double joists/trusses.

* Joist Hangers are available in 52 x 90, 52 x 120 and 52 x 190, to suit 52mm wide, rough sawn timber. 37 x 90, 37 x 120 and 37 x 190 are available for 35mm gauged timber. All sizes (except 37mm) are also available in Stainless Steel 304-2B.

Loadings



IMPORTANT NOTE

For other load conditions, refer to the Characteristic Load Table below for correct product selection and nailing or screw fixing. In some cases it may be necessary to fully nail or screw fix the Joist Hanger.

Joist Hanger Type	Characteristic Load - Nails			Characteristic Load - Screws		
	No. of Nails per Flange*	Down	Uplift	No. of Screws per Flange*	Down	Uplift
JH 47 x 90	3	9.0 kN	6.0 kN	1	7.0 kN	4.7 kN
JH 47 x 120	5	15.0 kN	10.0 kN	2	14.0 kN	12.0 kN
JH 47 x 190	9	27.0 kN	18.0 kN	3	21.0 kN	18.0 kN
JH 95 x 165	8	24.0 kN	16.0 kN	3	21.0 kN	18.0 kN
JH 70 x 180	8	24.0 kN	16.0 kN	3	21.0 kN	18.0 kN
Nail with LUMBERLOK Product Nails 30mm x 3.15 dia.				Fix with Type 17-12g x 35mm Hex Head Screws		

* 4 Flanges per hanger

Note: Loads for 47mm Joist Hangers also apply to 52mm & 37mm.

Material: 0.91mm G300 Z275 Galvanised Steel
or 0.9mm Stainless Steel 304-2B



JOIST HANGER SELECTION & FIXING RECOMMENDATION

DOMESTIC FLOOR JOISTS AND COMMERCIAL FLOOR JOISTS UP TO 3.0 kPa LIVE LOAD
(Refer Table 3.1 AS/NZS 1170.1:2002)

- ☆ **Loads 1. DOMESTIC FLOORS & BALCONIES - 1.5 kPa & 2.0 kPa Live Loads**
(Allows 1.8 kN Point Load & 0.4 kPa Dead Load)
- 2. COMMERCIAL FLOORS - 3.0 kPa Live Load**
(Allows 2.7 kN Point Load, 0.5 kPa Dead Load)

- ☆ Floor Joist centres up to 600mm.
- ☆ These charts cover SG6, SG8 & SG10 timber grades.
- ☆ The same selection of nail/screw pattern applies to gauged 35mm & nominal 50mm timber thickness.

NAILING RECOMMENDATION

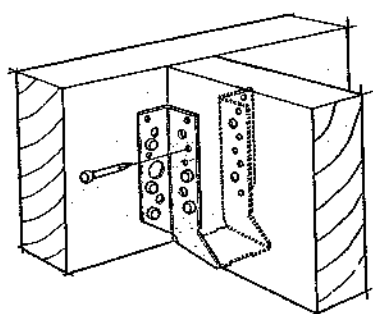
Nail with LUMBERLOK Product Nails 30mm x 3.15 dia.

Joist Size	Recommended Joist Hanger	Domestic Floors & Balconies Min. No. of Nails Per Flange (4 Flanges Total)	Commercial Floors Min. No. of Nails Per Flange (4 Flanges Total)
100 x 50	JH 47 x 90	2	3
150 x 50	JH 47 x 90	2	3
200 x 50	JH 47 x 120	3	4
250 x 50	JH 47 x 190	4	4
300 x 50	JH 47 x 190	4	5

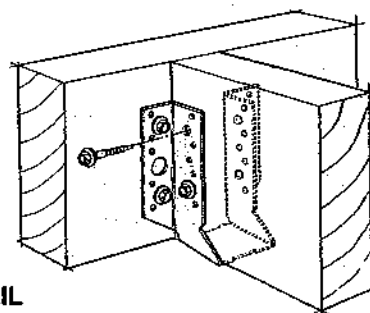
SCREW FIXING RECOMMENDATION

Fix with Type 17-12g x 35mm Hex Head Screws

Joist Size	Recommended Joist Hanger	Domestic Floors & Balconies No. of Screws Per Flange (4 Flanges Total)	Commercial Floors No. of Screws & Nails Per Flange (4 Flanges Total)
100 x 50	JH 47 x 90	1	1 Screw + 1 Nail
150 x 50	JH 47 x 90	1	1 Screw + 1 Nail
200 x 50	JH 47 x 120	2	2 Screws + 2 Nails
250 x 50	JH 47 x 190	2	2 Screws + 2 Nails
300 x 50	JH 47 x 190	3	3 Screws + 2 Nails



NAIL DETAIL



SCREW DETAIL



MiTek New Zealand Limited

AUCKLAND
PO Box 56-014, Botany 2163
Phone: 09-274 7109
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CHRISTCHURCH
PO Box 8387, Riccarton 8440
Phone: 03-345 8691
Fax: 03-345 0314

www.mitek.co.nz

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GANG-NAIL® LUMBERLOK® BOWMAC®

RAFTER FIXING DETAILS.

SH/AS1

SIMPLE HOUSE

5.3 Skillion roofs

CONTENTS

- 5.3.1 General
- 5.3.2 Rafters
- 5.3.3 Ridge and intermediate beams
- 5.3.4 Purlins and tile battens

Figures

- ### 5.3.2 Fixing rafters – skillion roof

Tables

- 5.3.1 Rafter sizes and spans
- 5.3.2 Fixing types for rafters
- 5.3.3 Ridge and Intermediate beams
- 5.3.4 Key to fixing types to restrain ridge/
intermediate beam uplift

5.3.1 General

The grade, species and preservative treatment for *rafters* shall be in accordance with Table 2.7.

5.3.2 Rafters

5.3.2.1 *Rafters* shall span between any two of the following:

- (a) *top plate*
(b) *lintel*
(c) *ridge beam*
(d) *intermediate beam.*

5.3.2.2 *Rafters* shall be sized from Table 5.3.1.

The depth of the *rafter* shall be at least the depth of the insulation required to satisfy Paragraph 2.8.1 plus 25 mm clearance.

Table 5.3.1

Refer to Paragraphs 2.4.2 and 2.4.4
Paragraphs 5.3.2 and 5.3.4

Light roof

Rafter size (width x thickness) (mm x mm)	Maximum span of rafters at a maximum spacing (mm) and their fixing types					
	600		900		1200	
	Span	Fixing type	Span	Fixing type	Span	Fixing type
	(m)		(m)		(m)	
70 X 45	1.4	A	1.2	B	—	—
90 X 45	1.8	B	1.6	B	1.4	B
140 X 45	2.9	B	2.5	B	2.3	B
190 X 45	3.5	B	3.0	B	2.7	C
240 X 45	3.8	B	3.3	B	3.0	C
290 X 45	4.1	B	3.5	B	3.2	C
90 X 70	2.1	B	1.8	B	1.7	B
140 X 70	3.3	B	2.9	B	2.6	C
190 X 70	4.5	B	3.9	C	3.6	C
240 X 70	5.7	B	5.0	C	4.5	D
290 X 70	6.3	C	5.5	C	5.0	D

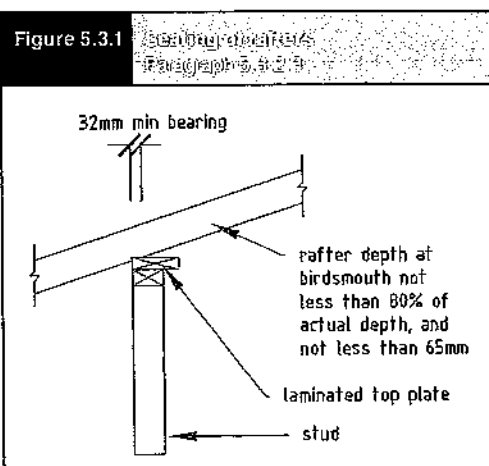
Heavy roof

Rafter size (width x thickness) (mm x mm)	Maximum span of rafters at a maximum spacing (mm) and their fixing types			
	600		900	
	Span	Fixing type	Span	Fixing type
	(m)		(m)	
70 X 45	1.3	A	1.3	B
90 X 45	1.7	A	1.5	B
140 X 45	2.7	B	2.3	B
190 X 45	3.6	B	3.2	B
240 X 45	4.1	B	3.5	B
290 X 45	4.3	B	3.8	B
90 X 70	2.0	B	1.7	B
140 X 70	3.1	B	2.7	B
190 X 70	4.2	B	3.7	B
240 X 70	5.3	B	4.6	C
290 X 70	6.4	B	5.6	C

Note:

1. For 1.0 kPa snow load the maximum span of rafters to a light or heavy roof are to be multiplied by a factor of 0.85. Refer to Paragraph 2.4.2.
2. Timber members 70 mm thick may be substituted for two 45 mm thick members of the depth specified. Members shall be nailed together with 75 x 3.15 mm hand driven or 90 x 3.15 mm power driven nails at 250 mm centres along length driven alternately from either side (refer to Paragraph 2.7.3).

Table 5.3.2 Fixing types for rafters		
Fixing type	Fixing to resist uplift	Proprietary fastener capacity (kN)
A	2/100 x 3.75 mm skewed nails	0.7
B	2/100 x 3.75 mm skewed nails + 1 wire dog	2.7
C	2/100 x 3.75 mm skewed nails + 2 wire dogs	4.7
D	2/100 x 3.75 mm skewed nails + 3 wire dogs	6.7



5.3.2.3 Rafters shall be seated on *top plates*, *lintels* and beams in accordance with Figure 5.3.1, and:

- the bearing width shall not be less than 32 mm, and
- the net width of the *rafter* at the notch or birdsmouth shall not be less than 80% of the actual width of the *rafter*, and not less than 65 mm.

5.3.2.4 Rafters shall be fixed to:

- top plates* as required by Table 5.3.1 and Table 5.3.2
- corresponding *rafters* in accordance with Figure 5.3.2. The 25 x 1 mm strap shown in Figure 5.3.2 may be replaced with a *proprietary fastener* of 6 kN capacity in tension and compression along the line of the *rafter*.

5.3.2.5 Rafters shall run at right angles to their associated ridge or eaves line.

BUTYNOL PHA SUBSTRATE

Tuffply Flooring



Plywood Flooring



IPL Tuffply Flooring

IPL makes a range of Tuffply Flooring manufactured to AS/NZ 2269 Construction Plywood, which can be used in a variety of situations from residential to commercial and industrial applications.

IPL Tuffply Flooring has the normal plywood qualities of light weight to strength ratio, which lends itself to being used in a range of applications where strength and stiffness is required.

IPL Tuffply Flooring is available treated to H3.2 (CCA treated) and on request clear treated LOSP to H3.1 standard necessary for wet areas and situations where there is some likelihood of dampness. It is also available untreated to be used in areas where contact with moisture is not a consideration. Available in more environmentally friendly option ACQ H3.2.

IPL Tuffply Flooring comes with a T&G plastic tongue which allows the sheets to be interlocked doing away with the need for nogging/blocking between, hence savings on labour and material.

IPL Tuffply Flooring is also available in a square edge finish which requires the panel to be joined on a joist on the 1.2m wide end and the 2.4m length is to be joined on nogging or blocking which will be required between the joists.

IPL Tuffply Flooring is available with a C grade face and with a D grade back although on request can be manufactured with a clean (S grade) face which can be clear coated to take advantage of the natural pine face.

IPL Tuffply Flooring can be manufactured for use in a situation where the underside can be exposed with our 100mm spaced V groove profile giving the TG&V effect to be seen on a mezzanine floor or second storey.

IPL Tuffply Flooring is available in 15, 17, 19, 22, 25 and 32mm.

Bonding of the plywood is made with Super E0 formaldehyde resin. The E0 level is less than 3 parts per million which is often less than the reading that occurs in natural surroundings. This makes IPL Tuffply Flooring a very good eco-friendly option.

Installation

- 1) Subfloor to be constructed to comply with relevant building codes
- 2) Sheets must be laid perpendicular (sheets laid lengthways across joists) to the floor joists.
- 3) Sheets must be laid in brick pattern as per diagram to disperse load more evenly.

Strong reasons to specify IPL Tuffply Flooring

- ☐ PROVEN tough, strong and stable
- ☐ GUARANTEED quality via EWPA Product Certification Scheme
- ☐ VERSATILE with 6 thicknesses for residential commercial and industrial applications
- ☐ LIGHT & EASY to handle
- ☐ LABOUR SAVING with easy-fit T&G plastic tongue jointing system
- ☐ ECO-FRIENDLY - rated as Super E0 (less than 3 parts per million formaldehyde emissions)



4) T&G edges should not be forced up tight to allow for some expansion if moisture is taken up during construction..

Square edge sheets and end joints on T&G sheets should be left with a 2mm gap to allow expansion. The total floor area should be left with at least a 5mm gap around the perimeter of the floor. This is to allow for any expansion that may take place if moisture is absorbed into sheets.

5) Nail or screw at 150mm around perimeter of sheet and 300mm around through the intermediate. When fixing H3.2 (CCA treated) use a minimum of hot dip galvanised but preferably stainless steel 316. If using H3.2 (ACQ treated) use stainless steel 316. Use annular grooved or ring shanked nails for superior holding power

6) To eliminate squeaking and to aid screw/nail holding use a continuous bead of construction adhesive on all joists, timber and steel.

7) Use suitable thickness plywood flooring as per Flooring Span Table. If special loads are required consult an engineer for subfloor design and thickness of plywood.

8) IPL Tuffply Flooring can be left exposed to the weather but the surface will deteriorate gradually over a period of time with checking (fine splits) etc. The structural integrity of the sheets will remain even though exposed during construction.

IPL Tuffply Flooring

9) If floor is to be clear finished care must be taken to protect the surface. If sanding is required only a light sand is advisable as heavy sanding weakens the panel and could expose the glue line.

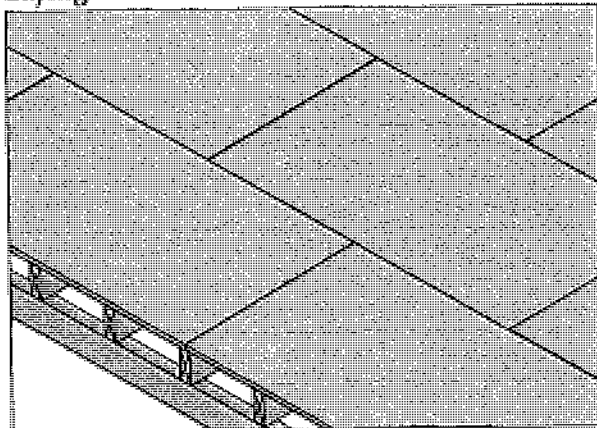
Compliance with Standards

IPL Tuffply Flooring is manufactured in accordance with AS/NZ 2269 Construction Plywood. The panels are to be installed in accordance with the building design code.

The Engineered Wood Products Association of Australasia (EWPAA or PAA) audits the production processes and internal quality control procedures to ensure we meet the requirements of the product Standard. This third party audited, process based, quality assurance scheme meets the requirements of an ISO Type 5 system and ensures constant monitoring of maintaining production of quality

plywood. The EWPAA is an accredited body to JAS - ANZ under registration No. Z1460695AB.

Laying Pattern



Flooring Span Table

		15mm F8	17mm F8	19mm F11	22mm F8	25mm F8	32mm F8
Domestic Homes	2kPa/1.8kN	400	480	600	600	800	1200
Domestic Garages	2.5kPa/2kN				400	480	800
Office	3kPa/2.7kN				600	800	1200
Retail Shops	4kPa/1.1kN				400	800	1200
Industrial	2.5kPa/1.8kN					600	800

Design actions as per AS/NZ standard 1170

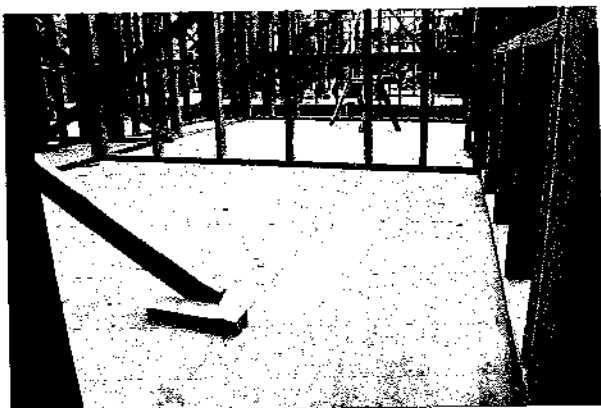
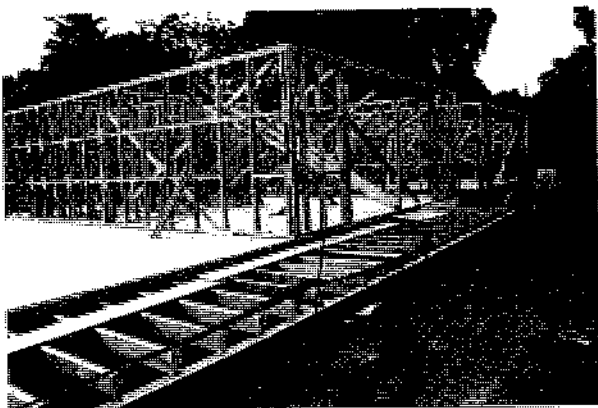
Fixing Recommendations

Ply Thickness (mm)	Timber Frame		Steel Frame	
	Nails Length x thickness (mm)	Screws Gauge x length (mm)	Screws Steel Thickness <1.15mm	Screws Steel Thickness <2mm
15	50 x 2.8	8 x 40	10-24-40	10-16-40
17	60 x 2.8	8 x 50	10-16-45	10-16-45
19	60 x 2.8	8 x 50	10-16-45	10-16-45
22	60 x 2.8	10 x 50	10-16-45	10-16-45
25	75 x 3.15	10 x 50	10-16-45	10-16-45
32	100 x 4.0	10 x 75		

IPL Tuffply Flooring

Environmentally Sustainable

All veneer used in IPL Tuffply Flooring is from renewable, plantation-grown *Pinus Radiata* New Zealand plantations and is available FSC (Forestry Stewardship Council) certified on request.



Product Details

Thicknesses

IPL Tuffply Flooring comes in 15, 17, 19, 22, 25 and 32mm.

Sheet Size

2400mm x 1200mm. The dimension tolerance for untreated plywood is +/- 1.5mm.

There may be some variation from these parameters on CCA treated plywood because during the treatment process the sheet expands and contracts during drying.

Stress Grading

IPL Tuffply Flooring plywood is rated at F8 (F11 for 19mm).

Bonding

All IPL construction plywood is bonded with phenol formaldehyde resin (dark red in colour). This results in a permanent bond which after manufacture will not part. This is the same bonding material used in Marine type plywood.

Formaldehyde emissions in IPL plywood are very low and rated as Super E0 - less than 0.3mg/l AS/NZ Standard 2098:11.

Branding

Back of all sheets marked:

CD	The back of all sheets marked with sheet face and back grade
IPL	Company name
A bond	Bond type
F8 or F11	Stress grade
AS/NZ 2269	Structural Plywood Standard
914	Engineered Wood Products Association mill number
	Construction code eg 19mm 19-24-7



INTERNATIONAL PANEL & LUMBER (WEST COAST) LTD
3 Trickies Road, Greymouth, New Zealand, PO Box 179
Telephone 03-762 6759, Facsimile 03-762 6789,
Freephone 0800 650 801, Freefax 0800 650 802, Email sales@tuffply.co.nz
Website www.iplplywood.co.nz

SUNTUF POLYCARBONATE SPECS, + WARRANTY

4312PS PSP SUNTUF POLYCARBONATE ROOFING & SKYLIGHTING

1. GENERAL

If you have pre-customised this work section using the "questions and answers" provided as part of the downloading process, it may be necessary to amend some clauses to suit the final project-specific version.

The section must still be checked and customised to suit the project being specified, by removing any other irrelevant details and adding project-specific details and selections.

This section relates to the supply and fixing of:

- **PSP Limited SunTuf™** Polycarbonate sheeting to roof structures.

0.8mm thick corrugated and Greca profile.

- **PSP Limited SunTuf™** Diffused Skylighting Polycarbonate sheeting to roof structures.
1.2mm thick in a range of profiles.

Modify or extend the above descriptions to suit the project being specified.

At the time of writing a fire group number of 1S was available for SunTuf™ Diffused Skylighting Polycarbonate sheeting. A fire group number for SunTuf™ Polycarbonate sheeting was not available, but was in the process of being obtained. Contact PSP Limited for the group number, or limit the use of SunTuf™ Polycarbonate sheeting to roof structures attached to buildings that are Risk Group SH as defined by NZBC Acceptable Solution C/AS1 and other attached or detached roof structures not subject to fire group number requirements.

1.1 RELATED WORK

Refer to 7411 RAINWATER SPOUTING SYSTEMS for rainwater disposal.

Include cross references to other sections where these contain related work.

This section does not include rainwater gutters, spoutings and pipework. Some flashing work is also often covered elsewhere.

1.2 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

NZMRM New Zealand Metal Roofing Manufacturers Inc

Refer general section 1232 INTERPRETATION & DEFINITIONS for abbreviations used throughout the specification.

Documents

1.3 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC C/M2 Verification method: Framework for fire safety design

AS/NZS 1170.2 Structural design actions - Wind actions

AS/NZS 1562.3 Design and installation of sheet roof and wall cladding - Plastic

AS/NZS 4389 Roof safety Mesh

NZS 3604 Timber-framed buildings

NZMRM CoP NZ metal roof and wall cladding Code of Practice

Delete from the DOCUMENTS clause any document not cited. List any additional cited documents.

The following are related documents and if referred to in the work section need to be added to the list of DOCUMENTS.

AS 2424 Plastics building sheets - General installation requirements and design of

1.4 MANUFACTURER'S DOCUMENTS - SUNTUF™ POLYCARBONATE SHEET

Manufacturer's and supplier's documents relating to work in this section are:

Suntuf Overview Flyer

PSP Suntuf Brochure

Suntuf Product Technical Statement

Copies of the above literature are available from PSP Limited

Web: www.suntuf.co.nz

Email: info@psp.co.nz

Telephone: 0800 786 883

Facsimile: 09 415 2809

It is important to ensure that all personnel on site have access to accurate, up to date technical information on the many products, materials and equipment used on a project. In most cases individual products are not used in isolation, but form part of a building process. Also a particular manufacturer's and/or supplier's requirements for handling, storage, preparation, installation, finishing and protection of their product can vary from what might be considered the norm. Access to technical information can help overcome this potential problem.

- 1.5 **MANUFACTURER'S DOCUMENTS - SUNTUF™ DIFFUSED SKYLIGHTING**
 Manufacturer's and supplier's documents relating to work in this section are:
 Suntuf Diffused Skylighting Brochure
 PSP Polycarbonate Products Care & Maintenance
 Suntuf Diffused Skylighting Technical Statement
 Group 1S Fire Report (BRANZ Type Test Summary, report number FI 5466)

Copies of the above literature are available from PSP Limited

Web: www.skylighting.co.nz

Email: info@psp.co.nz

Telephone: 0800 786 883

Facsimile: 09 415 2809

It is important to ensure that all personnel on site have access to accurate, up to date technical information on the many products, materials and equipment used on a project. In most cases individual products are not used in isolation, but form part of a building process. Also a particular manufacturer's and/or supplier's requirements for handling, storage, preparation, installation, finishing and protection of their product can vary from what might be considered the norm. Access to technical information can help overcome this potential problem.

