

APPLICATION



001

FAR NORTH DISTRICT COUNCIL
Approved Documents

SPECIFICATIONS

ORDING & YARDLEY RESIDENCE



SPECIFICATION

November 2013

Specification of the work to be done and the materials to be used in the erection and completion of additions to a residence as per the accompanying plans.

for

J Ording & I Yardley

at

SH10, Mangonui

This specification is to be read in conjunction with the accompanying plans and any other drawing which may be issued during the currency of the contract. Any item in this specification and not shown on the plans and vice versa shall be equally binding as though included in both.

If there are any inconsistencies, errors or omissions in or between documents, the contractor must seek direction in resolving it. Figured dimensions take precedence over scaled dimensions.

The contract and plans shall be signed and completed by all parties before the commencement of any work on the site. Any additions, omissions or variations to the contract shall be authorised in writing and agreed price stated.

Items specified in quote take precedence over this specification.

The owners are to ensure that all boundary marker pegs are in place and exposed for inspection.

CONTRACT DOCUMENTS

1. The accompanying plans
2. This specification
3. Construction - N.Z.S. 3604:2011 and updates
4. Builders quote
5. Contract NZS 3915:2005

PRELIMINARY AND GENERAL (ALL TRADES)

1. Consents

The owner shall arrange to obtain all consents to build. The contractor shall arrange all inspections as required by the local authorities. Obtain the original or copies of the building consent form and documents from the owner and keep on site. Liase with the territorial authority and/or the building certifier for all the required notices and all inspections required during construction to ensure compliance. Arrange for final inspection for Code of Compliance and provide as built drainage plans.

2. Producer Statements

When producer statements verifying construction are required, provide copies to both the territorial authority and the owner.

3. Protection of work

All parts of the work liable to injury and all adjoining property, existing work, foot ways etc. are to be protected until completion of the contract.

4. P C Sums (Net sums)

The P C sums quoted in contractors quote are net and the contractor or subcontractor concerned must add cartage, fixing charges and profit he required to all such items.

5. Site

Area to be built onto shall be cleared of all vegetation by contractor. Excavation is to be included by contractor. Any excess soil is to be left on the site. Access to the site to be provided by owner (all weather vehicle access).

6. Regulations

The whole of the work in this contract is to be carried out in strict accordance with the local authorities, NZ Building Code and NZ Building Act 2004.

7. Extent of work

This contract comprises the erection and completion in the soundest and most workmanlike manner of all the work shown on the accompanying plans and in accordance with this specification and the supply of all plant, tools, labour, materials, fixtures and fittings required for the due completion of this work.

8. Insurance

The contractor shall at all times, keep the whole of the works fully covered by Contractors All Risks Insurance. The contractor shall provide proof of Public Liability Insurance before commencing.

9. Temporary Services

The contractor shall arrange for all temporary services, pay all fees in connection therewith and remove same on completion of the contract. Sheds, power, water, scaffolding, unless otherwise noted in quote.

10. Maintenance

The contractor shall maintain the property for the period of 60 days after completion, and any damage done, arising during that time, through faulty workmanship or materials shall be made good at the contractor's expense.

11. Means of Communication

All directions and approvals to be in writing.

12. Completion

On completion all trade debris is to be removed from the site and the building and windows left clean and ready for occupancy, with all services and mechanical parts in good working order.

EXCAVATOR

1. Generally

Excavate as required for all pile footings etc. as shown on the plans.

Footing excavations are to be taken down to a solid bearing and not to be less than 450mm deep. Excavations are to be stepped to suit the slope of the ground, and kept level at the bottom, maintained free from water or fallen material and shall be firm before placing reinforcing or concrete. Back fill and ram the earth around the foundations after concrete work has firmly set.

CONCRETER

1. Scope of Work

Comprises the setting out, boxing and placing of concrete in the foundations.

2. Materials

Concrete - All concrete shall be certified concrete with a specified strength of 20 MPa at 28 days.

3. Formwork

Construct rigid formwork to form concrete as required.