Warranties

- 1.6 **WARRANTY - INSTALLER/APPLICATOR**
 Provide an installer/applicator warranty:
 5 years: For installation

- Provide the warranty in the Plastic Roofing installers' standard form.
- Include a copy of the **PSP Limited** maintenance requirements with the warranty.
- Commence the warranty from the date of completion of the roof.

Refer to the general section 1237 WARRANTIES for additional requirements.

Check general section 1237 WARRANTIES for the date of commencement of warranties; which is normally practical completion of the contract. Refer to the chosen conditions of contract as it may also contain information on warranties/guarantees.

- 1.7 **WARRANTY - MANUFACTURER/SUPPLIER - SUNTUF™ SHEET**
 Provide a material manufacturer/supplier warranty:
 25 years For light transmission
 15 years For breakage and hail damage

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of purchase.

Refer to the general section 1237 WARRANTIES for additional requirements.

Modify or expand the clause to suit project or manufacturer/supplier requirements, options include:

- Change the standard form to be used (check with the manufacturer/supplier, use the general section 1237WA WARRANTY AGREEMENT if required)
- Commence the warranty from the date of purchase (check with the manufacturer/supplier)

- 1.8 **WARRANTY - MANUFACTURER/SUPPLIER - SUNTUF™ DIFFUSED SKYLIGHTING**
 Provide a material manufacturer/supplier warranty:
 25 years For light transmission
 20 years For breakage and hail damage

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of purchase.

Refer to the general section 1237 WARRANTIES for additional requirements.

Modify or expand the clause to suit project or manufacturer/supplier requirements, options include:

- Change the standard form to be used (check with the manufacturer/supplier, use the general section 1237WA WARRANTY AGREEMENT if required)
- Commence the warranty from the date of purchase (check with the manufacturer/supplier)

Requirements

1.9 QUALIFICATIONS

Workers / Installers / applicators to be experienced, competent trades people familiar with the materials and techniques specified.

This clause includes generic text which should be expanded only if there are specific qualification requirements.

1.10 INFORMATION FOR OPERATION AND MAINTENANCE

Provide relevant PSP Limited maintenance requirements at completion of the work.

Refer to PSP Limited documents for maintenance guidance:

Suntuf: www.suntuf.co.nz/range/downloads/brochure.pdf

Suntuf Diffused Skylighting: www.skylighting.co.nz/downloads/Care-and-Maintenance.pdf

1.11 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Performance

1.12 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof.

1.13 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets.

1.14 FIRE GROUP NUMBER - SUNTUF™ DIFFUSED SKYLIGHTING

The Group Number Classification to NZBC C/AS1-AS6, Table 4.1, has been determined in accordance with NZBC C/M2 Appendix A, following testing ISO 9705. Refer to BRANZ Type Test Summary (report Number FI 5466) for fire performance results.

Product: Group number:

Suntuf™ DIFFUSED SKYLIGHTING 1S

Delete clause if not required. A Group Number may not be required in situations such as, the surface area is less than 5m² (NZBC C/AS2-AS7, 4.17.6.a), or the design is to NZBC C/AS1 risk group SH (houses etc.).

Consult with the project Fire Consultant and/or the Services Engineer if necessary.

1.15 FIXINGS, WIND

Use the fixings appropriate for the design loads of this site; refer to general section 1220 PROJECT for details of wind zone. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply.

Delete if using Wind (design by contractor) clauses. Refer to PSP Limited for fixing specifications and details.

Performance - Wind (design by contractor)

The next two mutually exclusive clauses, are setting a standard of performance for design by the contractor to meet. Specifiers should therefore consider adding some means of confirming (say by testing or certification) that the performance criteria will be or have been met. Delete the clause which does not apply.

Ensure correct information is supplied in 1220 PROJECT.

1.16 DESIGN PARAMETERS - NON SPECIFIC DESIGN

Design the installation to the wind zone parameters of NZS 3604, table 5.4.

Refer to general section 1220 PROJECT for details.

Delete the clause if using DESIGN PARAMETERS - SPECIFIC DESIGN.

1.17 DESIGN PARAMETERS - SPECIFIC DESIGN

Design the installation to the wind pressure parameters of AS/NZS 1170.2.

Refer to general section 1220 PROJECT for details.

Obtain information from the project structural engineer.
Delete the clause if using DESIGN PARAMETERS - NON SPECIFIC DESIGN.

2. PRODUCTS

Materials

Select the product that suits the brief and use the PRODUCTS and EXECUTION clauses that follow to suit the product selected.

- 2.1 **SUNTUF™ SHEET**
0.8mm thick Polycarbonate sheet with UV coating to top side. Refer to SELECTIONS for profile.
Corrugated or Greca profiles.

- 2.2 **SUNTUF™ DIFFUSED SKYLIGHTING**
1.2 mm thick profiled Polycarbonate roofing with co-extruded UV layer. Refer to SELECTIONS for profile.
Corrugated and trapezoidal profiles.
Sheets may be draped to a curve, refer to PSP Limited for minimum allowable curving radius.

Components - Suntuf™ Sheet

- 2.3 **SUNTUF™ NOISE REDUCTION TAPE**
White PE foam tape, 3mm thick, 20mm wide.
Used between purlins and polycarbonate sheet to reduce expansion and contraction noise.
- 2.4 **SUNTUF™ EAVES FILLERS**
Profiled foam filler, 20 mm thick.
Nominate black or white colour to suit.
Provide a means of closing the corrugate/greca cavities if required.
- 2.5 **PSP - SUNTUF™ RIDGE FLASHING**
Profiled polycarbonate ridge flashing.
- 2.6 **PSP - SUNTUF™ APRON FLASHING**
Profiled polycarbonate apron flashing.
- 2.7 **FIXING SCREWS**
Refer to SELECTIONS.

Components - Suntuf™ Diffused Skylighting

- 2.8 **PURLIN TAPE ANTI NOISE**
White PE foam tape, 5mm thick, 50mm wide.
Used between purlins and polycarbonate sheet to reduce expansion and contraction noise.
- 2.9 **SEALING TAPE**
Butyl (light grey) joining/lapping tape, 1mm thick, 25mm wide.
- 2.10 **EAVES FILLERS**
Profiled white foam filler to suit profile.
Provides a means of closing the rib cavities if required.
- 2.11 **FIXINGS**
Purlin Screws - crest fixing Suntuf Diffused Skylighting Multi-purpose 65mm x 12g screw with matching Crest Rider (Profile/Storm Washers) with EPDM gasket.
- Overlapping screws, Suntuf to Suntuf - side stitching 9.5mm x 25mm Stitching Screws (Grommet seals) with EPDM seal for overlapping sheets.
- Overlapping screws, Suntuf to metal - 35mm Self-Tapping Screws with 19mm Neo Washer for overlapping sheets.
Alter if required to suit profile or exposure zone.

Components - Safety Mesh

2.12

SAFETY MESH

Safety mesh to AS/NZS 4389.

Safety mesh is used in high studs and open spans, such as commercial, industrial and warehouse buildings, and particularly under plastic roofing to prevent fall through.

Amend clause if using 4161 UNDERLAYS, FOIL AND DPC for mesh.

3.

EXECUTION

Conditions

3.1

SAFETY MESH

Install to AS/NZS 4389 and AS/NZS 1562.3

Check the span capabilities of the sheet profile and determine whether safety mesh is required, to comply with AS/NZS 1562.3. Add a new clause if required.

Delete clause if using 4161 UNDERLAYS, FOIL AND DPC for mesh.

3.2

INSPECTION

Inspect the roof framing and supporting structure to ensure that it is complete ready for roofing. Do not start work until all requirements are complete to the required standard.

Expand if required to cover the painting of the support structure prior to installation of roofing system.

3.3

STORAGE - SUNTUF™ SHEET

Take delivery of and accept packs of sheets dry and undamaged on delivery. Reject all damaged material. Store packed sheets in a protected, shaded, ventilated area, with no direct exposure to sunlight, excessive heat and wind.

3.4

STORAGE - SUNTUF™ DIFFUSED SKYLIGHTING

Take delivery of packs of sheets dry and undamaged on delivery. Reject all damaged material. Store packed sheets in a protected, shaded, ventilated area, with no direct exposure to sunlight, excessive heat and wind.

3.5

HANDLING

Avoid distortion and contact with damaging substances. Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage.

Application - General

3.6

GENERALLY

To AS/NZS 1562.3 with all sheets square and oversailing the gutter true to line. Check during fixing to eliminate creep.

3.7

SETOUT

Set out the planned layout before fixing commences, to ensure true lines and the correct relationship of sheets to pitch, module, grid, roof framing and roof features.

Modify or expand the clause to suit project or manufacturer/supplier requirements.

Application - Suntuf™ Sheet

3.8

GENERALLY

Install and fix in accordance with the NZMRM CoP NZ metal roof and wall cladding Code of Practice requirements, and to PSP Limited requirements.

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Lay Suntuf Noise Reduction Tape to purlins.

Carefully set out sheets with the correct side facing up, widths of end sheets the same and all sheets square and oversailing the gutter true to line. Check during fixing to eliminate creep or spread. Use string lines along purlin centres to keep fastenings in line.

3.9 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the translucent roofing. Confirm that openings have been prepared ready for the installation of translucent roofing and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of translucent roofing and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

3.10 FIXING

Fix sheets in place using the fastening system required by **PSP Limited**, making due allowance for dynamic local wind pressures on the building and the thermal movement in the sheet.

3.11 END LAPS

End laps are only permitted where specifically detailed. Ensure any end laps are a minimum of 200mm and fully sealed at both ends of the lap using a neutral cure silicone sealant.

3.12 FLASH

Flash roof to verges, walls and penetrations to detail and **PSP Limited** requirements. *Add details of associated overflashings to penetrations, parapets and the like, either here or in other sections as appropriate to the project.*

3.13 PENETRATIONS

Flash and overflash all penetrations through the roof.

Expand this very general clause to better describe the various types and forms of penetrations needing to be flashed.

Application - Suntuf™ Diffused Skylighting

3.14 GENERALLY

Install and fix in accordance with the NZMRM CoP NZ metal roof and wall cladding Code of Practice requirements, and to **PSP Limited** requirements.

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Lay PSP Anti-noise tape to purlins.

Carefully set out with widths of end sheets the same, all sheets square and oversailing the gutter true to line and sealing tape installed. Check during fixing to eliminate creep or spread. Use string lines along purlin centres to keep fastenings in line.

Lay Suntuf™ Diffused Skylighting to overlap metal sheets on both sides, with all lapped edges neatly seated down with sealing tape. Install side fixings in accordance with **PSP Limited** requirements.

Suntuf™ Diffused Skylighting to overlap metal sheets on both sides, if this is not feasible the Suntuf™ Diffused Skylighting must underlap the metal roof sheets against the primary direction of rain.

3.15 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the translucent roofing. Confirm that openings have been prepared ready for the installation of translucent roofing and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of translucent roofing and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions

- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

- 3.16 **STOP ENDS**
Before lifting into place, set in neutral cure silicone sealant and pop rivet stop-ends to sheets.
- 3.17 **FIXING**
Fix sheets in place using the fastening system required by **PSP Limited**, making due allowance for dynamic local wind pressures on the building and the thermal movement in the sheet. Pre-drill for fixings.
- 3.18 **END LAPS**
End laps are only permitted where specifically detailed. Ensure any end laps are a minimum of 200mm and fully sealed at both ends of the lap using a neutral cure silicone sealant.
- 3.19 **FLASH**
Flash roof to verges, walls and penetrations to detail and **PSP Limited** requirements. *Add details of associated overflashings to penetrations, parapets and the like, either here or in other sections as appropriate to the project.*
- 3.20 **PENETRATIONS**
Flash and overflash all penetrations through the roof.
Expand this very general clause to better describe the various types and forms of penetrations needing to be flashed.
- Completion**
- 3.21 **REPLACE**
Replace damaged or marked elements.
- 3.22 **LEAVE**
Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.
- 3.23 **REMOVE**
Remove trade rubbish and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.
- 3.24 **PROTECTION**
Protect the completed work from damage for the remainder of the construction period. If access is given to the roof for later work, provide properly constructed walkways or platforms to eliminate damage.

4. **SELECTIONS**
For further details on selections go to:
www.suntuf.co.nz
www.skylighting.co.nz
Substitutions are not permitted to the following, unless stated otherwise.
If substitutions are permitted modify the statement above, ensure the NO SUBSTITUTIONS clause from GENERAL is treated the same.
- Select the options to suit the project and delete options not specified.*

Materials

- 4.1 **SAFETY MESH**
Location: ~
Finish: ~
Finish:- galvanized or PVC coated.

Normally galvanized but PVC coated is available for visual purposes or for sea spray zones and chemical environments. Stainless Steel is sometimes available for extreme environments, check availability. Avoid Stainless Steel contact with Steel or Aluminium roofs.
Delete clause if using 4161 UNDERLAYS, FOIL AND DPC for mesh.

4.2 PSP - SUNTUF™ POLYCARBONATE SHEETING

Location: ~
Type/Brand: Suntuf™ Polycarbonate Sheeting
Profile: ~
Thickness: 0.8mm
Colour: ~
Fixing: ~

Profile: Corrugated, Greca
Colour: Clear - 90% light transmission
Grey Tint - 35% light transmission Corrugated,
Grey Tint - 30% light transmission Greca
Bronze Tint - 43% light transmission
LightTech - anti-glare and light diffusing qualities, 85% light transmission
CoolTech Ice - reduced heat gain qualities, 25% light transmission
CoolTech Grey - reduced heat gain qualities, 20% light transmission

Fixing: Select to suit exposure Zone.
Galvanised SupaDrive Multi - multi-purpose fixing suitable for timber and steel, cuts correct sized hole to allow for expansion (avoids pre drilling).
PSP 50mm Galvanised Roof Fasteners
PSP 25mm Galvanised Wall Fasteners
PSP Suntuf 50mm Stainless Steel Roof Fasteners
PSP Suntuf 25mm Stainless Steel Wall Fasteners
PSP Suntuf Galvanised Roof Fixings with Storm Washers

Sheet width: 860mm Corrugated, 760mm cover
810mm Greca, 760 mm cover
Sheet length: Up to 7200 mm

4.3 PSP - SUNTUF™ RIDGE FLASHING

Profile: Ridge flashing to suit profile
Colour: Clear
Ridge flashing 2060mm lengths, for use with

4.4 PSP - SUNTUF™ APRON FLASHING

Profile: Apron flashing to suit profile
Colour: Clear
Apron flashing 2060mm lengths

4.5 PSP - SUNTUF™ DIFFUSED SKYLIGHTING

Location: ~
Type: Suntuf™ Diffused Skylighting
Profile: ~
Thickness: 1.2mm
Colour: Diffused

Profile: Match metal roofing profile - a profile matching service is available, minimum quantities apply, contact PSP Limited to confirm selection.

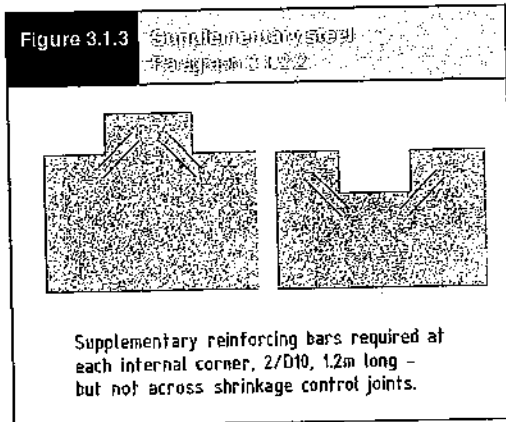
Standard Suntuf™ Diffused Skylighting translucent roofing profiles:
Corrugated - 5° minimum pitch
5 Rib Plumdek - 5° minimum pitch
5 Rib TrimSpan - 5° minimum pitch
6 Rib TrimSpan - 5° minimum pitch
7 Rib MaxSpan - 5° minimum pitch
10 Rib V Rib - 5° minimum pitch

Sheet length: Up to 9.0m

GROUND CLEARANCES.

SIMPLE HOUSE

SH/AS1



3.1.3 Ground clearances

3.1.3.1 Finished floor level

The height of the top surface of the floor slab above adjacent ground (refer to Figures 3.1.4 and 6.1.6) shall be no less than:

(a) for *cladding* other than *masonry veneer*:

- (i) 150 mm if ground is permanently paved, or
- (ii) 225 mm if ground is unpaved

(b) for *masonry veneer wall claddings*:

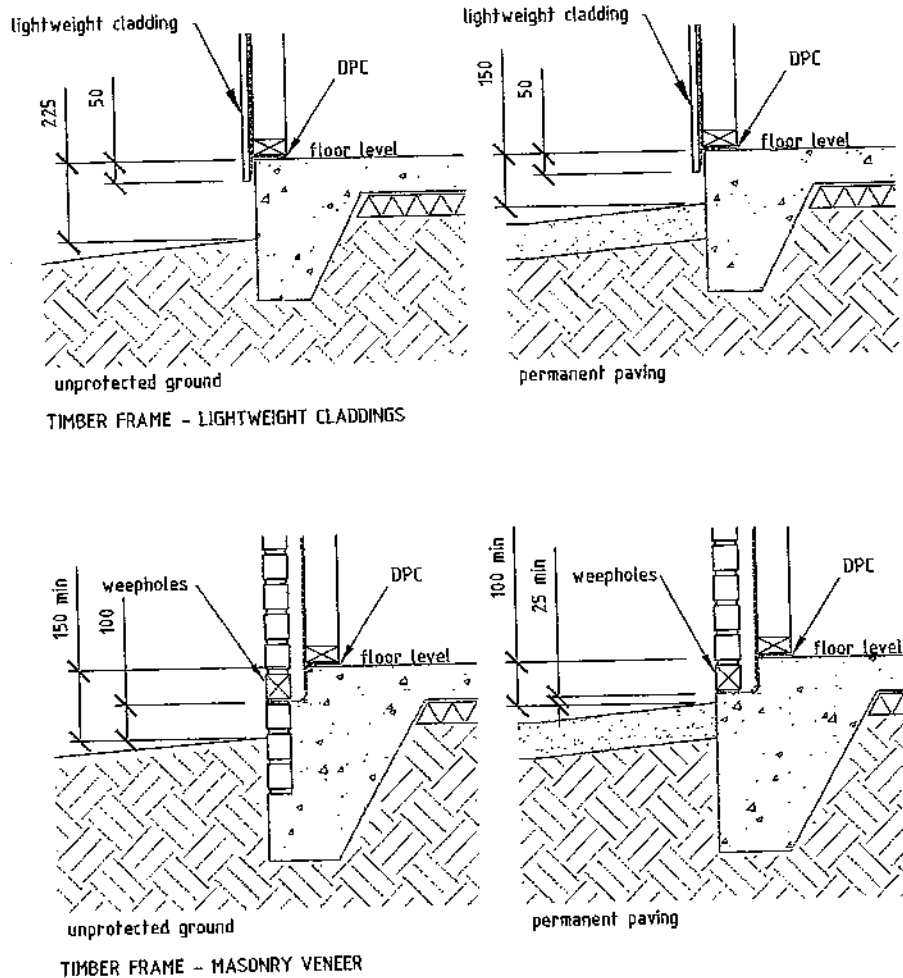
- (i) 100 mm if ground is permanently paved, or
- (ii) 150 mm if ground is unpaved.

3.1.3.2 The *finished ground level* adjoining the concrete slab-on-ground shall be formed at a slope of not less than 1 in 25 (1:25), for a distance of at least 1 m, falling away from the *simple house*.

3.1.3.3 At garage openings maintain clearance to *claddings* in accordance with Figure 6.1.6.

Figure 3.1.4

Height of slab above ground
Paragraph 3.1.4.2



3.1.4 Granular fill

3.1.4.1 General

Concrete slabs shall be cast on granular fill in accordance with Paragraph 3.1.4.2.

3.1.4.2 Granular fill

Granular fill material shall be composed of graded rounded gravel, crushed rock, scoria, or material approved by the BCA and:

- (a) not more than 5% shall pass through a 2.2 mm sieve except where it can be demonstrated to the satisfaction of the BCA that site conditions ensure capillary water is unlikely to reach the underside of the slab

- (b) 100% shall pass through either a 19 mm sieve for any fill thickness or a 37.5 mm sieve for a thickness exceeding 100 mm.

3.1.4.3 Granular fill material shall be placed and compacted in layers of 150 mm maximum thickness, over the area beneath the proposed ground slab, so that the total thickness of the granular fill is not less than 75 mm or more than 600 mm deep.

Compact each layer until the material is tightly bound together and does not visibly deform under the weight of a pressed adult heel.

Fill over 600 mm is outside the scope of this *Acceptable Solution*.

3.1.5 Damp-proof membrane (DPM)

3.1.5.1 The concrete floor slab cast on the ground shall have a *damp-proof membrane (DPM)* laid between the ground and the slab. The *DPM* shall be laid over the total area of the slab and be turned down into the excavation to finish at the outside edge of the *footing* – see Figures 3.1.5 and 3.1.6.

3.1.5.2 The *DPM* material shall consist of a single unprotected layer of polyethylene not less than 0.25 mm thick, and:

- (a) have lap joints not less than 150 mm wide, sealed with pressure-sensitive plastic tape not less than 50 mm wide
- (b) be protected from damage
- (c) have penetrations by services, reinforcing or other objects sealed by taping.

3.1.5.3 Where the granular surface is likely to puncture the *DPM*, it shall be protected by sand blinding of a nominal maximum thickness of 25 mm.

3.1.6 Concrete strength

3.1.6.1 Concrete shall be ordinary grade as specified in NZS 3109.

3.1.6.2 Minimum specified concrete strength at 28 days shall be:

- (a) 10 MPa for unreinforced concrete used in mass *foundations*
- (b) 17.5 MPa for unreinforced concrete used in piled *foundations*
- (c) 20 MPa for reinforced concrete slabs and *foundations* in zones 1, 2, 3 and 4.
- (d) 25 MPa for reinforced concrete slabs and *foundations* in the sea spray zone.

Refer to Paragraph 2.5 for a description of the different corrosion zones.

3.1.7 Slab reinforcing

All slabs shall be reinforced. Reinforcing bars and hard drawn mild steel wire mesh shall conform to AS/NZS 4671.

3.1.7.1 Cover

Minimum concrete cover to steel *reinforcement* shall be:

- (a) 75 mm when concrete is placed directly on or against the ground
- (b) 50 mm when concrete is placed on *DPM* and in all other situations where concrete is placed in formwork
- (c) 30 mm from the top of a wall or floor slab which is in an internal area (refer to Figure 3.1.1)
- (d) 50 mm from the top of any exposed wall or floor slab.

3.1.7.2 Ground slab reinforcing shall extend to within 75 mm of the outside edge of the slab (including the *foundation*) and be supported in final position prior to pouring concrete. Reinforcing shall consist of a minimum of 2.27 kg/m² welded steel mesh complying with AS/NZS 4671. Minimum lap of reinforcing mesh shall be 225 mm at sheet joints.

3.1.8 Concrete slab edge details

3.1.8.1 The combined *foundation* edge details shall be constructed in accordance with Figures 3.1.5 and 3.1.6 or Figure 3.1.7

8.0 Roof Claddings

8.1 General

8.1.1 Weathertightness

Roof claddings shall meet the requirements of NZBC E2.2, and be specified and constructed in accordance with the provisions of Paragraph 8.1.2 to Paragraph 8.5.

COMMENT:

For roofs used to collect water for human consumption, refer AS/NZS 4020.

Amend 5
Aug 2011

8.1.2 Limitations

The following roof cladding systems are covered in this Acceptable Solution:

- a) Masonry tiles Paragraph 8.2
- b) Pressed metal tiles Paragraph 8.3
- c) Profiled metal roof claddings Paragraph 8.4
- d) Membrane roofing Paragraph 8.5.

Other roof claddings are beyond the scope of this Acceptable Solution.

8.1.3 Maintenance

Maintenance of claddings shall be carried out as necessary to achieve the expected durability of the materials – refer to Paragraph 2.5.

Amend 5
Aug 2011

Amend 5
Aug 2011

COMMENT:

A deterioration in the appearance of the coating of the metal does not necessarily relate to a deterioration in the weathertightness of the roof cladding.

Care should be taken to avoid post-installation damage to the cladding when accessing the roof. Additional support is required around roof-mounted units such as air-conditioners to avoid roof distortion.

8.1.3.1 Projecting eaves

Soffits and verges of all projecting eaves shall be closed in. Refer to Paragraph 5.3 for details.

Amend 5
Aug 2011

8.1.4 Fixings

Fixings shall be as specified in Paragraph 8.2 to Paragraph 8.5.

Materials for fixing roof claddings and flashings, where necessary, shall be selected from Tables 20, 21 and 22 to minimise corrosion.

Amend 5
Aug 2011

Amend 5
Aug 2011

COMMENT:

The use of stainless steel fixings is not recommended by steel manufacturers for use with coated steel in severe marine and industrial environments, as they are considered to cause deterioration.

Amend 5
Aug 2011

8.1.5 Roof underlays

Roof underlays shall be to Table 23 and NZS 2295, and be either:

- R1 heavy weight kraft, or
- R2 self supporting kraft.

Underlays shall be:

- Layed with minimum numbers of laps
- Lapped at all side and end laps by minimum 150 mm
- Run horizontally for roof pitches below 10°
- Run horizontally or vertically for roof pitches above 10°
- Have anti-ponding boards at lower edges of masonry tiles, refer Figure 25(b) and Paragraph 8.2.5.

Amend 2
Jul 2006

8.1.5.1 Underlay support

Prevent sagging of roof underlay by either:

- For R1 underlays, fully support with a corrosion resistant material
- For R2 self supporting underlays, laid to maximum 1.2 metre span between adjacent supports

Amend 5
Aug 2011

COMMENT:

Solvent in freshly LOSP-treated timber can affect bitumen in underlays. Any solvent should be allowed to evaporate before the roof underlay is installed.

Amend 5
Aug 2011

COUNCIL COMPLIANCE

Specification Data Sheet

AUGUST 2016



COLORSTEEL maxx®

DESCRIPTION

Prepainted ZINCALUME® steel

STANDARD

Substrate manufactured to AS1397:2011

SUBSTRATE COATING CLASS

AZ200

TYPICAL APPLICATIONS

Very severe environments, industrial roofing, wall cladding

STANDARD COLOURS

20 colours

STRIPPABLE FILM

Available on request

BACKING COAT

Perpetual Grey®

MAXX® PHYSICAL PROPERTIES

Pencil hardness

F minimum

Reverse impact resistance (10 joules)

Pass

T-bend test

No tape off

4T minimum

Top coat specular gloss (60° head)

Nominal Range	Tolerance
0-15	± 3
16-80	± 10
80+	Nominal -10

Chalk rating (AS1580: 481.1.11, 1998)

≤4 (10 years exposure)

Colour retention (CIE Lab units, Delta E)

8 units (maximum) – 10 years exposure

10 units (maximum) – 15 years exposure

COLORSTEEL endura®

DESCRIPTION

Prepainted ZINCALUME® steel

STANDARD

Substrate manufactured to AS1397:2011

SUBSTRATE COATING CLASS

AZ150

TYPICAL APPLICATIONS

Roofing, cladding, rainwater goods, garage doors, fence panels

STANDARD COLOURS

20 colours

STRIPPABLE FILM

Available on request

BACKING COAT

Perpetual Grey®

ENDURA® PHYSICAL PROPERTIES

Pencil hardness

F minimum

Reverse impact resistance (10 joules)

Pass

T-bend test

No tape off

4T minimum

Top coat specular gloss (60° head)

Nominal Range	Tolerance
0-15	± 3
16-80	± 10
80+	Nominal -10

Chalk rating (AS1580: 481.1.11, 1998)

≤4 (10 years exposure)

Colour retention (CIE Lab units, Delta E)

8 units (maximum) – 10 years exposure

10 units (maximum) – 15 years exposure

Zincalume®

Description

Steel base hot dip coated with a 45% zinc, 55% aluminium alloy coating

Standard

Manufactured to AS1397:2011

Typical applications

Roofing, cladding rainwater goods, air conditioning, garage doors

ZINCALUME® AVAILABILITY

Grades

G300, G550

Thickness (BMT)

0.33 – 1.15mm

Width

70 – 1230mm

ZINCALUME® COATING

Coating type

AZ (naturally small spangle)

Coating mass – standard (g/m²)

150

GALVSTEEL®

Description

Steel base hot dip coated with a zinc coating

Standard

Manufactured to AS1397:2011

Typical applications

Roofing, cladding, drums and tubes, purlins, air conditioning, culverts, sheet metal work, concrete form work

GALVSTEEL® AVAILABILITY

Grades

G1, G250, G300, G450, G500, G550

Thickness (BMT)

G1, G250: 0.30 – 2.00mm

G300, G550: 0.30 – 1.00mm

G500: 1.01 – 1.49mm

G450: 1.50 – 2.00mm

Width

70 – 1230mm

GALVSTEEL® COATING

Coating type

Z (regular spangle)

Coating mass – standard (g/m²)

100, 200, 275, 450, 600

FABRICATION PERFORMANCE FOR ZINCALUME® AND GALVSTEEL®

PROCESS	FOR ZINCALUME® AND GALVSTEEL®	FOR GALVSTEEL®
Bending	Excellent	Limited
Drawing	Fair	Not recommended
Pressing	Limited	Not recommended
Roll-Forming	Excellent	Excellent
Painting	Excellent	Excellent

NOTE: Not all combinations of grade, thickness and width are readily available. Please discuss your specific requirements with your steel supplier or New Zealand Steel.

For more information about NEW ZEALAND STEEL products call 0800 100 523 or visit nzsteel.co.nz



NOTE: Buyers and users of New Zealand Steel products and services must make their own assessment of the products for their own purposes. Any queries regarding product specifications, purpose or application should be directed to New Zealand Steel, phone 0800 100 523, New Zealand. Free technical advice and training products, techniques, equipment and information to assist in the manufacture and application of its products. The information concerning work is supplied as a guide only and is not intended to be a substitute for the standard terms and conditions of sale. In the event of conflict between this information and the standard terms and conditions, the standard terms and conditions prevail. (GALVSTEEL® and GALVSTEEL® are registered trademarks of New Zealand Steel Limited. 2011/12. 2011 is a registered trademark of New Zealand Steel Limited.

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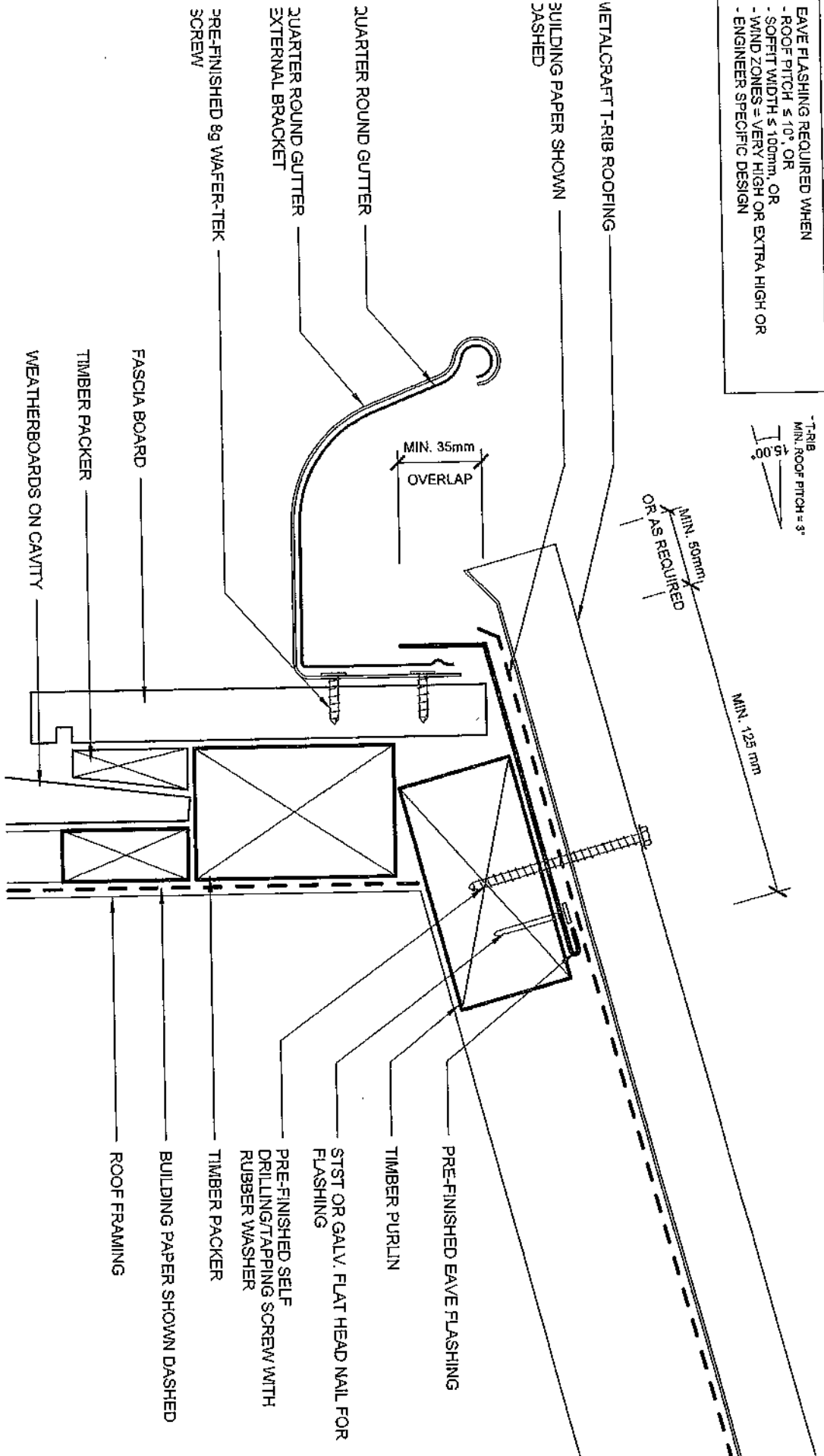
ROOF FLASHING DETAILS

- EAVE FLASHING REQUIRED WHEN**
- ROOF PITCH $\leq 10^\circ$ OR
 - SOFFIT WIDTH $\leq 100\text{mm}$ OR
 - WIND ZONES = VERY HIGH OR EXTRA HIGH OR
 - ENGINEER SPECIFIC DESIGN

T-RIB
MIN. ROOF PITCH = 3°
15.00°

MIN. 50mm
OR AS REQUIRED

MIN. 125 mm



BUILDING PAPER IS THE COMMON GENERIC NAME FOR PERMEABLE JOINT AND WALL UNDERLAYS. PLEASE REFER TO NZBC E2/AS1 AND NZRM CODE OF PRACTICE VERSION 2.2 (2012).

* PLEASE REFER TO NZRM CODE OF PRACTICE VERSION 2.2 (2012) AS MINIMUM PITCH WILL INCREASE DEPENDING ON SHEET LENGTH.

DISCLAIMER:
All details are to be used for indicative purposes only and the designer should consult both the NZRM code of practice and the relevant building codes. Compliance of the supporting mechanisms is the responsibility of the designer. Construction detail can vary for wall cladding. The underlay is detailed as a single line for simplicity and is indicative only. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

Metalcraft
Roofing

T-Rib

FLUSH EAVE WITH EXTERNAL GUTTER BRACKET
RESIDENTIAL ROOFING

Reference: RRTRI

Date: 2014

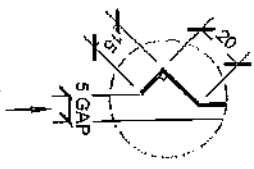
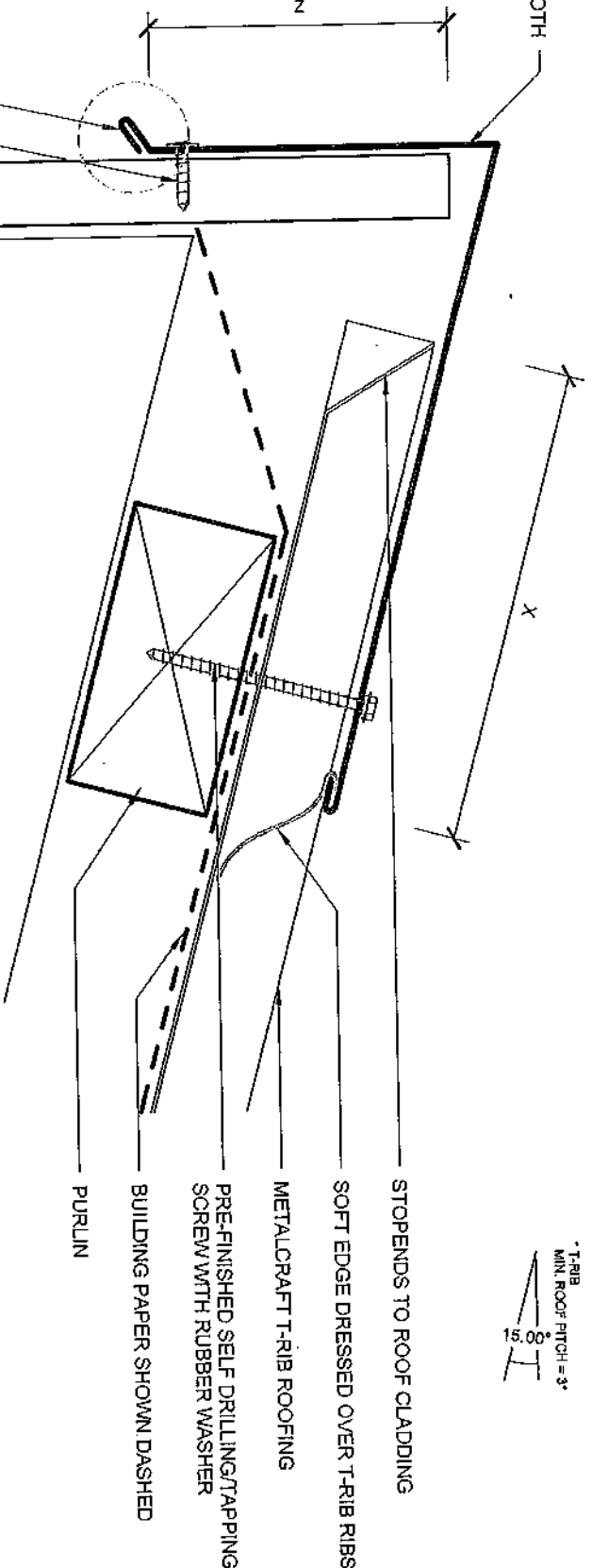
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Sheet

10/24

PRE-FINISHED SAWTOOTH
RIDGE CAP FLASHING

* T-RIB
MIN. ROOF PITCH = 3°



ALTERNATIVE OPTION
BIRDS BEAK EDGE

HEMMED EDGE

PRE-FINISHED Bg
MAFER-TEK SCREW
BEADED IN SILICONE

TIMBER FASCIA

ROOF FRAMING

SOFFIT LINING

* BUILDING PAPER IS THE COMMON GENERIC NAME FOR PERMEABLE
ROOF AND WALL LINERLAYS. PLEASE REFER TO NZBC E2/AS1 AND
MFM CODE OF PRACTICE VERSION 2.2 (2012).

* PLEASE REFER TO MFM CODE OF PRACTICE VERSION 2.2 (2012) AS
MINIMUM PITCH WILL INCREASE DEPENDING ON SHEET LENGTH.



DISCLAIMER:
All details are to be used for indicative purposes only and the designer should consult both the MFLI code
of practice and the relevant NZBC E2/AS1 and E2/AS2 and all other relevant building codes.
Details of the supporting mechanisms are indicative only. Compliance of the supporting mechanisms is the
responsibility of the designer. Construction detail can vary for each building. The industry is advised as a
single line for simplicity and is indicative only. Building paper type and method of installation should comply
with industry manufacturers recommendations and NZBC regulations.

CATEGORY A		CATEGORY B	
1. NORMAL EXPOSURE 2. ROOF PITCH > 10°		1. EXPOSED (HIGHER RISK & WIND LOAD EXCEEDS 1.5 kPa. 2. ROOF PITCH < 10°	
X	MIN. 130mm	MIN. 200mm	
Z	MIN. 50mm (VERTICALLY DOWN FACE - SMOOTH) MIN. 75mm (VERTICALLY DOWN FACE - PROFILED)	MIN. 75mm (VERTICALLY DOWN FACE - SMOOTH) MIN. 100mm (VERTICALLY DOWN FACE - PROFILED)	
PLEASE REFER TO MFM CODE OF PRACTICE VERSION 2.2 (2012) FOR FURTHER INFORMATION ON FLASHING COVER WIDTHS.			
SITUATION 1	SITUATION 2	SITUATION 3	
1. LOW, MEDIUM, HIGH WIND ZONES 2. ROOF PITCH ≥ 10°	1. VERY HIGH WIND ZONE 2. ALL ROOF PITCHES	1. EXTRA HIGH WIND ZONE 2. ALL ROOF PITCHES	
X	MIN. 130mm (EXCLUDING ANY SOFT EDGE OR TURN-DOWN TO ROOFING)	MIN. 200mm	
Z	MIN. 50mm	MIN. 75mm	

T-Rib

Reference: RRTRI

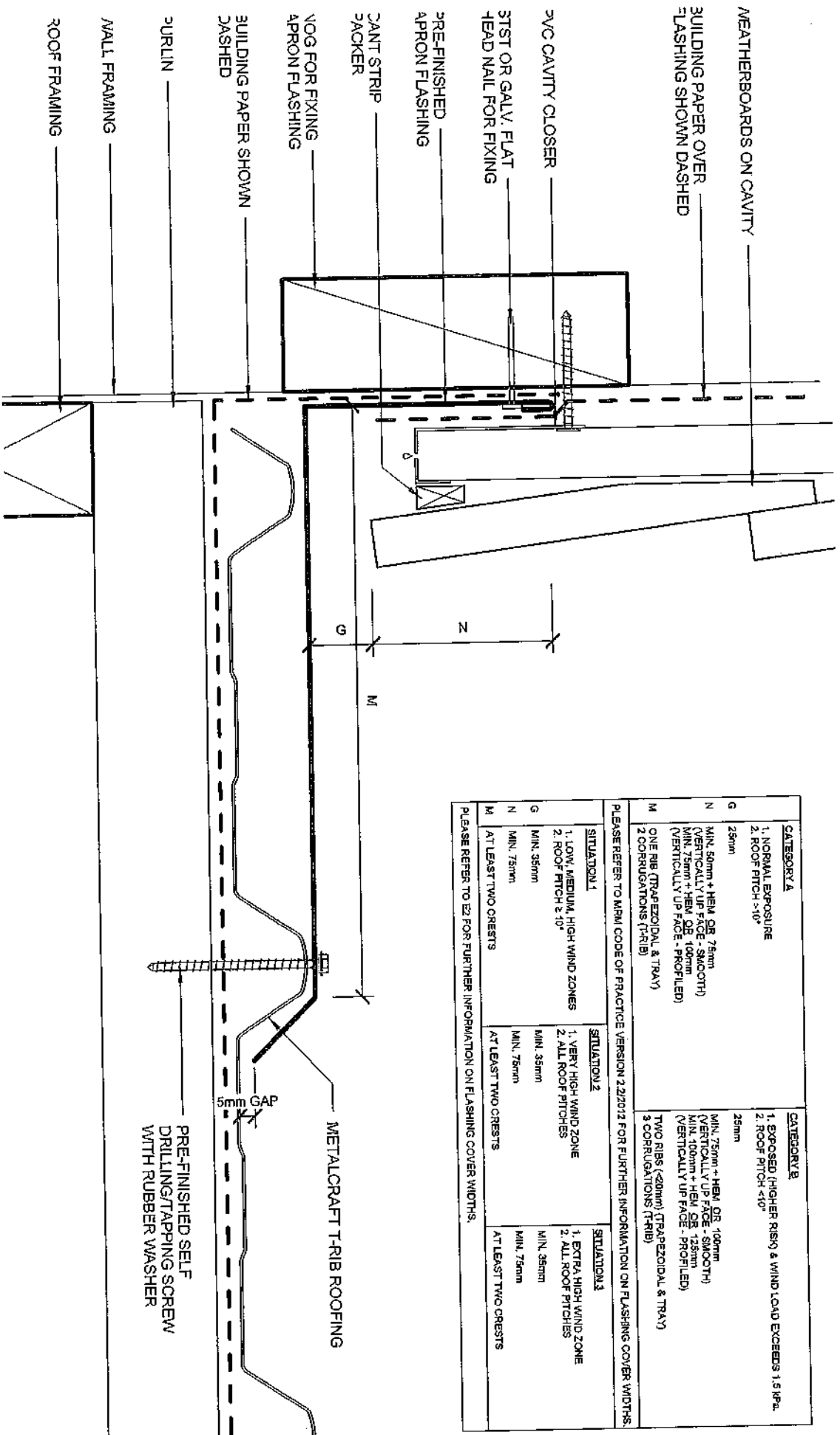
Date: 2014

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Sheet

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SAWTOOTH EAVE
RESIDENTIAL ROOFING



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Metalcraft
Roofing

DISCLAIMER:
All details are to be used for reference purposes only and the designer should consult with the MRM code of practice and relevant standards and codes of practice to ensure that the details are in accordance with the relevant standards and codes of practice. The drawings are indicative only. Compliance of the supplying mechanisms is the responsibility of the designer. Construction detail can vary for each building. The underlay is detailed as a single line for simplicity and is indicative only. Building paper type and method of installation should comply with underlay manufacturers recommendations and NZBC regulations.