4. Concrete Footing and Foundation walls

Concrete footings shall be in accordance with NZS 4229 and as detailed on the drawings.

WALL CLADDING

Cladding -brand/type: Hardies Smooth Weatherboard direct fixed, Galv. corner soakers

- finish: Acrylic painted

- fixings: Galvanised

CARPENTER

1. Generally

Allow to supervise and organize all sub-trades and excavations and arrange times of material deliveries.

2. Construction

All materials are to be the best of their respective kinds and grades, laid true to their various lines and levels and constructed in a proper trades manlike manner, to the whole of the works a sound construction in accordance with the local by-laws. All timber work abutting or resting on masonry units, concrete or brickwork is to be protected with bitumen-fabric damp proof course. All work to be done to NZS 3604:2011 and amendments.

Supply and fix the necessary trusses and braces as required to complete the roof framing and as detailed on the plans. Where detailed, the roof framing is to be constructed with engineer designed Mitec trusses, fixed plumb, fastened to the plates with framing anchors, stiffened with runners and braced at each end of the building. Roof battens to be spaced to accommodate the roof covering and ridging and fastened to the trusses as detailed.

3. Exterior finish

All end grain joints are to be given a coat of primer.

Behind all wall linings and as detailed on the plans, fit building paper lapped 100mm.

Grooved fascia and barge boards are to be fixed to level and straight lines, mitred, primed, where joined and fastened with galvanized nails. Soffits to be lined with flat Hardies 4.5mm sheets.

Lay timber spaced boarding for exterior decks. Avoid very short lengths, drill all fixings, stagger end joints and space boards a maximum of 2mm apart. Fix using annular grooved galvanized/stainless steel jolt head nails, heads driven flush with the surface. Nails hand driven. Boards +/- 2mm deviation to straight line.

4. Interior finish

All joints screw holes and other imperfections are to be stopped flush by the painter.

All studs to be straightened before fixing linings. Line walls and ceilings with plasterboard sheets, fastened to the plasterboard manufacturer's requirements. Line by the horizontal method. Line wet area walls with water resistant plasterboard sheets using adhesive and nail fixing to studs at centres to suit the surface finish. Form bracing panels using high density plasterboard sheets fixed with clout-washers and clouts and to conform with NZS 3604, sections 5.8 and 13.5.

Fix plasterboard external angles full length to external corners, with clouts at 100mm each side staggered. Fix plasterboard cornice with adhesive and with joints scribe-fitted to the plasterboard manufacturer's requirements.

Plasterboard jointing and stopping - fill joint recess with bedding compound, centre the paper tape, apply second coat of bedding compound followed by a coat of finishing compound. Allow to dry and lightly sand off. Fill nail holes and flush up external angles with two successive coats of bedding compound followed by a coat of finishing compound. Allow to dry and lightly sand off. All to the plasterboard manufacturer's requirements.

Provide levels of finish to standards laid down by AS/NZS 2589.1 as follows:

Level 4: surfaces receiving light texture or wall covering finishes.

Build in the various fittings as supplied under 'Plumber' and 'Joiner' trim around with splash boards primed and set in mastic and other finishing trim and moldings as required.

Skirtings: 60 x 10 FJ pine. Scotias all 40 x 18 pine to flat ceilings. Supply and fix the sundry internal moldings and trim as required, to match existing.

Interior doors are to be fitted with three 90mm loose pin hinges. Architraves to be fitted in single lengths, fully glued 40 x 10 FJ pine. Interior doors flush paint quality.

All trim window and door frames FJ pine. All internal finishing timbers shall be sanded to remove machine marks and on completion, shall be free of all hammer marks, splits or other defects.

Cut for, attend on, and make good after all trades and provide and fix all necessary blocks for securing the work of all other trades.

All nail holes in exposed work (interior and exterior) are to be punched.

Fit insulation as detailed, to the manufacturer's requirements, and to the requirements of BRANZ Bulletin 357: Thermal insulation of houses. All ceilings to be insulated with Batts. All walls to be fitted with insulation as noted on plans.