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Reference RRT1

Date 2014

Scale 1 : 2

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RESIDENTIAL ROOFING

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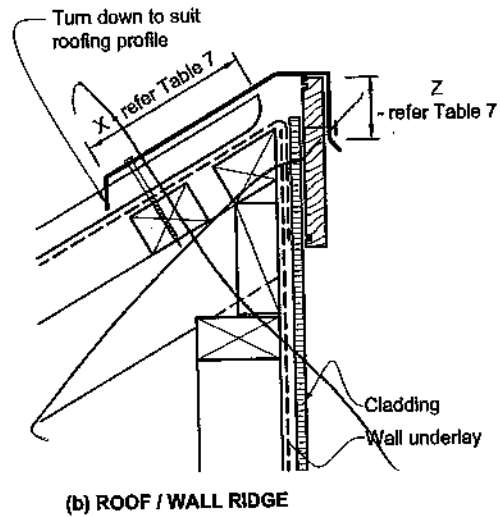
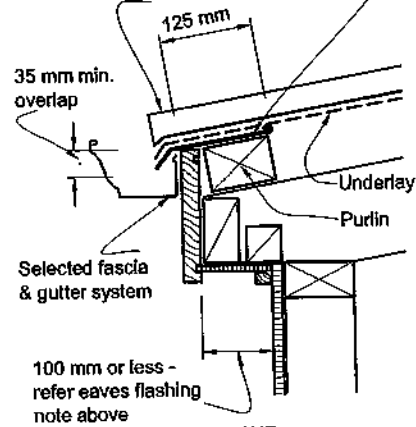
Errata 2
Dec 2011

Figure 45: Eaves and roof/wall ridge for profiled metal
Paragraphs 4.5, 8.4.11, 8.4.12, Table 7

Eave flashing required where all of the following conditions are met:

- Roof slope less than or equal to 10°, and
- soffit width less than or equal to 100 mm, and
- wind zones are Very High or Extra High

Profiled metal roofing

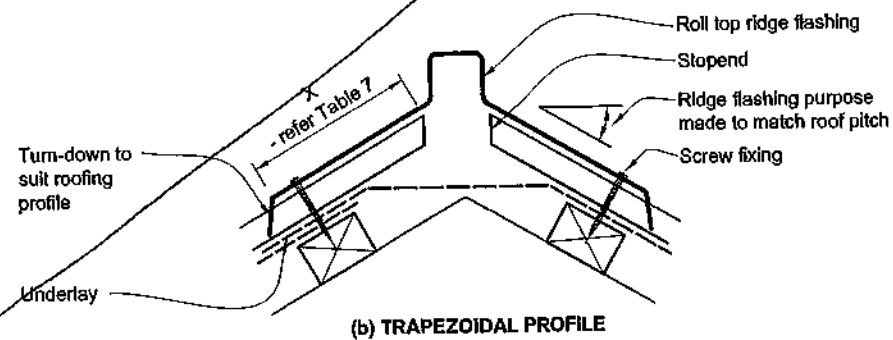
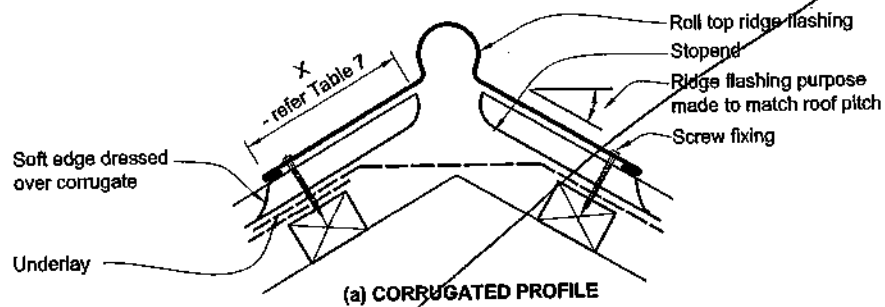


Amend 2
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Figure 46: Ridge and hip flashings for profiled metal
Paragraphs 4.4, 4.5, 8.4.11, 8.4.12, Table 7

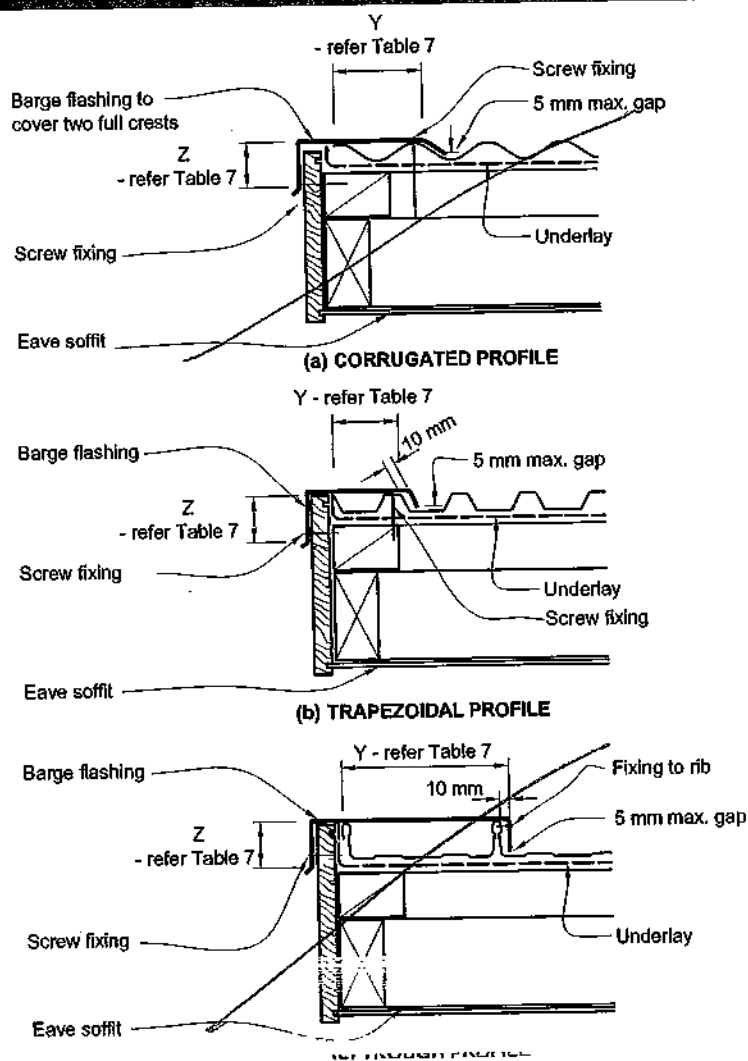


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Figure 47: Barge flashings for profiled metal
Paragraphs 8.4.11, 8.4.12, Table 7



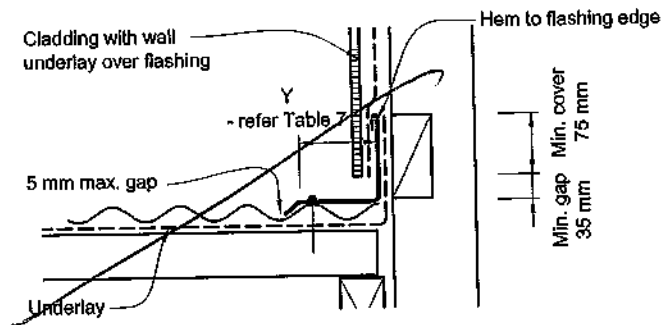
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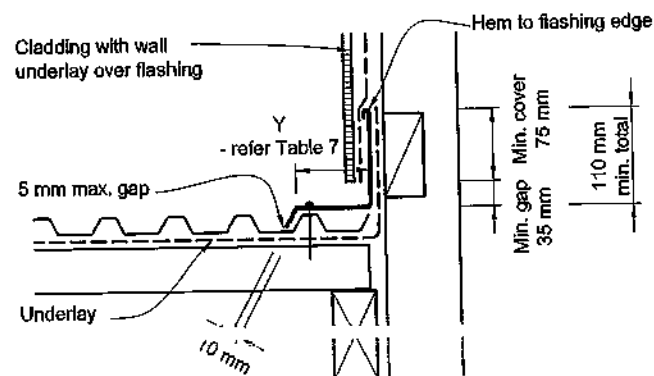
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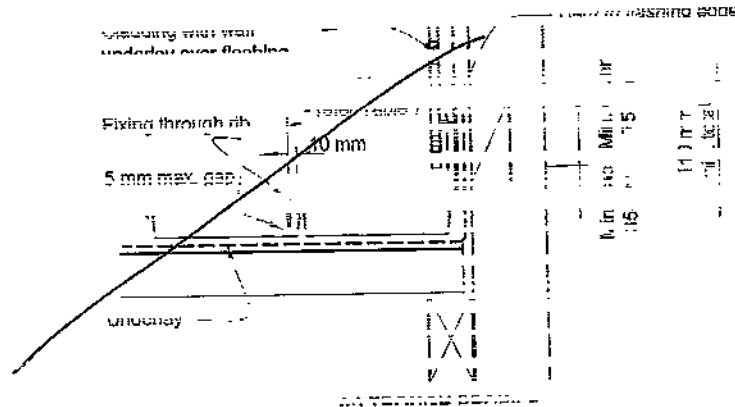
Figure 48: Parallel apron flashings for profiled metal
Paragraphs 8.4.11, 8.4.12, Table 7



(a) CORRUGATED PROFILE



(b) TRAPEZOIDAL PROFILE



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Jul 2005

Membrane Roof Specs.

Acceptable Solution E2/AS1

EXTERNAL MOISTURE

8.5 Membrane Roofs and Decks

8.5.1 Limitations

This Acceptable Solution is limited to *membranes* composed of butyl or EPDM installed over plywood substrates for:

- a) *Roofs* with a minimum fall of 2° (1:30),
- b) *Decks* with:
 - i) a minimum fall of 1.5° (1:40),
 - ii) a maximum area of 40 m²,
 - iii) no steps in level within *deck* area except into gutters,
 - iv) no integral roof gardens, and
 - v) no downpipe direct discharge to *deck*,

- c) Internal gutters with a minimum fall of 1 in 100, with no cross seams in the gutters, and

- d) *Decks* with removable raised surfaces to give level access as shown in Figure 17A.

The application of directly applied wearing or decorative surfaces to *membranes* is not covered in this Acceptable Solution.

COMMENT:

EPDM and butyl rubber *membranes* are subject to damage when on trafficable roof-decks. A suitable wearing surface will help reduce such damage.

Increases in slopes from the previous version recognise deflection tolerances in NZS 3604 and in-service loadings by *building* owners.

8.5.2 General

Closed-in *construction* spaces under *membrane roofs* and *decks* require adequate ventilation to prevent the accumulation of moisture under the *membrane*. Maintain a minimum gap of 20 mm between the underside of the substrate and any insulation, and for *membrane roofs* greater than 40 m², refer to manufacturer's details for *roof* cavity vents and/or substrate vent requirements.

COMMENT:

Refer to Paragraph 1.5 for qualification of installers.

8.5.3 Plywood substrates

Plywood shall be:

- a) A minimum of 17 mm complying with AS/NZS 2269,
- b) At least CD Grade Structural plywood with the sanded C face upwards, and
- c) H3 with treatment type compatible with *membrane* and adhesives used, and kiln dried after treatment.

COMMENT:

The compatibility of LOSP-treated timber must be checked with *membrane* suppliers.

If using plywood containing copper-based preservatives, check the compatibility of adhesives and *membranes* with copper with the product manufacturers.

8.5.4 Butyl and EPDM

Butyl rubber and EPDM rubber sheet and system components used for *membrane* roofing or *decks* shall:

- a) Be a minimum thickness of:
 - i) 1 mm for roofing, or
 - ii) 1.5 mm for *decks*, and

Refer to Paragraph 8.1.6.1 for *membranes* to gutters

- b) Comply with the following parts of Table 1 in ASTM D6134:

- i) tensile strength,
- ii) elongation,
- iii) water absorption,
- iv) water vapour permeance, and
- v) heat aging followed by:
 - a. tensile strength
 - b. elongation, and

- c) Have adhesives, primers, seam tapes and pre-formed components where supplied by the manufacturer that:
 - i) comply with BRANZ EM 5, and
 - ii) are part of a complete system approved by the manufacturer or supplier of the *membrane*.

8.5.5 Installation

8.5.5.1 Plywood

Substrates must be dry when *membranes* are applied. The plywood and timber substructure must be a maximum moisture content of 20% when a *membrane* is adhered.

COMMENT:

This will generally require substrates to be covered to prevent rain wetting, or to be pre-primed to avoid moisture uptake.

Manufacturers' recommendations should be consulted, as some require a lower moisture content in order to validate guarantees.

Plywood substrates shall be fixed according to the following requirements:

- a) Panels shall be laid with staggered joints (brick bond),
- b) Panels shall be laid with the face grain at right angles to the main supports,
- c) Supports in b) shall be at 400 mm maximum centres,
- d) The edge of sheets shall be supported with *dwangs* or *framing*,
- e) External edges shall be chamfered with a minimum radius of 5 mm,
- f) A 20 mm H3.2 triangular fillet shall be used at the base of any 90° upstand, and
- g) Shall be fixed:
 - i) with 3 mm gaps between all sheets,
 - ii) using 10 g x 50 mm stainless steel countersunk head screws,
 - iii) at 150 mm centres on edges, and
 - iv) at 200 mm centres in the body of the sheets.

8.5.5.2 Butyl and EPDM

Seam tapes shall be used on all joints of:

- a) Roofs or decks with falls less than 5° (1:12),
- c) Penetrations through the *membrane* where butyl or EPDM flashing is required,
- d) EPDM *membrane*, and
- e) Butyl *membranes* that contain EPDM.

COMMENT:

Coloured butyl *membranes* contain EPDM, which makes them more difficult to adhere properly.

Seams should be aligned parallel to the fall of the *deck* to minimise ponding.

Where a penetration is made through the *membrane* subsequent to laying, the *flashing* should be installed by the applicator of the *membrane* system.

All joints in the plywood and junctions of plywood with other materials shall have 25 mm polyethylene release tape applied before application of the *membrane*.

8.5.6 Roof and deck drainage

Membrane roofs and *decks* shall be constructed to provide:

- a) Falls as shown in Figure 56 and details in Figures 57–64
- b) A minimum of 100 mm below an adjoining threshold as shown in Figure 62
- c) *Membrane upstands* against all *walls*, *parapets*, or *enclosed balustrades* extending to a minimum level of 150 mm above *deck* level as shown in Figure 62.

COMMENT:

If the clearance of the *cladding* from the *deck* or *roof* surface is at the minimum of 35 mm, give an overlap of 115 mm to the *cladding*.

d) Water discharging either:

- i) into a *roof* or gutter outlet with a minimum diameter of 75 mm as shown in Figure 64 with either:
 - an overflow as shown in Figure 63 (c) or
 - an extra outlet, with both outlets sized to take the full required capacity.
- or,

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ii) via a *scupper*, into a gutter, or rainwater head, as shown in Figure 63 (a), (b) and (d).

e) Gutters formed with continuous butyl or EPDM strip complying with Paragraph 4.3.9, with no cross-joints.

COMMENT:

Refer to E1/AS1 for specific drainage requirements outside the scope of this Acceptable Solution.

Seams in gutters are particularly difficult to form at outlets through *enclosed balustrade walls*, and the risk of failure is high. Failure of a seam can result in damage to underlying *walls*.

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8.5.7 Control joints

All *control joints* in the substrate shall be accommodated in the *membrane roof design*.

The design of *control joints* for *membrane roofing* is subject to *specific design* and is outside the scope of this Acceptable Solution.

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Figure 56: Falls in membrane roofs and decks
Paragraph 8.5.6, Figures 61, 62, 63 and 64

NOTE:

- (1) Refer Figure 62 for thresholds and clearances.
(2) Junction *saddle flashing* - refer Figure 13.

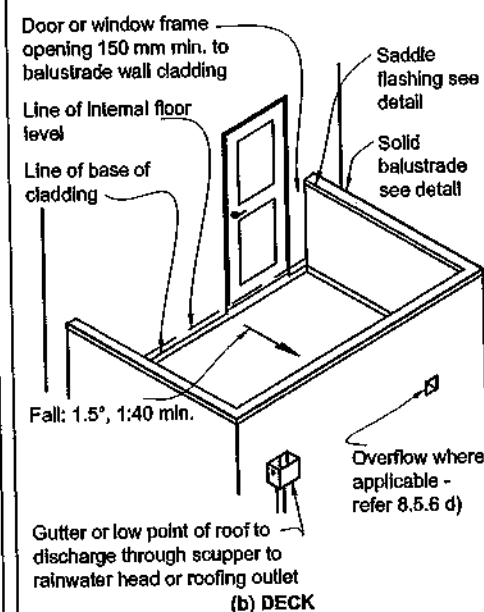
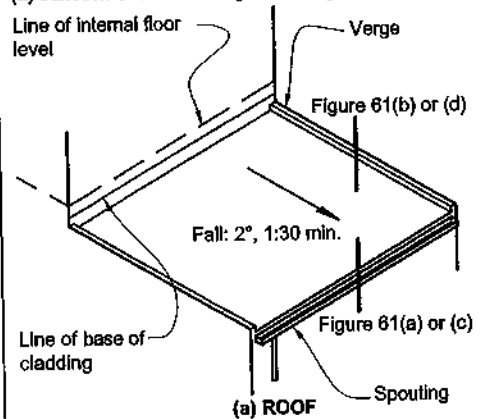
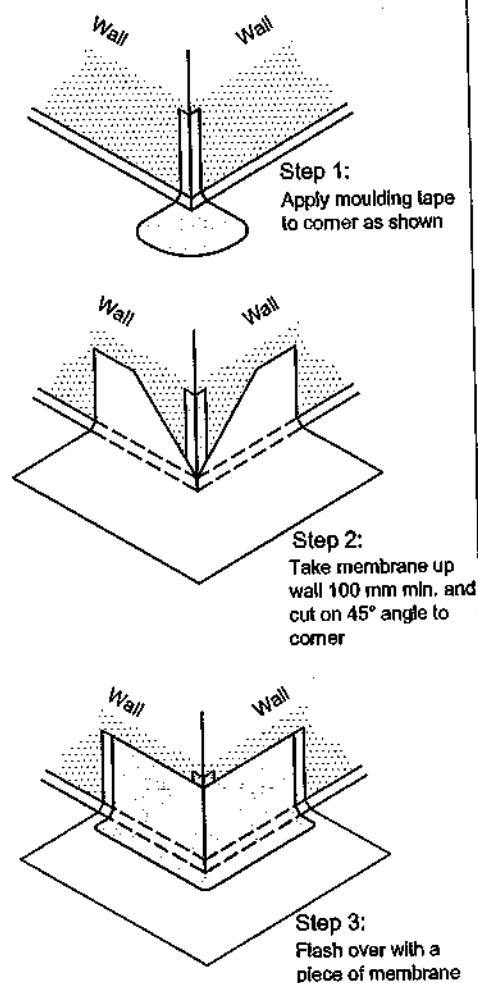
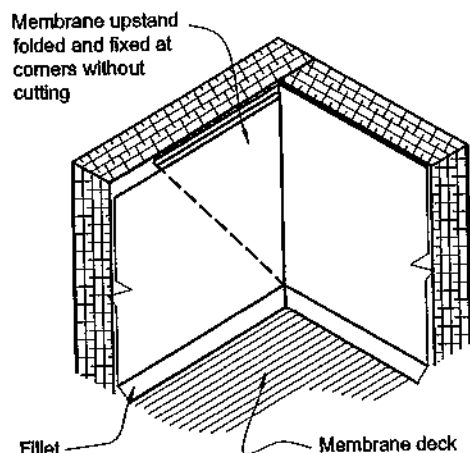


Figure 57: External corner in upstand
Paragraph 8.5.8, Figures 59, 62, 63 and 64



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Figure 58: Internal corner in upstand
Paragraph 8.5.8, Figures 62 and 64



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8.5.8 Junctions

All junctions of roof or deck to walls, parapets and enclosed balustrades shall be made *weathertight* using the following appropriate details:

- Figure 57: External corner in upstands,
- Figure 58: Internal corner in upstands,
- Figure 61: Verges and eaves,
- Figure 62: Junctions of decks and walls, and
- Drainage details to Paragraph 8.5.6.

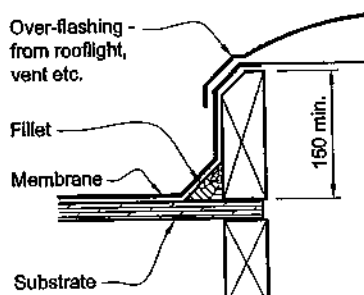
8.5.8.1 Junctions with walls

Junctions of membrane decks or walls shall be formed as shown in Figure 62.

The bottom of the wall cladding above the deck or roof surface shall be sealed prior to fixing.

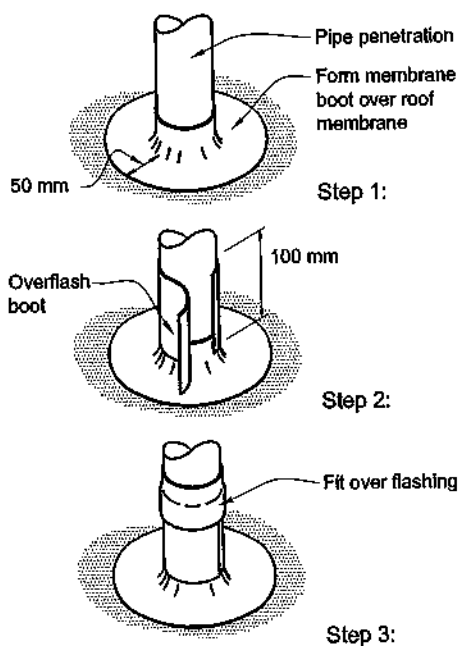
Figure 59: Roofing penetration in membrane
Paragraphs 8.5.8 and 8.5.9

NOTE: (1) For maximum penetration size of 1200 mm x 1200 mm.
(2) External corners to be formed as shown in Figure 57.



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Figure 60: Pipe penetration in membrane
Paragraph 8.5.9

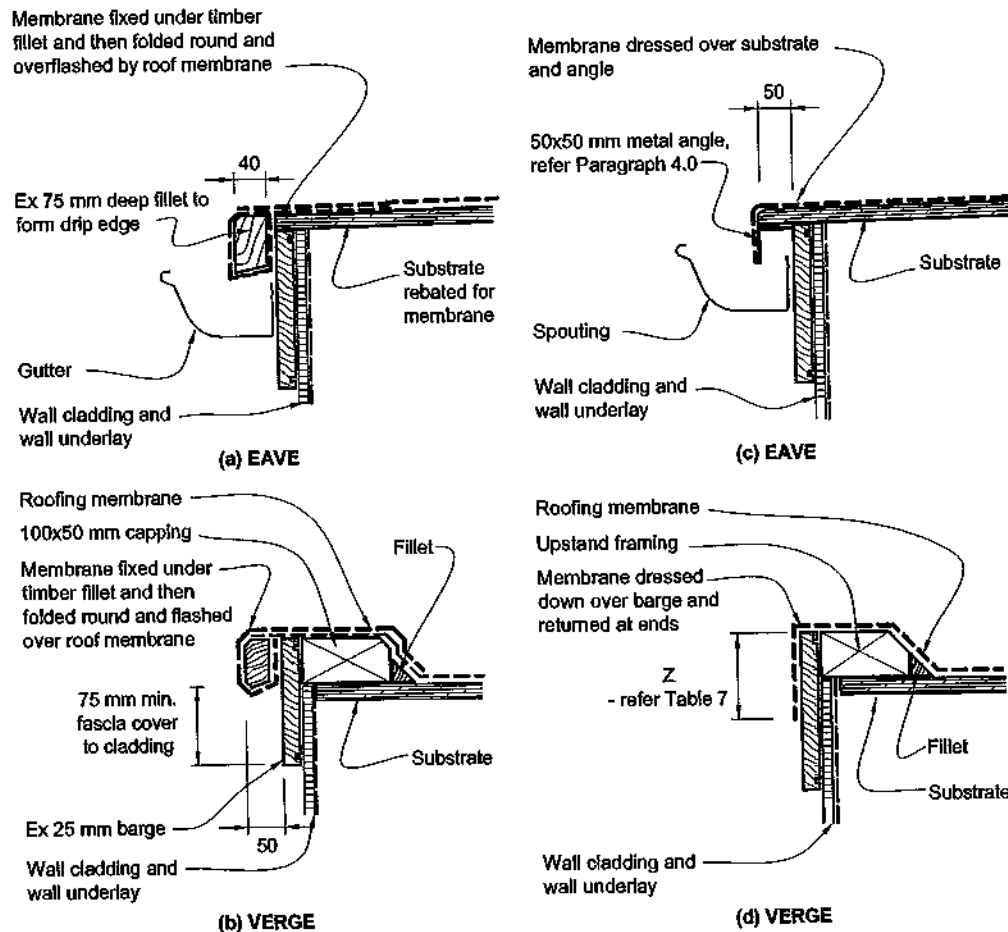


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8.5.9 Penetrations

Penetrations through membrane roofs and decks shall be as shown in Figure 59 and Figure 60.

Figure 61: Verges in membrane
Paragraph 8.5.8, Figure 56



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8.5.9.1 Handrails

Fixing of posts for *handrails* into *membrane roofs* or *decks* is not covered by this Acceptable Solution.

COMMENT:

Any fixing of posts into *membrane roofs* or *decks* will require *specific design*.

The fixing of posts into tiles over a *membrane* is particularly risky, and should be avoided.

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COMMENT:

Internal outlets should have a dome-type cover to reduce risk of blockage, except where this could constitute a pedestrian hazard.

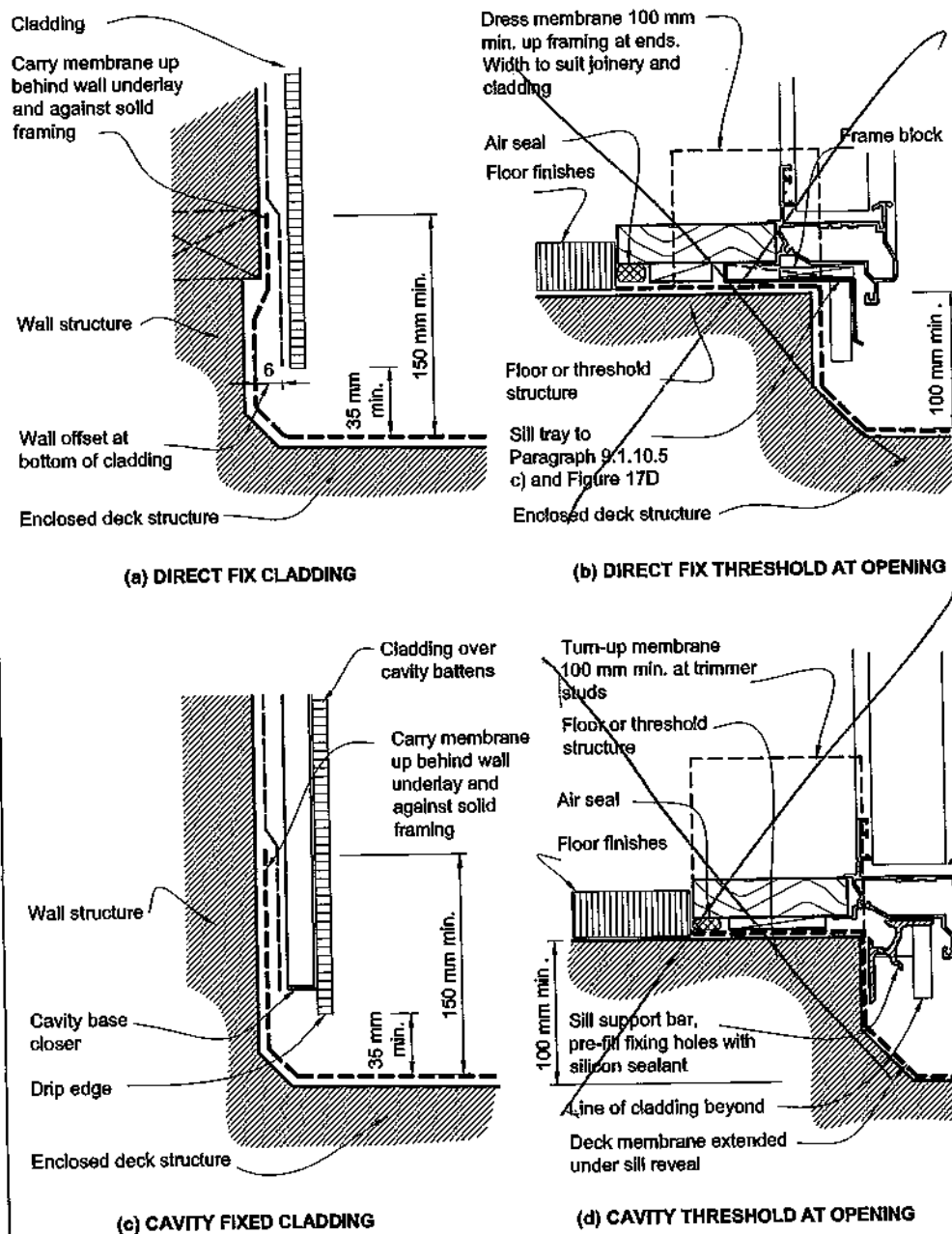
8.5.10 Gutters

Deck gutters and internal outlets shall be *constructed* as shown in Figure 64.

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Figure 62: Junctions with walls for membrane
Paragraph 7.4.3, Figure 56

NOTE: (1) Internal corners to be formed as shown in Figure 58.
(2) Dimensions are shown to *membrane*. However, where there is an additional material applied over the *membrane*, all dimensions shall apply to the highest level of the wearing surface.



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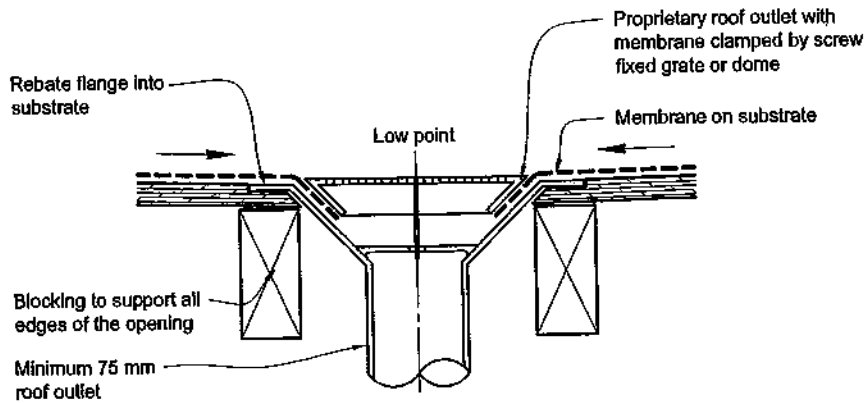
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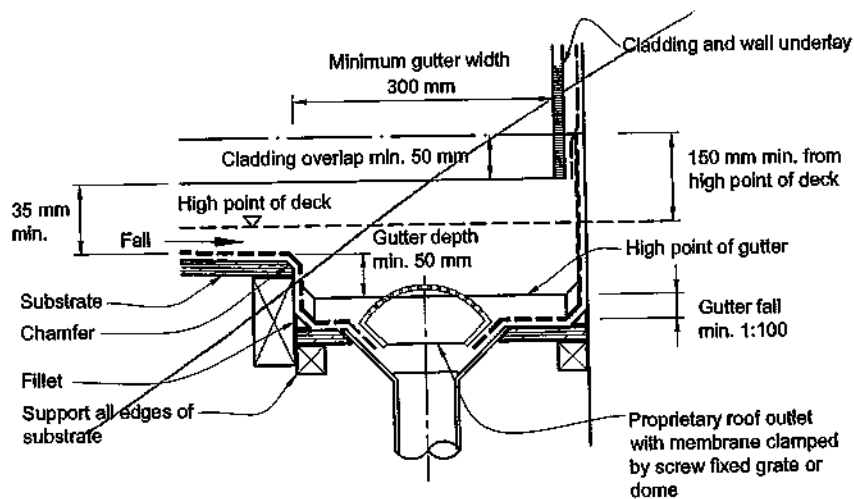
EXTERNAL MOISTURE

Acceptable Solution E2/AS1

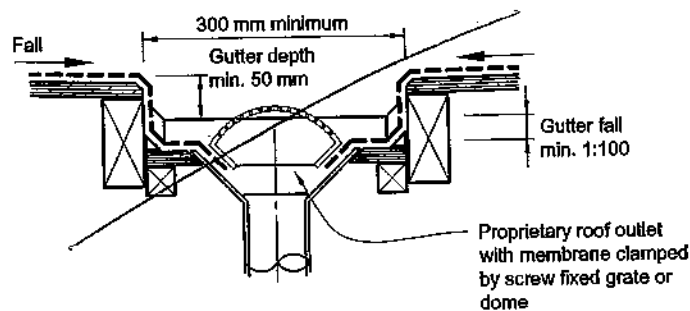
Figure 64: Gutters and outlets in membrane
Paragraphs 8.5.6 and 8.5.10



(a) TYPICAL ROOF OUTLET



(b) EDGE GUTTER



(c) CENTRAL GUTTER

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8.1.6 Gutters general

Gutters, downpipes and spreaders, including eaves gutters/spoutings are required for the drainage of roof water, and shall:

- a) Be to the minimum dimensions shown in this Acceptable Solution, or calculated to E1/AS1, whichever is the greater
- b) If a gutter depth is reduced to allow entry of a valley gutter, the reduced depth must be used to calculate the capacity of the gutter
- c) For internal, valley, and hidden gutters, have no fixings in gutter bottoms or sides, and be continuously supported on H1.2 minimum treated timber gutter boards or H3 ply which is separated from metal by roof underlay strip.

Eaves gutters/spoutings shall:

- d) Be to any of the materials outlined for flashings in Paragraph 4.1 except 4.3.9, 4.3.10 and 4.3.11
- e) Have a minimum cross sectional area of 2500 mm²
- f) Be designed to overflow water to the outside.

Downpipes shall:

- g) Be formed from any of the materials outlined for flashings in Paragraph 4.1 except 4.3.9, 4.3.10 and 4.3.11
- h) Upper roofs shall drain via downpipes directly to ground level where possible, or
- i) Where discharging to a lower roof, be fitted with a spreader as detailed in Figure 20
- j) Have a maximum catchment area of 25 m² if discharging on to a lower roof area.

Spreader shall:

- k) Be to any of the materials outlined for flashings in Paragraph 4.1 except 4.3.9, 4.3.10 and 4.3.11
- l) Be to Figure 20 and not be used on masonry tile roofs unless a roof underlay is installed
- m) Discharge directed away from roofing laps and clear of roof penetrations.

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COMMENT:

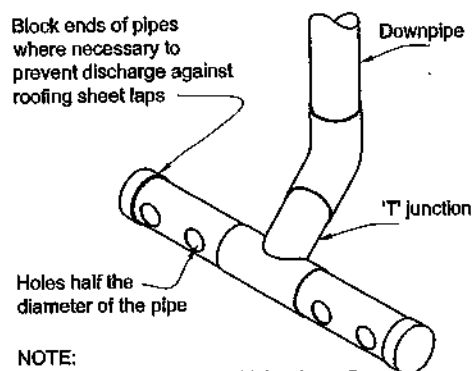
Design calculations for a specific roof may allow larger catchment areas per spreader to be used.

The alternative to a spreader is to direct an upper level downpipe into a rainwater head.

The ends of spreaders should be blocked off where a sideways flow of water is against laps in roof claddings.

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Figure 20: Spreader for roof discharge
Paragraph 8.1.6.



NOTE:

- (1) Hole positions to avoid joints in roofing.
- (2) When downpipe is located in corner, spreader to be L-shaped.

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8.1.6.1 Internal gutters

Internal gutters shall:

- a) Be formed with continuous butyl or EPDM strip complying with Paragraph 4.3.9, with no cross-joints in the gutter, or aluminium, copper, stainless steel, or zinc sheet to Paragraph 4.3, with joints that are welded
- b) Where butyl or EPDM, be minimum 1.5 mm membrane thickness, or 1.0 mm thickness for gutters less than 1 metre wide
- c) Have a minimum slope of 1:100
- d) Be constructed to at least the minimum dimensions shown in Figure 52, or the capacity calculated to E1/AS1 plus an additional freeboard depth of 20 mm minimum.

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For roofs other than *membrane roofs*:

- e) Discharge into a rainwater head as shown in Figure 63 (a) and (b), or
- f) Discharge to an internal outlet to Figure 64 (b) or (c) with overflows provided by either:
 - i) a second outlet to a rainwater head, or
 - ii) an overflow as shown in Figure 63(c), and positioned below the level of any potential overflow into the *building*.

For internal gutters and *membrane roofing*, refer to Paragraph 8.5.

8.1.6.2 Valley gutters and hidden gutters

Valley gutters and *hidden gutters* shall be constructed as shown in Figures 50 and 51 for the applicable *roof cladding* (except for *membrane roofing*) and:

- a) Not change direction in plan
- b) Have a minimum underlap to *roof cladding* as specified in Figures 27, 37, 50, and 51 for the relevant *roof cladding*
- c) Be formed from any of the materials outlined for *flashings* in Paragraph 4.3 except 4.3.10 and 4.3.11
- d) Be fixed at upper ends only, and be secured with a purpose-made clip system for the remaining length to enable expansion/contraction along the length of the gutter
- e) Discharge into an internal gutter or *eaves* gutter/spouting.

In addition:

- f) Have minimum slopes of 8° for *hidden gutters*, and to Table 8 for *valley gutters*
- g) *Hidden gutters* receive no discharge from downpipes or spreaders
- h) Spreaders not discharge directly into a *valley gutter*
- i) *Valley gutters* be minimum 250 mm wide where receiving run off from spreaders.

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Table 8: Maximum catchment areas for valley gutters
Paragraphs 8.1.6.2, 8.4.16.2, 9.7.7.1, 9.9.4.4, 9.9.10.1, Figures 27, 37 and 51

Gutter width	Maximum catchment area	Minimum roof pitch
250 mm	25 m ²	8°
160 mm to 249 mm	16 m ²	12.5°

NOTE: Catchment areas are limited to:

- (1) Gutters in accordance with Paragraph 8.1.6.2.
- (2) Rainfall intensity with average recurrence interval (ARI) no greater than 200 mm per hour.

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Aug 2011

COMMENT:

Gutters for lower-pitched roofs, or for catchment areas other than those shown in Table 8, require *specific design*. Additional information may be found in the New Zealand Metal Roof and Wall Cladding Code of Practice.

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8.1.7 Roof penetrations

Roof penetrations shall be made *weathertight* in accordance with Paragraph 8.2 to Paragraph 8.5.

Where *roof penetrations* are required for large openings such as *roof lights* and *chimneys*, this Acceptable Solution is limited to the following requirements:

- a) The edge of roofing penetrations over 200 mm wide shall be supported in either direction with additional *framing* as shown in Figure 21, and
- b) For the catchment area of the *roof* above the penetration as shown in Figure 22, the *roof* length shall be limited to:
 - i) for profiled metal roofing, Table 17
 - ii) for other *roof claddings*, the areas shown in Table 9.

COMMENT:

Flashings for *roof penetrations* not included in this Acceptable Solution require *specific design*.

For pipe penetrations, refer to details for the *roof cladding* material used.

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Aug 2011

4.0 Downpipes

4.1 Materials

4.1.1 Materials for downpipes shall comply with Table 4.

Table 4: Acceptable Material Standards for Downpipes
Paragraph 4.1.1

Amend 1 Sep 1993	PVC-U	AS/NZS 1260 or AS/NZS 1254
Amend 2 Aug 1994	Galvanised steel	AS 1397
Amend 3 Oct 2011	Copper	BS EN 1172
	Aluminium	AS/NZS 1734
	Stainless steel	NZS/BS 970
Amend 7 Sep 2010	Zinc aluminium	AS 1397

4.1.2 Downpipes, gutters, roofing, fastenings and all adjoining components shall be of the same or a compatible material to eliminate the risk of galvanic corrosion.

4.2 Sizing of downpipes

4.2.1 Downpipes sized using Table 5 are acceptable. Other downpipes are acceptable provided their cross-sectional area is no less than that required by Table 5, and they permit passage of a 50 mm diameter sphere.

4.3 Installation of downpipes

4.3.1 Where thermal movement of downpipes cannot be accommodated by movement of the guttering, expansion joints shall be incorporated.

4.3.2 All internal downpipes shall withstand without leakage, a water test with an applied head of 1.5 m of water, or a high pressure air test as described in E1/M1 Paragraph 8.3.

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Jul 2001

5.0 Roof Gutters

5.1 Size of roof gutters

5.1.1 Roof gutters shall discharge to downpipes that are sized as given in Paragraph 4.2.

5.1.2 Any gutter under consideration shall be divided into sections and each section shall be sized. A section shall comprise the length of gutter between a downpipe and the adjacent high point on one side only of that downpipe. Each section of gutter shall have a cross-sectional area of no less than that determined from Figure 15 or Figure 16 (depending on whether the gutter is external or internal), and increased where required in accordance with Paragraph 5.1.3.

5.1.3 Figures 15 and 16 are based on a rainfall intensity "I" of 100 mm/hr. Where "I" exceeds 100 mm/hr the required gutter size shall be increased by taking the value read from the figures and multiplying it by the ratio of "I"/100. Paragraph 3.2.2 describes how to determine the value of "I".

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Aug 1994

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Aug 1994

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Sep 1993

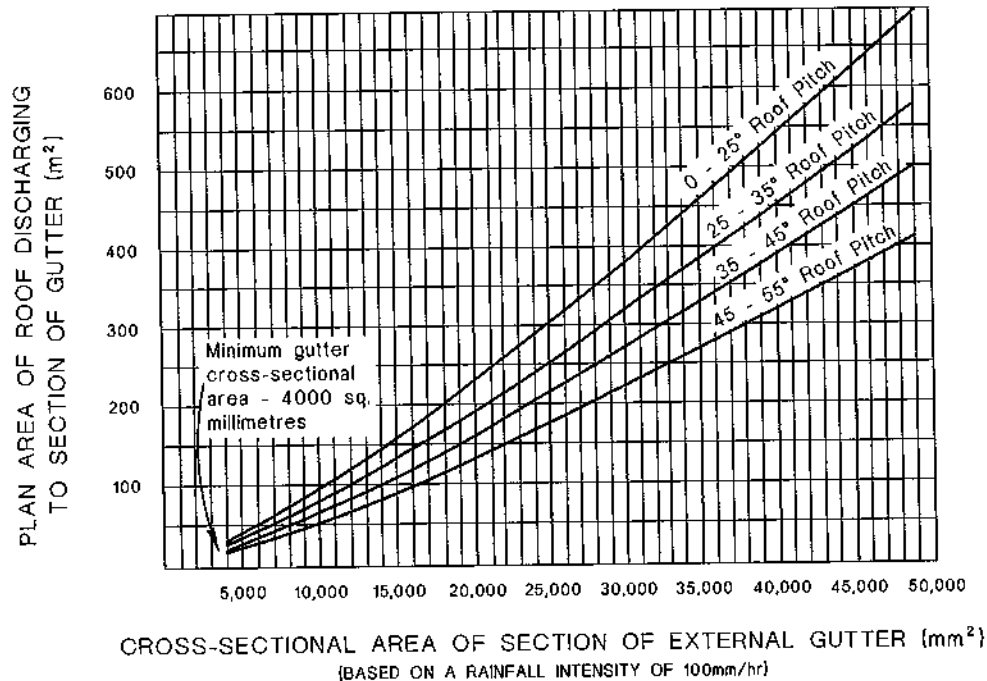
Table 5: Downpipe Sizes for Given Roof Pitch and Area
Paragraph 4.2.1

Downpipe size (mm) (minimum internal sizes)	Roof pitch			
	0-25°	25-35°	35-45°	45-55°
Plan area of roof served by the downpipe (m ²)				
63 mm diameter	60	50	40	35
74 mm diameter	85	70	60	50
100 mm diameter	155	130	110	90
150 mm diameter	350	290	250	200
65 x 50 rectangular	60	50	40	35
100 x 50 rectangular	100	80	70	60
75 x 75 rectangular	110	90	80	65
100 x 75 rectangular	150	120	105	90

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Sep 1993

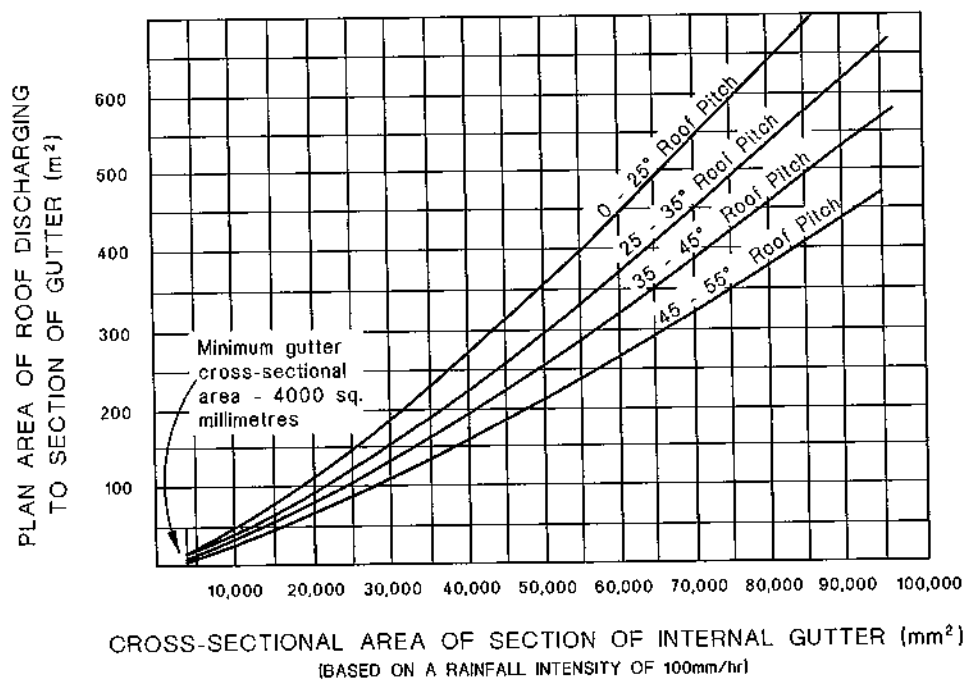
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Aug 1994

Figure 15: Cross-sectional Area of External Gutter
Paragraphs 5.1.2 and 5.1.3



Amend 1
Sep 1993

Figure 16: Cross sectional Area of Internal Gutter
Paragraphs 5.1.2 and 5.1.3



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Sep 2010
Amend 1
Sep 1993

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Sep 1993

5.1.4 In no case shall the cross-sectional area of any gutter be less than 4000 mm².

5.2 Materials

5.2.1 Roof gutter materials shall comply with the standards stated in Table 6.

COMMENT:

Proprietary membrane systems using bitumen, rubber or epoxy resins may also be acceptable.