Fasten 20mm particleboard (21mm H3.1 plywood to Ensuite only) flooring to the flooring manufacturer's requirements and NZS 3604, section 7.2.3. Punch nails then sand with one coarse and one fine paper, hand sanding into corners.

All wet area walls to be Aqualine Gib. All gib-board to be stopped to Grade 4 painted finish.

WINDOWS

Jamb liners - type/treatment/finish: PQ pine H3.1 preprimed

Catches/finish: Powdercoat

Glass - type: Clear (Obscure to Ensuite)

1. Generally

Window and door reveals as selected with timber jamb liners to NZS 3602.

Glass as selected, with glass details to 46 GLAZING and complying with NZS 4223.

Execution to NZBC E2/VM1, WANZ 'Aluminium Window Handbook' and 'Installation code for aluminium joinery products'.

Install to WANZ WISTTM Window installation System requirements.

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.

Fix frames rigidly in place without distortion, to the window manufacturer's and the Window Association of New Zealand's 'Aluminium Window Handbook' requirements, plumb, true to line and face, weather tight and with all openings operating freely.

Safety glass installation - use in doors, sidelight panels, low level windows and all other locations to comply with NZS 4223, part 3, as modified by NZBC F2/AS1, 1.0 Glazing.

ROOFER

Roofing - type/brand/profile/material: Coloursteel Endura – Profile to match existing
- thickness: 0.40mm

Fixings: metal and frequency to suit roofing, wind zone and exposure zone.

Roofing fitted as per manufacturer's instructions. Allow galvanized coloured screws and apron flashings. Supply and fix all flashings, caps, pointing etc. to make the roof thoroughly watertight and bird proof.

Storage - stack roofing and accessories on clean, level areas of the site. Cover and protect from damage and from weather until ready to fix in place.

Set Out - Overlaps to face away from prevailing wind direction.

Take care to avoid damaging pre-finished roofing both during and after fixing. Mark only with chalk or spirit-based pen. Wear only soft-soled shoes on the finished surface. Remove metal filings daily.

Install profiled metal - use cutting tools recommended by the roofing manufacturer. Fold ends and seal cut edges to the roofing manufacturer's requirements. Fix complete with matching accessories, flashed to roof features and penetrations; all in accordance with the New Zealand Metal Roofing Manufacturers Inc. publication 'NZ metal roof and wall cladding code of practice'.

Provide apron, verge and ridge flashings. Install and fix as detailed and to the roofing manufacturer's details and to comply with NZBC E2/AS1, 4.0 Flashings, 5.0 Roof/wall junctions, and 6.0 Parapets.

PLUMBER AND DRAINLAYER

1. Generally

The whole of the plumbing and drainlaying shall be done in strict accordance with NZS 3500 and drains shall be laid by registered workmen only.

2. Exterior work

Install gully traps set on concrete 50mm above surrounding ground or paving and brought up to protect the top of the fitting. Trowel off.

Supply and fix PVC spouting to all eaves (to match existing), laid with even falls to 80mm diameter downpipes.

3. Water service

Supply existing. Lay on hot and cold water services to the various fittings as shown on the plans All water pipework butylene. PVC waste pipes.

4. Fittings

Provide and set up the fittings as shown on the plans. Contractor to supply all taps, shower mixers, roses, WC as detailed. Fix mirrors with adhesive mirror-mastic and double-sided adhesive tape. Adhesive mastic area 0.25 square metres per 1 square metre of mirror. Regular traps and wastes may be PVC.

5. Drains

Stormwater to be taken in PVC pipes to existing downpipes. Stormwater drainage to be completed as shown on plans. Sewer drains to be PVC pipes, taken to existing septic system, 100mm laid with even falls and easy bends etc. as may be necessary to comply with NZ Standards.