Table 7: Thermal Expansion of 5 m length over 50°C
Paragraph 5.4.1

Material	Expansion (mm)
PVC-U	17.5
Zinc	5.0
Galvanised steel	2.5
Copper	4.5
Aluminium	5.8
Stainless steel	3.8

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Sep 2010

Table 6: Acceptable Material Standards for Roof Gutters
Paragraph 5.2.1

PVC-U	AS 1273
Galvanised steel	AS 1397
Copper	BS 2870
Aluminium	AS/NZS 1734
Stainless steel	NZS/BS 970
Zinc aluminium	AS 1397

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Sep 2010

5.3 Gradients

5.3.1 Roof gutters shall fall to an outlet.

5.4 Thermal movement

5.4.1 Allowance shall be made for the thermal expansion and contraction of gutters. Table 7 shows for different materials the change in length of 5.0 m of guttering when subjected to a 50°C change in temperature.

COMMENT:

The provision of expansion joints is particularly important where both ends of a gutter are restrained against movement, and on PVC-U guttering due to its relatively high rate of thermal expansion.

5.5 Overflow outlets

5.5.1 All internal gutters shall be fitted with overflow outlets which drain to the exterior of the *building*. The top of the outlet shall be set at least 50 mm below the top of the gutter. The cross-sectional area of the outlet shall be no less than the cross-sectional area of the downpipes (determined by Paragraph 4.2.1) serving the gutter.

COMMENT:

An internal gutter overflow outlet should be located to give an early, conspicuous warning to the *building* occupier that maintenance is required.

5.5.2 External gutters do not require overflow outlets but shall be installed to ensure any overflow from the gutter spills to the outside of the *building*.

COMMENT:

Although specific overflow provision is not necessary it is nevertheless important to ensure any overflowing water cannot track back inside the *building* where it could cause problems.

Amend 9
Feb 2014

Roof

PINK® BATTS® SKILLION ROOF INSULATION

Critical Design Considerations

Historically there have been moisture related problems with skillion roofs. The following design factors should be considered to ensure your roof's performance and durability.

Internal moisture and condensation

- To prevent internal moisture entering the roof space, use vapour resistant lining in wet areas such as kitchens and bathrooms (e.g. gloss/oil based paint systems)
- Reduce airflow into the roof cavity through ceiling linings that are resistant to airflow (e.g. for a tongue and groove ceiling) by using a breather type air barrier
- Reduce penetrations through ceilings e.g. use sealed recessed downlights
- Special situations: Ski lodges, indoor pools/spas, cold stores may require an additional fully sealed vapour barrier (e.g. Sisalation® Heavy Duty 450)

Ventilation

- A minimum 25mm clearance between the top of the insulation and the building underlay is required to provide a minimum amount of ventilation and reduce moisture build up in the roof cavity. However in areas of high humidity and/or large temperature differences, additional ventilation may be required to compensate for higher levels of condensation and water vapour
- Ensure the insulation product you specify or install is guaranteed not to over recover or loft above the rafter depth; often nominal thickness measurements are not the maximum loft that segments will achieve

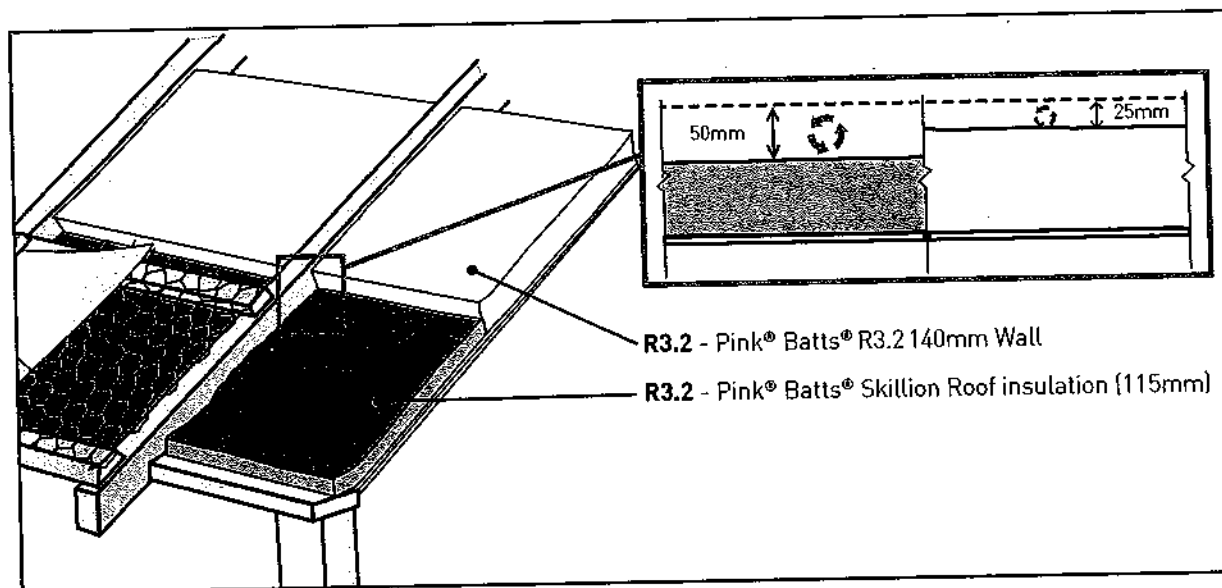
Trapped moisture

- To avoid trapping excessive levels of construction moisture into the roof cavity ensure timber, concrete and other building materials are dry before enclosing building

For more detailed information please refer to BRANZ Bulletin 525

How to reduce moisture related problems in skillion roofs

By providing additional ventilation, Pink® Batts® Skillion roof insulation achieves 100% more ventilation clearance, while still maintaining the same R-value as R3.2 140mm Wall (or R3.6 180mm) insulation products.



Environment

Pink® Batts® insulation is a sustainable and energy efficient product.

- Manufactured using over 80% recycled glass, making sustainable use of waste
- Energy used during the manufacture of Pink® Batts® products is offset by the energy saved by a home fully insulated with Pink® Batts® products within 3-15 months¹
- Locally manufactured in New Zealand minimising shipping distances
- Recyclable packaging

Green Star NZ Credits

Green Star is a comprehensive environmental rating system for buildings; materials with certain attributes can receive points that contribute to the overall score of a rated home.

New Zealand Green Building Council (NZGBC) does not test or certify products; they rely on the work done by third party certification bodies and eco labels like Environmental Choice. Further information is available at nzgbc.org.nz.

Environmental Choice

Higher R-value Pink® Batts® ceiling insulation products have Environmental Choice New Zealand Accreditation (refer to Specification Notes on page 5 for accredited products)



Licence No 2504017.
Thermal Building Products

Independently assessed for:

- Waste Minimisation: Recycled content, and recycling of process waste
- Energy Management: Effective energy management policies and procedures
- Manufacturing Process: Not manufactured using blowing agents with a Global Warming Potential (GWP) or Ozone Depleting Potential (ODP)
- Product Characteristics: Durability and performance

While only the higher R-value products are eligible for Environmental Choice, all Pink® Batts® insulation products are manufactured in the same environmentally considerate way.

¹ (Beca Carter Hollings & Ferner Ltd, Energy Economics of Fibreglass Insulation, 2005)

Roof

PINK® BATTS® SKILLION ROOF INSULATION

Health and Safety

Product Safety

Pink® Batts® insulation is a non-hazardous, safe product.

- IARC (International Agency for Research on Cancer) classifies the glass wool formulation used to manufacture Pink® Batts® products as Group 3: 'Not classifiable as to its carcinogenicity to humans'. This is the same classification as caffeine, tea, hair colouring, chlorinated drinking water and saccharin
- Pink® Batts® insulation is bio-soluble. In the unlikely event any fibres are inhaled into the lungs they will dissolve in the body fluids and be cleared from the body



Indoor Air Quality

- Pink® Batts® insulation is certified under the GREENGUARD Certification Program. Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments



General Health

- Pink® Batts® insulation will assist in meeting the World Health Organisation recommendation for houses to be maintained at a minimum temperature of 18°C to provide a healthy and comfortable home
- A Wellington School of Medicine study found insulated houses resulted in families with fewer sick days and the economic benefit was double the initial cost of the insulation²

² Howden-Chapman, P. et al. "Effect of insulating existing houses on health inequality: cluster randomised study in the community" British Medical Journal, 2007, p334-460

Technical Data

Properties	Result		Test/Method/Standard	Test Results
Combustibility	Non-Combustible	✓	AS/NZS 1530.1:1994	Group Number 1S
Early Fire Hazardsy		✓	AS/NZS 1530.3:1993 - Ignitability (Range 0-20) - Spread of Flame Index (Range 0-10) - Heat Evolved Index (Range 0-10) - Smoke Developed Index (Range 0-10)	= 0 = 0 = 0 = 0-1
R-value	Various*	✓	AS/NZS 4859.1:2002	
Corrosion	Non-Corrosive	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Moisture Absorption	Non-Hygroscopic	N/A	AS/NZS 4859.1:2002-Glass wool exempt	
Vermin Resistance	No Food Source	✓	AS/NZS 4859.1:2002-Glass wool exempt	

* Refer to product specifications

Acoustic Properties

Pink® Batts® insulation will assist with noise control, however penetrations in ceilings and walls will transmit sound readily. Superior noise control can be achieved by using Pink® Batts® insulation products in conjunction with good acoustic design.

Wall

PINK® BATTS® WALL INSULATION

Installation:

Any slight irritation to exposed skin caused by the fibres in glass wool, or through their inhalation, is harmless and temporary.

However for your comfort while installing, it's recommended you wear:

- Loose fitting work clothes which cover the arms and legs
- Covered shoes
- Dust mask
- Safety glasses

For safety while installing, it's recommended you use:

- Cut resistant gloves (if knife is used)

For an efficient installation, the following tools are recommended:

- Stable working platform
- Knife
- Tape measure

To ensure Pink® Batts® wall insulation performance isn't compromised, use only wall products for installing in wall applications.

- Ensure the product and all cavities are dry
- If cutting is required, cut oversize by 5 mm to ensure a good friction fit
- Ensure there are no gaps, folds or compression of the product to achieve optimal performance
- Fill gaps around windows and doors with off-cuts
- Follow the manufacturer's instructions for minimum clearances from hot inbuilt appliances. If they are unknown, refer to NZS 4246:2016
- Do not cover vents. Insulate around vents to allow unhindered ventilation
- Fit Pink® Batts® insulation tight and close around electrical cables and pipes. It's important to minimise compression, gaps and folds in the insulation. For electrical cables and small diameter pipes, partially cut insulation and place around the cables and pipes
- In new construction, it is recommended that Pink® Batts® insulation is installed once the cladding system is completely installed.

Pink® Batts® Masonry Walls Insulation

- It is recommended that an absorbent building paper or a waterproof membrane is placed between the insulation and the concrete. This is not intended to replace the DPC which must still be fixed between strapping and masonry.

CAUTION: Electrical cables and equipment installed prior 1989 may overheat and fail when partially or completely covered with bulk thermal insulation

💡 **Tip:** To verify Building Code Compliance, staple a product label and installer information at an easy to find location away from any hot items such as downlights or water cylinders. An alternative is to supply the information to the building owner or authorised person.

Refer to NZS 4246:2016 for further information related to the correct installation of insulation and clearances.

Wall

PINK® BATTS® WALL INSULATION

INSTALLATION INSTRUCTIONS

Product Guide

	LIFETIME WARRANTY*	BRANZ APPRAISED	ENVIRONMENTAL CHOICE	GREENGUARD CERTIFICATION	CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER PACK (m²)	APPROX COVERAGE PER PACK* (m²)
Pink® Batts® Classic R1.8 Wall	✓	✓		✓	7127118	1140 X 560	90	16.6	19.6
Pink® Batts® Classic R2.2 Wall	✓	✓		✓	7127122	1140 X 560	90	13.4	15.8
Pink® Batts® Classic R2.4 Wall	✓	✓		✓	7127124	1140 X 560	90	10.2	12.1
Pink® Batts® Ultra® R2.6 Wall	✓	✓	✓	✓	7127126	1140 X 560	90	9.6	11.3
* Pink® Batts® Ultra® R2.8 Wall	✓	✓	✓	✓	7127128	1140 X 560	90	6.4	7.5
Pink® Batts® R1.0 Masonry Wall	✓	✓		✓	7160110	1220 x 580	40	21.2	-
Pink® Batts® R1.2 Masonry Wall				✓	7160134	1220 x 580	50	17.0	-
Pink® Batts® Ultra® R3.2 140mm Wall	✓	✓	✓	✓	7127132	1140 X 560	140	9.6	11.3
Pink® Batts® Ultra® R3.2 140mm Narrow Wall	✓	✓	✓	✓	7160241	1140 X 380	140	7.3	8.6
Pink® Batts® Ultra® R4.0 140mm Wall	✓	✓	✓	✓	7127140	1140 X 560	140	5.1	6.0
Pink® Batts® Ultra® R4.0 140mm Narrow Wall	✓	✓	✓	✓	7160242	1140 X 380	140	4.3	5.0
Pink® Batts® R2.2 Narrow Wall	✓	✓		✓	7120123	1140 X 380	90	9.5	11.2
Pink® Batts® Ultra® R2.6 Narrow Wall	✓	✓	✓	✓	7160207	1140 X 380	90	7.8	9.2
Pink® Batts® Steel R2.2 Wall	✓	✓		✓	7160214	1220 X 610	90	15.6	15.6
Pink® Batts® Ultra® Steel R2.6 Wall	✓	✓	✓	✓	7160215	1220 X 610	90	9.7	9.7

For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz
 * Coverage relates to standard structure and actual coverage may vary.

Storage and Maintenance

Pink® Batts® insulation should be protected from damage and weather. Store under cover in clean, dry conditions. The installed product should remain dry at all times. If the product becomes wet or damp, the source of dampness (e.g. leak in building) should be repaired and any wet or damp insulation should be removed and replaced with new insulation of an equivalent R-value.

Disposal of bags

Recyclable LLDPE bags are used for packaging of Pink® Batts® insulation. These bags are categorised as Rec 4 and can be placed in a recyclable refuse collection bin. For further details download the relevant product data sheet from pinkbatts.co.nz

Accreditations/Appraisals/Certifications



For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz



DISTRIBUTED BY
 Tasman Insulation New Zealand Ltd
 9-15 Holloway Place, Penrose, Auckland,
 New Zealand

This document supersedes all previous versions and may have been superseded; is a guide only and the purchaser should ascertain the suitability of this product for the end-use situation intended and when used in conjunction with other products; and is provided without prejudice to Tasman Insulation New Zealand Ltd (Tasman) standard terms of sale. Tasman retains the right to change specifications without prior notice. Refer to www.pinkbatts.co.nz or consult Tasman for further information. Do not use this product for any application not detailed in this document. All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. The liability of Tasman and its employees and agents for any errors or omissions in this document or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. The colour PINK and Pink® are registered trademarks of Owens Corning used under license by Tasman Insulation. Batts® is the registered trade mark of Tasman Insulation.



■ pinkbatts.co.nz

These installation instructions may have been superseded. Please refer to pinkbatts.co.nz or call 0800 746 822 for the most current information.



STRUCTURAL SKETCH DETAILS

FOR

ALTERATIONS AND ADDITIONS

TO

104 RAUKAWA RD
PEKAPEKA

FOR

LORRAINE & BILL CARGILL



Building Code Clause(s) B1; VM 1

PRODUCER STATEMENT – PS1 – DESIGN(Guidance on use of Producer Statements (formerly page 2) is available at www.ipenz.nz)

ISSUED BY: **BASE CONSULTING ENGINEERS LTD**
(Design Firm)

TO: **MR. B. CARGILL**
(Owner/Developer)

TO BE SUPPLIED TO: **KAPITI COAST DISTRICT COUNCIL**
(Building Consent Authority)

IN RESPECT OF: **CARGILL EXTENSION TO DWELLING - Foundations & Block retaining wall**
(Description of Building Work)

AT: **104 RAUKAWA ROAD**
(Address)

Town/City: **PEKAPEKA** LOT: DP: SO:

We have been engaged by the owner/developer referred to above to provide:

THE STRUCTURAL DESIGN FOR: DRIVEN TIMBER PILE FOUNDATIONS; BLOCK RETAINING WALL
NZS: 3101: NZS: 4230

(Extent of Engagement)

services in respect of the requirements of Clause(s) **B1; VM 1** of the Building Code for:
☐ All or ☐ Part only (as specified in the attachment to this statement), of the proposed building work.

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

- ☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment **B1; VM1: AS/NZS:1170** or
(verification method/acceptable solution)
- ☐ Alternative solution as per the attached schedule.

The proposed building work covered by this producer statement is described on the drawings titled:

CARGILL EXTENSION TO DWELLING and numbered **17120**
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to: **As per BCE Report : 10091**

- (i) Site verification of the following design assumptions
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

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

I, **PETER BOLTON** am: ☒ CPEng **56179** # ☐ Reg Arch #
(Name of Design Professional)

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: **BE CIVIL**
The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.
The Design Firm is a member of ACENZ: ☐

SIGNED BY: **PETER BOLTON** (Signature)
(Name of Design Professional)

ON BEHALF OF: **BASE CONSULTING ENGINEERS LTD** Date: **19/07/2017**
(Design Firm)

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

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.
THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent.

PS2 Design Review Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent.

PS3 Construction Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011²

PS4 Construction Review Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional"

*Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers³). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

1. Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
2. NZIA Standard Conditions of Contract SCC 2011
3. Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2014)
4. PN Guidelines on Producer Statements

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



ARCHITECTS
NEW ZEALAND



ENGINEERS
NEW ZEALAND



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: 104 RAUKAWA ROAD

Suburb:

Town/City: PEKAPEKA

Postcode:

THE OWNER

Name: MR. B. CARGILL

Mailing address:

Suburb:

PO Box/Private Bag:

Town/City:

Postcode:

Phone number:

Email address:

BASIS FOR PROVIDING THIS MEMORANDUM

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

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

I, Peter Bolton, carried out the following design work that is restricted building work

PRIMARY STRUCTURE: B1

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

	out this design work]	
--	-----------------------	--

Primary structure

All RBW Design work relating to B1	()		() Carried out () Supervised	
Foundations and subfloor framing	(√)	Driven timber pile Foundations	(√) Carried out () Supervised	17120
Walls	()		() Carried out () Supervised	
Roof	()		() Carried out () Supervised	
Columns and beams	()		() Carried out () Supervised	
Bracing	()		() Carried out () Supervised	
Other	(√)	Block retaining wall	(√) Carried out () Supervised	17120

EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2

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

FIRE SAFETY SYSTEMS: C1 – C6

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

control systems, or other			
---------------------------	--	--	--

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

Note: continue on another page if necessary.

WAIVERS AND MODIFICATIONS

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

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

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

Note: continue on another page if necessary.

ISSUED BY

Name: Peter Bolton	LBP or Registration number: 56179
The practitioner is a: () Design LBP () Registered architect (√) Chartered Professional Engineer	
Design Entity or Company (optional): Base Consulting Engineers Ltd	
Mailing address (if different from below):	
Street address / Registered office: 279 Oxford Street	
Suburb:	Town/City: Levin
PO Box/Private Bag:	Postcode:
Phone number:	Mobile: 0274 444 080
After Hours:	Fax:
Email address: peter@basecon.co.nz	Website:

DECLARATION

I Peter Bolton [name of practitioner], CPEng,

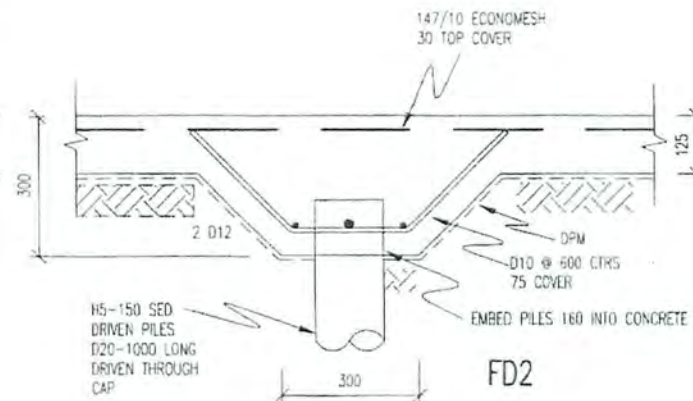
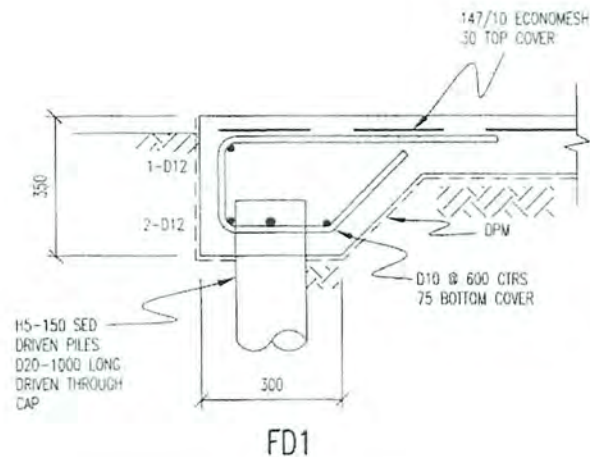
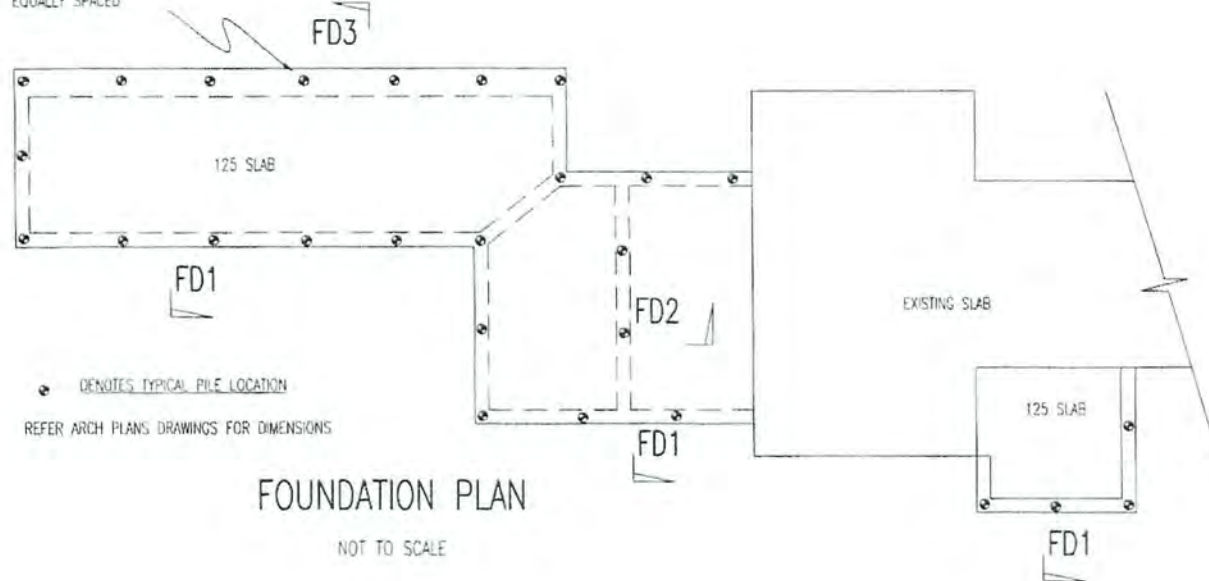
state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW:

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

Signature:

Date: 19 July 2017

DRIVEN TIMBER PILES
EQUALLY SPACED



No.	AMENDMENT	NAME	DATE

NOTES:

REFER TO ARCHITECTURAL PLANS FOR DETAILS AND DIMENSIONS

ANY DISCREPANCIES WITH THE ENGINEERS AND ARCHITECTS DRAWINGS SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING

ANY VARIATION FROM THESE DRAWINGS OR SUBSTITUTION OF SPECIFIED PRODUCTS SHALL REQUIRE ENGINEERS APPROVAL PRIOR TO PROCEEDING

ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT CODE OF PRACTICE

THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR

THE CONTRACTOR TO PROVIDE 24 HOURS NOTICE FOR ALL INSPECTIONS AT WHICH TIME ALL WORK TO BE INSPECTED SHALL BE COMPLETE

CONTRACTOR SHALL DETERMINE FROM THE TERTIARY AUTHORITY WHAT INSPECTIONS ARE REQUIRED BY THE ENGINEER

THE CLIENT SHALL PROVIDE A COPY TO THE TA AND RETAIN A COPY FOR THEIR OWN RECORDS

Base Consulting Engineers Limited



279 Oxford Street
P.O. Box 434
Lynn 5540

Telephone: Lynn 06-367 0684
Pangarau 04-287 0688
Fax 06-367 0658
Mobile 027 44 44 080

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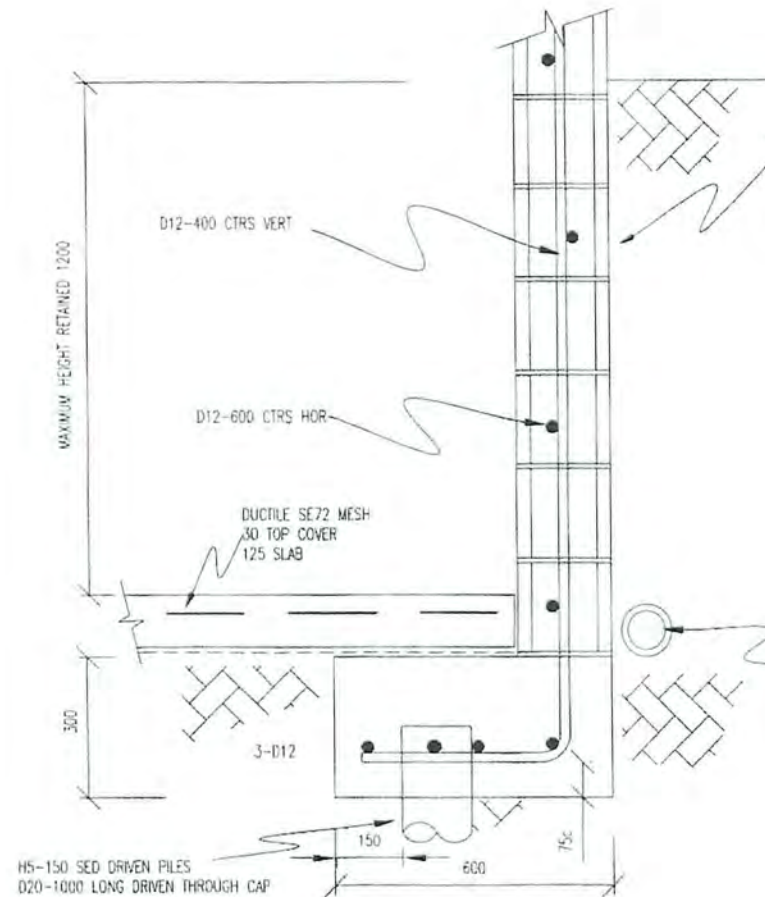
CARGILL EXTENSION TO DWELLING

104 RAUKAWA ROAD
PEKAPEKA

SCALE
AS SHOWN

NAME	DATE	DRAWING NUMBER
FIELDWORK		
DESIGNED	PB 18/7/17	17120 SS1
DRAWN	PB 19/7/17	
CHECKED	PB 19/7/17	

SHEET 1 OF 2 SHEETS



FD3

NOTES:

ALL BLOCKWORK TO BE GRADE B MASONRY ALL CELLS FILLED WITH 20MPa GROUT CONTAINING CAVEI.

ALL GROUTING SHALL BE CARRIED OUT USING THE HIGH LIFT METHOD

CONSTRUCTION TO BE IN ACCORDANCE WITH NZS4210 OR 4229 AS APPROPRIATE

VERTICAL CONTROL JOINTS SHALL BE PROVIDED AT MAXIMUM 6.0 METRE CENTRES TO DETAIL NZS4229 FIG 12.2

PROVIDE CLEAN OUT PORTS AT 600 CTRS

SPICE LENGTHS TO BE:

DIA	GRADE 300	GRADE 500
12	480	720
16	640	960
20	800	1200

REINFORCING:

D DENOTES GRADE 300 DEFORMED
H DENOTES GRADE 500 DEFORMED

NOVAFLO WITH DRAINAGE
METAL AND CARLON CLOTH

No.	AMENDMENT	NAME	DATE

NOTES:

PILES TO BE DRIVEN TO A SET NOT EXCEEDING 100mm PER 10 BLOWS FOR 480kg HAMMER FALLING 1000mm.

RECORD ALL PILE SETS AND LENGTHS AND SUBMIT COPY TO TERTIARY AUTHORITY

PLACE 020-1000 LONG THROUGH PILE CAP
DO NOT TRIM PILES TO LESS THAN 120mm WIDTH

REINFORCING:
D DENOTES GRADE 300 DEFORMED
H DENOTES GRADE 500 DEFORMED

LAP TO REINFORCING TO BE
D12-400mm D16-600mm
H12-500mm H16-750mm

MINIMUM COVER 50mm EXCEPT WHERE SHOWN OTHERWISE, ENSURE 50mm SIDE COVER TO REQ. WIDEN FOOTING OR CRANK H12 AS REQUIRED

CONCRETE STRENGTH TO BE 20MPa AT 28 DAYS.
VIBRATE ALL CONCRETE WHEN IN PLACE. ADD NO WATER ON SITE.

PROVIDE 24 HOURS NOTICE FOR INSPECTIONS

Base Consulting Engineers Limited



279 Oxford Street
P.O. Box 434
Lynn 5540

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CARGILL EXTENSION TO DWELLING

104 RAUKAWA ROAD
PEKAPEKA

SCALE
AS SHOWN

NAME	DATE	DRAWING NUMBER
FIELDWORK		
DESIGNED	PB 18/7/17	17120 SS2
DRAWN	PB 19/7/17	
CHECKED	PB 19/7/17	

SHEET 2 OF 2 SHEETS



Job CAYMAN EXTENSION TO DWELLING
104 LAUCIANA ROAD, PEKAPLEKA

By P. BORTON

Date 18/7/17

PREAMBLE

To provide the structural design for foundations and block retaining wall as per drawings provided.

A Foundation Investigation in July 2010 by BCU reveals loose sand 60 depth. Design to use driven timber piles.

Design to be in accordance with
AS/NZS 1170 Structural Design Actions
NZS 3101 Concrete Code
NZS 4230 Masonry Code

LOADINGS	Wall	20 series	dead	4.47kN
	Roof	ds	dead	0.40kN
			live	0.25kN
	Floor	100 slab	dead	2.40kN
			live	1.50kN

Determine Pile Capacity ϕ_{Rn}

$$\phi_{Rn} = \frac{W_k H}{5 + C_2} \quad \begin{matrix} 480 \text{ kg hammer} \\ 1000 \text{ mm fall} \\ 10 \text{ set} \end{matrix}$$

$$= 40 \text{ kN}$$

Consider Retaining Wall

Height retained $h = 1.20 \text{ m}$

backfill density $\rho = 18.5 \text{ kN/m}^3$

angle of repose $\phi = 34^\circ$

backfill slope $\psi = 0^\circ$

Rankine Coefficient of Active Earth Pressure

$$K_a = \tan^2(45 - \frac{\phi}{2})$$

$$= 0.28$$



Job

By

Date

Determine Wall Moment M_s

$$M_s = k_a p g h^3 / 6$$

$$= 0.28 \times 18.5 \times 1.2^3 / 6$$

$$= 1.5 \text{ kNm}$$

For D12-600 dia

$$A_s = 188 \text{ mm}^2$$

$$\phi M_b = A_s f_y (d - 0.5a)$$

$$= 0.85 \times 0.6 \times 188 \times 300 (195 - 3.6)$$

$$= 2.5 \text{ kNm} \quad \text{ok}$$

$$a = \frac{A_s f_y}{0.85 f'_c b}$$

$$= \frac{188 \times 300}{0.85 \times 1200}$$

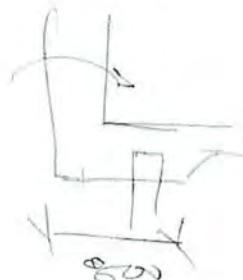
$$= 6$$

Foundation

Overturning Moment M_b

$$M_b = k_p p g (h + h_b)^3 / 6$$

$$= 3.5 \text{ kNm}$$



Reckoning Moment

$$W_w = 4.47 \times 1.8$$

$$W = 8.0$$

$$x = 0.7$$

$$W_x = 5.6$$

ok

800 x 300
Fig.

$$1.2k_1 + 1.5k_2$$

$$m^x = 1.2 (4.47) 2.4 + 1.2 (0.4) 3.1 \times 1.5 + [1.2 (0.185) 2.4 + 1.5 (1.5)] 2.0$$

$$= 21.6 \text{ kNm}$$

$$\text{For } S_{max} = \frac{\phi M_b}{S}$$

$$= 1.8$$

Design Moment M^x

$$M^x = w l^2 / 8$$

$$= 21.4 \times 1.8^2 / 8$$

$$= 8.7 \text{ kNm}$$

use 3-D12





Job

By

Date

For external footing

$$W = [1.2(0.4) + 1.5(0.25)] 1.9 + 1.2(0.125) 24 + 1.5(1.5) 2.0 \quad 1.1$$

$$= 13.3 \text{ kN}$$

For piles @ 2.1 m o/c

Design Moment M^*

$$M^* = W l / 8$$

$$= 13.3 \times 2.1^2 / 8$$

$$= 7.3 \text{ kNm}$$

2. D12 350W x 350H



Moment Capacity ϕM_b

OK $A_s f_y (d - 0.5 a)$

$$= 0.85 \times 226 \times 300 (350 - 75 - 6 - 6)$$

$$15.1 \text{ kNm} - \text{OK}$$

$$a = \frac{A_s f_y}{0.85 f'_c b}$$

$$= \frac{226 \times 300}{0.85 \times 20 \times 350}$$

$$= 11 -$$

Ext Fty
350 x 350
2-D12
piles
@ 2100 o/c

Consider Lounge Slab

For no internal

$$W^* = 1.2(24) 0.125 + 1.5(1.5) \quad 5200$$

$$= 5.85 \text{ kN}$$

Design Moment M^* for slab

$$M^* = W l^2 / 8$$

$$= 5.85 \times 4.4^2 / 8$$

$$= 14.1 \text{ kNm}$$

$$S = 5.2 - 2(0.4)$$

$$= 4.4 -$$

For 125 slab bottom slab in tension $Z_b = 2604 \text{ cm}^2$

$$P_b = \frac{M^*}{Z_b}$$



Job _____

By _____

Date _____

$$P_b = \frac{14.1 \text{ EG}}{2604 \text{ EG}}$$

$\approx 5.4 \text{ MPa}$ excessive

use central beam, $S_{max} = 5.9 - 2 \left(\frac{0.3}{2} \right) = 2.6 \text{ m}$

Design Moment M^*

$$M^* = 5.85 \times 2.6^2 \frac{1}{8}$$
$$\approx 5.1 \text{ kNm}$$

$$P_{be} = \frac{5.1 \text{ EG}}{2604 \text{ EG}}$$

$\approx 2.0 \text{ MPa}$ accept

For central beam

$$W_b^* = 5.85 \times 5.9 \frac{1}{2} \approx 17.3 \text{ kNm}$$

$$S_{max} = \phi_{b_y} \frac{W_b^*}{W_b} \approx 2.3 \text{ m} \quad \text{say } S = 2.0 \text{ m}$$

$$M^* = 17.3 \times 2.0^2 \frac{1}{8}$$
$$\approx 8.7 \text{ kNm} \quad \text{accept } 2 - 12$$

125 slab

central
long beam

300 x 300

2 - 12

piles @ 2000

JOB NAME: Cargill Dwelling

ENGINEER: P BOLTON

JOB NUMBER: 17120

DATE: 19/07/2017

DESCRIPTION: 104 Raukawa Road Pekapeka

CANTILEVER WALL

NOTE: SPREADSHEET ADOPTS PENDER PROVISIONS FOR FACTORED LOAD/FACTORED RESISTANCE FOR CANTILEVER WALL DESIGN INSTEAD OF PARTIAL FACTOR OF SAFETY METHOD OF NZS4203:1992

WALL DIMENSIONS			
Width stem - top	0.2 m		
Width stem - bottom	0.2 m		
Height stem	2.4 m		
Height retained	1.2 m => Ratio	0.50	
Slope stem	0 degrees	0.000 rads	
Depth footing	0.3 m		
Length toe	0.40 m	Length of Footing	
Length heel	0.00 m	L.F	0.6
SOIL AND WALL PROPERTIES			
Overburden	0.0 m		
Applied Surcharge	0.0 kPa		
Surcharge	0.0 kPa		
Applied Gravity Loads	0.0 kN/m @	0.1 m (horizontally)	
Applied Live Loads	0.0 kN/m @	0.1 m (horizontally)	
Density backfill	18.5 kN/m ³		
Density wall material	24 kN/m ³		
Density footing	24 kN/m ³		
Undrained Shear Str	100 kPa	For use with shear key design	
Ult. Soil Bearing Strength	300 kPa		
Angle internal friction	34 degrees	0.593 rads	
Angle passive pressure	20 degrees	0.349 rads	
Slope backfill	0 degrees	0.000 rads	
Active Pressure Coef Ka	0.25		

SEISMIC PARAMETERS			
Consider Seismic Factors	Yes	Risk Factor	1.0
Seismic Zone	A	Horiz. Accel Coef K_h	0.2 g = 25% R*Z*Lu
Risk Category	IV	Vert. Accel Coef K_v	0.0 g
Zonal Coef	0.8	theta	11 degrees
ULS Lu	1.0	EQ Active Pressure K_{aEQ}	0.41

DESIGN ACTIONS (For 1m strip wall)			
Weight stem	10.37 kN @	0.10 m (horizontally)	
Weight footing	3.89 kN @	0.30 m (horizontally)	
Weight soil on heel	0.00 kN @	0.00 m (horizontally)	
	0.00 kN @	0.00 m (horizontally)	
	0.00 kN @	0.00 m (horizontally)	
Soil active force	7.81 kN @	0.50 m (vertically)	
Soil/soil (or conc) fric. force	2.94 kN @	0.00 m (horizontally)	
Surcharge force	0.00 kN @	0.75 m (vertically)	

SEISMIC DESIGN ACTIONS (For 1m strip of wall)			
Active Thrusts			
P_a	5.29 kN		
P_{aEQ}	0.00 kN		
P_A	5.29 kN		
P_{aEQ}	0.00 kN at TOF	0.00 at Base of Footing	
P_{aEQ}	5.40 kN at TOF	7.78 at Base of Footing	
ΔP_{aEQ}	0.10 kN		
$P_{aHorizontal}$	4.88 kN @	0.50 m (vertically)	
$\Delta P_{aEQ Horizontal}$	0.10 kN @	0.90 m (vertically)	
$P_{aEQ Horizontal}$	0.00 kN @	0.75 m (vertically)	

Stem Moments			
Ultimate stem moment Static	2.00 kNm/m		
Ultimate stem moment EQ	0.11 kNm/m		

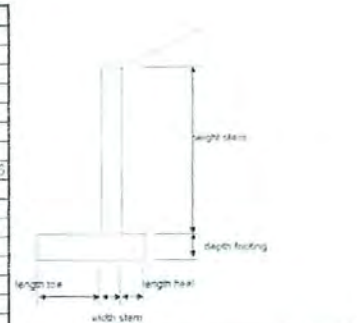
Footing Bearing Static			
Vertical force Static	17.19 kN/m		
Location of Vertical Force	0.128 m (horizontally)		
Moments about heel	6.11 kNm/m		
Resisting force acts at	0.355 m (from heel)		
Bearing area	0.49 m ²		
Bearing stress req. Static	70.3 kPa	OK	

Sliding Static (For 1m strip wall)			
Friction capacity	6 kN		
Sliding / Resisting	74% therefore	Check Key	
Force on Shear Key	2 kN		
Min. Depth Shear Key h_s	0 mm short term		
Assumes cohesive soils. Neglects effects of key depth			

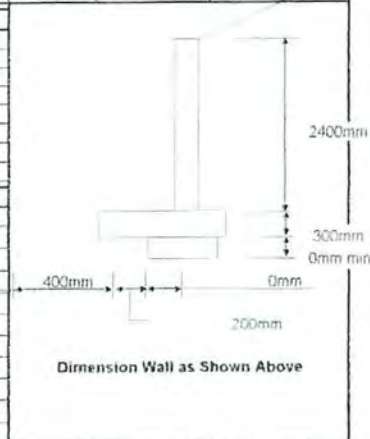
Base Shears			
Base Shear Static	7.8 kN/m		
Base Shear EQ	5.0 kN/m		

Footing Bearing EQ			
Vertical force EQ	16.13 kN/m		
Location of Vert Force	0.128 m (horizontally)		
Moments about heel	4.50 kNm/m		
Resist. force acts at	0.285 m (from heel)		
Bearing area	0.57 m ²		
Bearing stress req. EQ	56.6 kPa	OK	

Sliding EQ (For 1m strip wall)			
Friction capacity	5 kN		
Sliding / Resisting	69% therefore	Check Key	
Force on Shear Key	2 kN		
Min. Depth Shear Key h_s	0 mm short term		
Assumes cohesive soils. Neglects effects of key depth			



Load Factors	
L.F. Dead	0.90
L.F. act. Static	1.60
L.F. act. EQ	1.00
ϕ bearing	0.50
ϕ sliding	0.80

**NOTES:**

- Calculations do not account for water pressure i.e. assumes wall is fully drained
- Cohesion of the soil is ignored. Except in shear key design
- Passive resistance of soil acting on footing is ignored

JOB NAME: Cargill Dwelling ENGINEER: P BOLTON
 JOB NUMBER: 17120 DATE: 19/07/2017
 DESCRIPTION: 104 Raukawa Road Pekaheka

Concrete Block Retaining Wall Design

WALL DIMENSIONS (Modify these dims in the stability sheet)			
Width stem - top	0.2 m		
Width stem - bottom	0.2 m		
Height stem	2.4 m		
Slope stem	0 degrees	0.000 rads	
Depth footing	0.3 m		
Length toe	0.40		
Length heel	0.00 m		

Strength Reduction Factors	
Masonry Bending	0.85
Masonry Shear	0.75
Concrete Bending	0.85
Concrete Shear	0.75

Block Wall Details			
Block Width	200 mm		
Block Comp. Str. f_m	12 MPa		
Grade of Reinf. Steel	500 MPa		
Vertical Bar Size	12 mm		
Max. Vert. Spacing	600		
Vertical Bar Spacing	400 mm ==>	2.5 bars/m	
depth to bars d	95 mm ==>	89 mm clear cover	
A_s Vertical	283 mm ² /m		
ρ vertical	0.14%	OK	
Horizontal Bar Size	12 mm		
Max. Vert. Spacing	600		
Horizontal Bar Spacing	400 mm ==>	2.5 bars/m	
A_s Horizontal	283 mm ² /m		
ρ horizontal	0.14%		

Block Wall Capacities			
Bending			
Str. Red. Factor ϕ	0.85		
$A_s * f_y$ Vertical	141372 N		
depth stress blk a	13.9 mm		
effective moment arm	88 mm		
Net moment capacity	1.2E+07 Nmm		
ULS Moment Demand	2.0		
$\phi M_{vertical}$	10.6 kNm	OK	
Capacity / Demand	5.29		

Shear Friction Across Base			
Required A_v	0 mm ² /m	OK	
Coef of Friction μ	1 See [7.3.8.5]		
Shear Across Wall			
Max Shear Demand	7.8 kN/m Out-of-plane		
Shear Stress v_v	0.04 MPa	OK	
Masonry v_m	0.56 MPa		
Shear Capacity	84 kN/m Out-of-plane	OK	

Wall Reinforcing Summary	
Provide YD12s at 400mm crs. Vertically, 89mm cover.	
Provide YD12s at 400mm crs. Horizontally	

Concrete Toe Details			
Thickness of Toe	300 mm		
Conc. Comp. Str. f_c	25 MPa		
Grade of Reinf. Steel	500 MPa		
Bottom Bar Size	12 mm		
Max Bar Spacing			
Bottom Bar Spacing	400 mm	2.5 bars/m	
Clear Cover	75 mm	219 mm	
A_s Bottom	283 mm ² /m		
ρ bottom	0.09%		
Transverse Bar Size	12 mm		
Number of bars	3 bars		
Trans. Bar Spacing	213 mm	4.7 bars/m	
A_s Transverse	532 mm ² /m		
ρ vertical	0.18%		

Concrete Toe Capacity			
Bending			
Str. Red. Factor ϕ_s	0.85		
$A_s * f_y$ Vertical	141372 N		
depth stress blk a	6.7 mm		
effective moment arm	216 mm		
Net moment capacity	3.0E+07 Nmm		
ULS Moment Demand	2		
$\phi M_{vertical}$	26 kNm	OK	
Capacity / Demand	12.96		

Shear			
Str. Red. Factor ϕ_s	0.75		
Basic Shear stress	0.40 MPa		
Basic Shear Capacity	87 kN		
Vertical Shear Demand	17 kN		
Fact. Shear Cap ϕV_n	65 kN	OK	
c 16			
cb 51.8181818 OK			

Toe Reinforcing Summary	
Provide YD12s at 400mm crs. Longitudinally with 75mm bot. cover	
Provide 3 YD12 bars transverse	

J0010



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Demand Calculation Sheet

single storey

V06/11

Job Details

Name Cargill
 Street and Number 104 Raukawa Rd
 Lot and DP Number
 City/Town/District Peka Peka
 Designer tjh
 Company Name T & M Design
 Date 9/08/2017



Select Lining Option

10 or 13 mm GIB® Plasterboard

Building Specification

Number of storeys	single	
Floor Loading	2kPa	
Foundation Type	slab	
	Single Floor	Complete Single Floor
		Column only
Cladding Weight	heavy	
Roof Weight	light	
Room in Roof Space	no	
Roof Pitch (degrees)	3	
Roof height above eaves (m)	0.2	
Building height to apex (m)	2.6	
Ground to lower floor level (m)	0.2	
Stud Height (m)	2.6	
Building Length (m)	15.0	
Building Width (m)	8.0	
Building Plan Area (m2)	73	

Building Location

Wind Zone	Very High	Earthquake Zone	Soil Type
Select by Building Consent Authority Map		3	D&E (deep to very soft)
or Preference	Very High	Annual exceedance probability	
Wind Region	Preference selected	1/500 (NZS3604:2011 default)	
Lee Zone	Preference selected		
Ground Roughness	Preference selected		
Site Exposure	Preference selected		
Topographic Class	Preference selected		

Bracing Units required for Wind

Demand W (BU)		
		Walls single
along	slab	273
across	slab	473

Bracing Units required for Earthquake

Demand along / across E (BU)	
	Walls
	single
slab	600

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SINGLE OR UPPER STOREY WALLS ALONG

V06/11

[illegible]

GIB EzyBrace® 2011 Software



SINGLE OR UPPER STOREY WALLS ACROSS

V06/11

[illegible]



J0011

Design Navigator H1 Compliance Report



Project Summary

H1 Report created by:	T & M Design Ltd
Project Name:	Cargill Addition
Client:	Cargill
Lot No:	
Comment:	
Project Id:	104219
Report Date:	08/09/2017

Compliance Result

This report shows compliance of the design with Clause H1 Fourth edition Amendment 3 from January 2017 and the R-value targets of Clause E3 Second edition Amendment 6 from January 2017.

This building complies with H1 via the following methods:

- the Calculation Method in NZS4218:2009

H1 Compliance Details

NZS4218:2009 Calculation Method Compliance

The use of the Calculation Method is permitted .

In order to comply the Actual Heat Loss must be the same or smaller than the Reference Heat Loss AND all component R-values must be the same or larger than 50% of the R-values in the '50% Rule' table below. This design **complies** with the NZS4218:2009 Calculation Method.

HeatLoss:

Reference building	Proposed building
247	232

Minimum R-values ("50% rule"):

	Permitted Minimum	Proposed Minimum	
Floor:	0.65	1.04	✓
Non-solid Walls:	0.95	1.35	✓
Roof:	1.45	3.5	✓

The Reference building has the following areas and R-values.

		Non-solid	Solid Timber	Other Solid
		100.0	0.0%	0.0%
Floor:	Area: 74 m ² R-values:	1.3	1.3	1.5
Walls excl. glazing:	Area: 76.4 m ² R-values:	1.9	1.2	1
Glazing (up to 30%):	Area: 32.8 m ² R-values:	0.26	0.26	0.26
Glazing (surplus of 30%):	Area: 0 m ² R-values:	0.4	0.34	0.31
Roof:	Area: 70 m ² R-values:	2.9	3.5	3.5
Heat Loss:		247	267	272

For mixed constructions the heat loss of the reference building is calculated as the sum of the heat losses for each type of wall construction multiplied by the fraction of the wall area of each type. This approach is based on clause 4.2.6 of NZS4218:2009. There are no skylights in the reference building. The reference building roof area is the sum of the proposed building roof and skylight areas.

Compliance with Clause E3

This building complies with the R-value targets in NZBC Clause E3 .

Component	Minimum R-value	Project R-value
Framed wall constructions with cavities	1.5	
Single skin masonry wall without a cavity	0.6	
Solid timber wall no less than 60 mm thick	0.6	
Roof or ceilings	1.5	

Design Details

Building Dimensions

Floor Area	<input type="text" value="74"/> m ²
Gross Wall Area	<input type="text" value="109.2"/> m ²
Net Wall Area	<input type="text" value="85.2"/> m ²
Wall (North) Area	<input type="text" value="13"/> m ²
Wall (East, South and West) Area	<input type="text" value="72.2"/> m ²
Gross Roof Area	<input type="text" value="70"/> m ²
Net Roof Area	<input type="text" value="70"/> m ²
Glazing Area	<input type="text" value="24"/> m ²
Window (North) Area	<input type="text" value="0"/> m ²
Window (East, South and West) Area	<input type="text" value="24"/> m ²
Skylight Area	<input type="text" value="0"/> m ²

Glazing Areas

Total Vertical Glazing Percentage	<input type="text" value="22"/> %
East, South and West Window Percentage	<input type="text" value="24.9"/> %
Total over 30%	<input type="text" value="no"/>
East, South and West over 30%	<input type="text" value="no"/>
Total over 50%	<input type="text" value="no"/>
max. Skylight Area for Schedule Method	<input type="text" value="1.5"/> m ²
Skylights over Schedule Method Limit	<input type="text" value="no"/>
Decorative Glazing	<input type="text" value="0"/> m ²
Decorative Glazing over 3m ²	<input type="text" value="no"/>

Information required for BPI calculation

Living Floor Area	<input type="text" value="0"/> m ² Note: This includes also internal floors.
Average Room Height	<input type="text" value="0"/> m

Thermal Mass Level

Suspended timber floor with timber framed walls or a heavily carpeted slab floor with timber framed walls.

Climate

Location	<input type="text" value="Paraparaumu"/>
Climate Zone	<input type="text" value="2"/>

Heat Loss Details

	ID	Orient.	Width	Height	Gross Area	Net Area	R-value*	Heat Loss	Shad. Coeff.**	Solid Wall***
<u>Floors</u>										
Floor 1	f1				74.0	74.0	1.04	71.2		
<u>Walls</u>										
Wall 1	w1	N	5.0	2.6	13.0	13.0	2.53	5.1		C
Wall 2	w2	E	19.0	2.6	49.4	29.0	2.53	11.5		C
Window 2-1	1		2.4	2.4		5.8	0.26	22.2	0.00	
Window 2-2	2		2.4	2.4		5.8	0.26	22.2	0.00	
Window 2-3	3		3.0	2.0		6.0	0.26	23.1	0.00	
Window 2-4	4		2.4	1.2		2.9	0.26	11.1	0.00	
Wall 3	w3	S	4.0	2.6	10.4	10.4	1.35	7.7		C
Wall 4	w4	W	14.0	2.6	36.4	32.8	1.35	24.3		C
Window 4-1	1		1.8	2.0		3.6	0.26	13.8	0.00	
<u>Roofs</u>										
Roof 1	r1				70.0	70.0	3.50	20.0		
<u>Total Heat Loss</u>								232.1		

* Any concrete slab-on-ground floor regardless of its dimensions can be assumed to have an R-value of at least R-1.3 (H1/AS1 2.1.5).

** The Shading Coefficient is only required for BPI calculations.

*** C: Cavity Construction (any construction that is not solid), T: Solid Timber, S: Other Solid Construction (Note that the use of solid timber and other solid construction types is discretionary, i.e. solid timber walls and other solid walls can be treated as if they are non-solid (NZS4218:2009 section 4.1.3.).)

Floor Construction Details

Name:

Floortype 1

1.04
m²K/W

Type: Floor: Slab floor

internal surface 0.09	
Flooring :	
none (Example: polished surface of a concrete floor) ▼	
R-value: 0.00	
Slab Insulation	
Slab floor area [m ²]:	74
Perimeter length [m]:	45
External wall thickness [mm]:	100 i
Soil conductivity [W/m °C]	1.2 i
Underslab insulation:	none ▼ i
Piles Footings: Number:	Penetration Diameter: —
Slab edge insulation:	none ▼ i

Wall Construction Details

Name:

Walltype 1

2.53
m²K/W

Type: Wall: Timber frame with vented cavity

external surface 0.03	
Cladding : Plywood 12mm ▼	
R-value: 0.09	
Air Barrier : Building paper ▼	
R-value: 0.01	
Timber Frame & Cavity : 144mm, studs @ 600mm, dwangs @ 800mm ▼	
Wall Frame Area: 14.4%	Cavity Area: 85.6%
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : R-value: 1.19	Pink®Batts® Ultra R2.6 Wall 2.6
	still Airgap: none ▼
	R-value: 0.00
Wall Lining : Gypsum plasterboard 10mm ▼	
R-value: 0.04	
internal surface 0.09	

Name:Walltype 2**1.35**
m²K/W

Type: Wall: Solid wall (concrete, masonry or other) without vented cavity, with internal insulation

external surface 0.03	
Cladding : <input type="text" value="Plaster"/>	
R-value: 0.01	
Solid Masonry : <input type="text" value="Standard Blocks, 200mm, all cells filled"/>	
R-value: 0.14	
Strapping : <input type="text" value="Timber batten, 40mm deep, 45mm wide @ 600mm centers"/>	
Strapping Area: 11.0%	
Cavity Area: 89.0%	
Thermal Break : <input type="text" value="none"/>	Expol Platinum R-1.4 Block Wall 1.4
R-value: 0.00	
Strapping :	still Airgap: <input type="text" value="none"/>
R-value: 0.34	R-value: 0.00
Wall Lining : <input type="text" value="Gypsum plasterboard 10mm"/>	
R-value: 0.04	
internal surface 0.09	

Roof Construction Details

Name:Rooftype 1**3.50**
m²K/W

Type: Roof: Timber framed skillion roof

external surface 0.03	
Roofing : <input type="text" value="Butyl membrane"/>	
R-value: 0.03	
Timber Frame & Cavity : <input type="text" value="250mm rafters or joists @ 400mm, blocking @ 900mm"/>	
Roof Frame Area: 15.7%	
Cavity Area: 84.3%	
Framing :	still Airgap : <input type="text" value="10-30mm airgap (non-reflective)"/>
R-value: 2.07	R-value: 0.13
Thermal Break : <input type="text" value="none"/>	Pink®Batts® R3.6 Ceiling 3.6
R-value: 0.00	
Roof Lining : <input type="text" value="Gypsum plasterboard 10mm"/>	
R-value: 0.04	
internal surface 0.09	

23

Ceiling diaphragms

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

Limitations for GIB® plasterboard ceiling diaphragms

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

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

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

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

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

FIGURE 20: PROTRUSIONS AND CUTOUTS

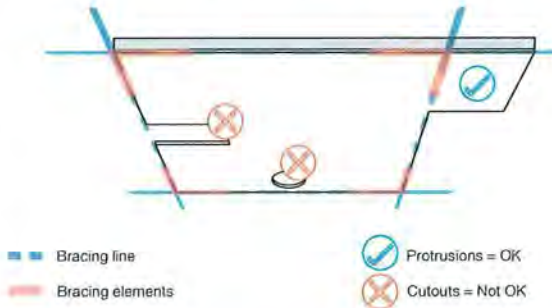


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

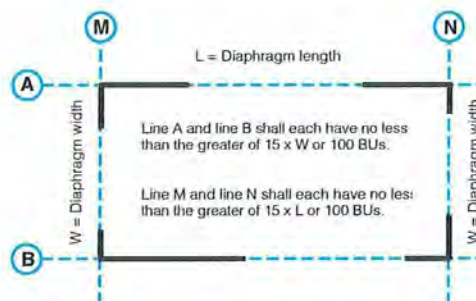


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS

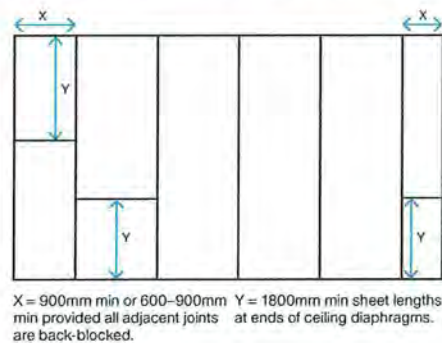
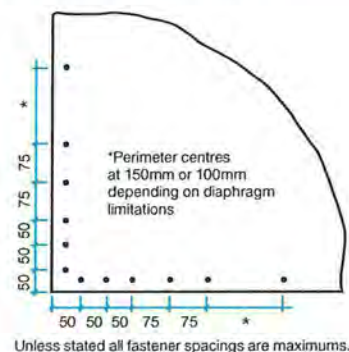


FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



GEB015

Acceptable Solution E2/AS1

Amend 5
Aug 2011

1.0 Scope

This Acceptable Solution covers the *weathertightness* of the *building* envelope. Notes shown under 'COMMENT', occurring throughout this document are for guidance purposes only and do not form part of this Acceptable Solution.

Amend 2
Jul 2005

1.1 Construction included

The scope of this Acceptable Solution is limited to the materials, products and processes contained herein, for *buildings* within the scope of NZS 3604, and:

Amend 2
Jul 2005

- a) Up to 3 storeys with a height measured from lowest ground level adjacent to the *building* to the highest point of the *roof* (except for chimneys, arials and the like) of 10 m or less, and
- b) With floor plan area limited only by seismic and structural *control joints*, and
- c) *External walls* that are vertical, and *roofs* that are 60° or less above the horizontal.

Amend 5
Aug 2011

Where *buildings* are based on NZS 3604, but require specific engineering design input, the *framing* shall be of at least equivalent stiffness to the *framing* provisions of NZS 3604.

Amend 5
Aug 2011

COMMENT:

The floor plan limitations of NZS 3604 may be exceeded up to the point that *specific design* is required to accommodate seismic or wind movement. Beyond that point, *specific design* is required to demonstrate compliance with Clause E2 of the *Building Code*.

Amend 5
Aug 2011

Claddings also required to perform as bracing must comply with NZS 3604. Where a *drained cavity* is used, specific testing can be used to demonstrate that a *cladding* on *cavity battens* can provide the required bracing resistance.

Amend 5
Aug 2011

1.1.1 Attached garages

Attached garages that are integral with the *weathertightness* envelope of the *building* are included within the scope of this Acceptable Solution. Refer to Paragraph 9.1.3.4.

Amend 5
Aug 2011

1.2 Construction excluded

1.2.1 Outbuildings

Outbuildings, such as stand-alone garages and other structures that are unlined, are outside the scope of this Acceptable Solution.

Amend 5
Aug 2011

COMMENT:

Details contained in this Acceptable Solution can be used for outbuildings and unlined structures, but the requirements may be in excess of the minimum required by the *Building Code*.

Amend 5
Aug 2011

This is particularly the case in regard to unlined and uninsulated *buildings*, where a *drained cavity* is unlikely to be necessary.

However, care must be taken, as some *weathertight* details depend on the presence of an internal *lining* to provide pressure equalisation behind the *cladding*.

Amend 2
Jul 2005

1.2.2 Spread of flame

Buildings with *drained cavities* and spread-of-flame requirements, as specified in NZBC C Clauses, are outside the scope of this Acceptable Solution. Cavities in such circumstances must be specifically designed for both *weathertightness* and spread of flame.

Amend 5
Aug 2011

COMMENT:

Options could include the provision of a *fire rated* wall behind the battens, or breaking the cavity at each floor and providing a cavity *flashing* and *fire stop* at each level.

Amend 5
Aug 2011

1.2.3 Acoustics

Buildings with *drained cavities* and acoustic requirements, as specified in NZBC Clause G6, are outside the scope of this Acceptable Solution.

Amend 2
Jul 2005

COMMENT:

Cavities in such circumstances must be specifically designed for both *weathertightness* and acoustic performance.

1.3 Provisions for snow

Specific design for preventing the ingress of snow melt water is required when the open ground snow load S_g , as defined in NZS 3604, exceeds 1.0 kPa, and the roof is *constructed* in a way that is likely to cause a build-up of snow.

Amend 2
Jul 2005

Amend 5
Aug 2011

COMMENT:

Hidden gutters, parapets and skylights are examples of features within a roof design that are likely to cause a build-up of snow.

However, some additional work, such as extra fixings that penetrate *flashings*, can lead to details that need to be considered in terms of *specific design*.

Amend 2
Jul 2005

Additional or alternative details may be required that need supporting documentation or testing to demonstrate compliance in regard to *weathertightness*.

Amend 2
Jul 2005

1.4 Specific design

Buildings, components or junction details not included or shown in this Acceptable Solution require specific design.

Amend 5
Aug 2011

Amend 2
Jul 2005

Amend 5
Aug 2011

1.5 Qualifications

Amend 2
Jul 2005

COMMENT:

An understanding of the proper methods of design and installation and the importance of the correct *construction* sequence is essential if an NZBC compliant *building* is to be achieved. Adequate training by those designing and applying particular products and *claddings* is therefore highly recommended.

Amend 5
Aug 2011

Amend 5
Aug 2011

The design, installation and alteration of *claddings* will be 'restricted work' under the licensed building practitioner scheme, due to take effect in 2012. Until then, the use of licensed designers, builders and installers is optional. It is important that product suppliers, manufacturers and NZ agents (for imported products) ensure those handling and applying their products are adequately trained to do so, and that site managers oversee the correct integration of adjoining *building elements* to achieve a complete weathering system.

Amend 5
Aug 2011

Amend 2
Jul 2005

2.3 Systems versus materials

All *building* products shall be considered as part of a system, even if the components of that system are provided from different sources. Materials used to *construct* the *building* envelope shall be designed as a complete *cladding system* rather than as separate items.

Amend 5
Aug 2011

COMMENT:

It is important that the compatibility and *durability* of the combination of materials is able to be demonstrated for any given application.

Amend 5
Aug 2011

2.0 General**2.1 Weathertightness**

Cladding systems shall meet the requirements of NZBC E2.2 to E2.3.7, and the provisions of this Acceptable Solution are acceptable means of achieving this.

COMMENT:

Most manufacturers provide technical literature for their *cladding* materials and systems that include recommendations for design and installation.

Amend 5
Aug 2011

Manufacturers' recommendations may include information additional to that shown in this Acceptable Solution.

2.4 Cladding finish colours

Finish colours for *flush-finished* fibre cement sheet and *EIFS* shall have a reflectivity of 40% or more when measured in accordance with ASTM C1549.

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Aug 2011

COMMENT:

Dark colours cause *claddings* to reach higher temperatures, which results in more thermal expansion and a greater risk of cracking of joints in monolithic *wall claddings*. Risks of cracking are also associated with dark colours on painted timber *wall claddings* and trim. Expansion of metal roofing and *flashings* are affected by dark colours.

Amend 5
Aug 2011

Colour cards from some coating manufacturers may include reflectance values.

Amend 5
Aug 2011**2.5 Maintenance – general**

Maintenance shall be carried out as necessary to achieve the required *durability* of materials, components and junctions.

The extent and nature of necessary maintenance is dependent on the:

- a) Type of *cladding* or components used,
- b) Position of *cladding* or components on the *building*,
- c) Geographical location of the *building*, and
- d) Specific site conditions.

COMMENT:

A deterioration in the appearance of the surface of a *cladding* does not necessarily relate to a deterioration in the *weathertightness* of the *cladding*.

Amend 5
Aug 2011**2.5.1 Regular maintenance**

Regular maintenance of a *building* will include:

- a) Washing exterior surfaces,
- b) Inspecting surfaces and junctions, and repairing or replacing items when necessary, in order to preserve the *weathertightness* of the *building*.
- c) Maintaining clearances between *cladding* and external ground or paving as per Paragraph 9.1.3.
- d) Maintaining minimum 35 mm clearances between *roofing* and *membrane* decking, and *wall cladding* above
- e) Maintaining finish coatings especially for *stucco*, *EIFS* and fibre cement *claddings*.

Amend 5
Aug 2011**COMMENT:**

Washing by rain removes most accumulated atmospheric contaminants, but sheltered areas, such as walls directly below *eaves*, are protected from the direct effects of rain and require regular manual washing.

Some heavily textured surfaces will not be as effectively washed by rain as smoother surfaces, so will require more regular manual washing.

However, it is important that high pressure water is not directed at sensitive junctions such as window surrounds and other *flashings*. Great care must be taken to avoid water being driven past anti-capillary gaps and *flashings* into the *wall* cavities.

3.0 Weathertightness Risk Factors**COMMENT:**

Analysis of inspection reports from leaking *buildings* shows that a high incidence of leaks is associated with junctions within, and penetrations through, the *building* envelope. It also shows serious problems are more commonly associated with *claddings* that have limited capacity to drain and dry out any water that gets behind them, when a leak occurs.

Amend 5
Aug 2011

This Acceptable Solution addresses these problems in two ways:

- a) By providing details for common junctions and penetrations of the *building* envelope, and
- b) By classifying *buildings* within the scope of this document into risk categories, and requiring different *cladding* solutions depending on the *risk score*.

Using the risk assessment, risk factors can be identified and changes may be made to a design to lower the *risk score*.

3.1 Establishing the risk

A risk assessment of the proposed design shall be carried out using a *building* envelope *risk matrix*. This allows the risks related to various features to be aggregated, resulting in a *risk score* for the design.

Figure 1 shows the process that shall be followed in order to assess the risk.

3.1.1 Definitions of risk

Table 1 sets out the definitions of risk levels relating to the location and design features of the *building*.

3.1.2 The risk score

Table 2 sets out the *risk matrix* that shall be used to define the *risk score* for a *building* within the scope of this Acceptable Solution.

A *risk score* is calculated for each external face of the *building*. *Claddings* are then selected from Table 3 according to the *risk scores*, or the highest *risk score* may be used for all *walls*.

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Amend 5
Aug 2011Amend 2
Jul 2005Amend 5
Aug 2011**3.3 Wall claddings**

The following wall *cladding systems* are covered in this Acceptable Solution:

- | | |
|----------------------------------|----------------|
| a) <i>Masonry veneer</i> | Paragraph 9.2 |
| b) <i>Stucco</i> | Paragraph 9.3 |
| c) Timber weatherboards | Paragraph 9.4 |
| d) Fibre cement weatherboards | Paragraph 9.5 |
| e) Profiled metal wall claddings | Paragraph 9.6 |
| f) Fibre cement sheet | Paragraph 9.7 |
| g) Plywood sheet | Paragraph 9.8 |
| h) <i>EIFS</i> | Paragraph 9.9. |

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Other wall *claddings* are outside the scope of this Acceptable Solution.

Figure 1: How to assess risk
Paragraph 3.1

Step One:
Obtain
Detailed
Drawings

Suitably detailed drawings are required to assess *weathertightness* risk. This documentation may include a site plan, floor plans, elevations, details of junctions and penetrations, and the presence of features like *decks* and *pergolas*.

Step Two:
Assess Each
External Face
Against Risk
Factors

Assess the drawings for each external face to determine the *risk score* for each risk factor. These are:
Wind zone
Number of storeys
Roof/wall intersection design
Eaves width
Envelope complexity
Deck design
Refer Table 1.

Step Three:
Complete the
Building
Envelope Risk
Matrix Table

Complete the "Building envelope risk matrix" (Table 2) for each face of the *building*.

It is possible for different elevations to have different *risk scores*.

Step Four:
Determine
Suitable
Cladding

Consult Table 3; Suitable wall *claddings* to determine what *cladding* types are recommended with the *risk score* for each face.

The *cladding* selected must be appropriate for the score on that face, but can be beyond the minimum required (i.e. *cladding* suitable for a higher score can be used).