6. Water

Install polybutylene/polyethylene water supply - size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Run pipes complete with all fittings, support and fixing, and jointed to the pipe manufacturer's specifications, all to NZBC G12/AS1, 5.0 Water Supply. Conceal pipework and pressure test before wall linings are fixed. Pressure test to ensure no leakage and leave in proper working order. Clean tapware and fittings.

ELECTRICIAN

1. Generally

This contract includes the supply and installation of the electric wiring system complete. The whole of the work should be carried out strictly in accordance with the local authorities by-law and the electrical contractor is to obtain all permits from the supply authority, pay all fees in connection therewith and arrange all inspections required.

2. Supply

Existing

3. Boards

Existing

4. Lights

Provide and fix the light switches and power outlets as shown on the plans. Contractor to supply and fit all lights.

5. Fittings

Earth all metal waste pipes and metal fittings as required by the regulations.

Install smoke detectors to NZBC F7/AS1, 3.3 Location of smoke alarms, and to manufacturer's requirements, fitted neatly and without damage to the surrounding finish.

PAINTER

1. General

Refer to all other sections which may have clauses affecting work done under this section.

2. Regulations and Standards

All work and materials shall be in accordance with the requirements of the Building Code 2004 and with the New Zealand Building Code Handbook and Approved Documents.

The contractor and subcontractors undertaking this work shall obtain copies of the relevant sections of the New Zealand Building Code and documents relating to acceptable solutions. Where there is conflict between any two Standards the requirements of the New Zealand Standard shall apply.

3. Scope

Paint materials shall be delivered in sound and sealed containers labelled clearly. Work covered by this Specification is to provide all materials and execute all work necessary for the completion of the building decoration and includes all painting, varnishing, staining and polyurethaning.

Interior: All the walls and ceilings except bathroom sealed with gib sealer/undercoat, sanded and given two coats of ultra-low-sheen acrylic (light colour throughout). All doors, window jambs, door frames and wet areas to be given two undercoats and one top coat of semi-gloss enamel.

Exterior: Fascia, soffits and walls to be given two coats acrylic as Resene or equivalent specification.

4. Inspection of Previous Work

The painter shall inspect the finish of all surfaces to be painted, varnished etc. and report to the main contractor any deficiencies, defects, blemishes or contamination which could affect the provision of a first class, permanent finish. Any defects shall be corrected.

5. Workmanship

All work shall be executed in accordance with the requirements of the New Zealand Building Code, the relevant New Zealand Standard, the manufacturer's recommendation and to the best of trade practice. Before commencing any painting work, all exposed hardware and fittings which would be subject to damage by paint shall be removed and carefully stored ready for re-fixing in first class condition on completion of the painting work.

6. Completion

Remove all scaffolding, planks, rubbish and debris, thoroughly sweep up, clean windows inside and out, replace all hardware removed during the course of the work and leave the premises ready for occupation.

COMPLETION

On completion the building is to be left clean and tidy, windows and other glasswork cleaned, and all trade debris is to be removed from the site and the building left clean and ready for occupancy.

HEALTH AND SAFETY IN EMPLOYMENT

The contractor shall diligently fulfill its obligations under the Health and Safety in Employment Act and shall hold harmless the client by attending to all matters contained in the following list:

The subcontractor shall comply with the following: Government statutes, Council by-laws, Codes of Practice, guidelines, manufacturers specifications of equipment used. The subcontractor will have, prior to the commencement of the Contract: identified hazards to employees, eliminated and/or isolated hazards if practicable, identified hazards and protected employees where elimination and isolation are impractical. Include hoarding to isolate site, ie: Safetyzone Fences, (09) 407-8704 or equivalent.

The subcontractors Health and Safety Policy and programme and the implementation of that policy and programme shall include: Health and Safety rules, safe work practices, accident investigation procedures, hazard investigation and control, standards, of training to ensure that staff are adequately trained, emergency procedure, safety equipment, specific job instructions, procedures and work permits applicable.

DISCLAIMER

The Drawings and Specification form one document. Any item appearing in the one but not the other shall be deemed to appear in both.

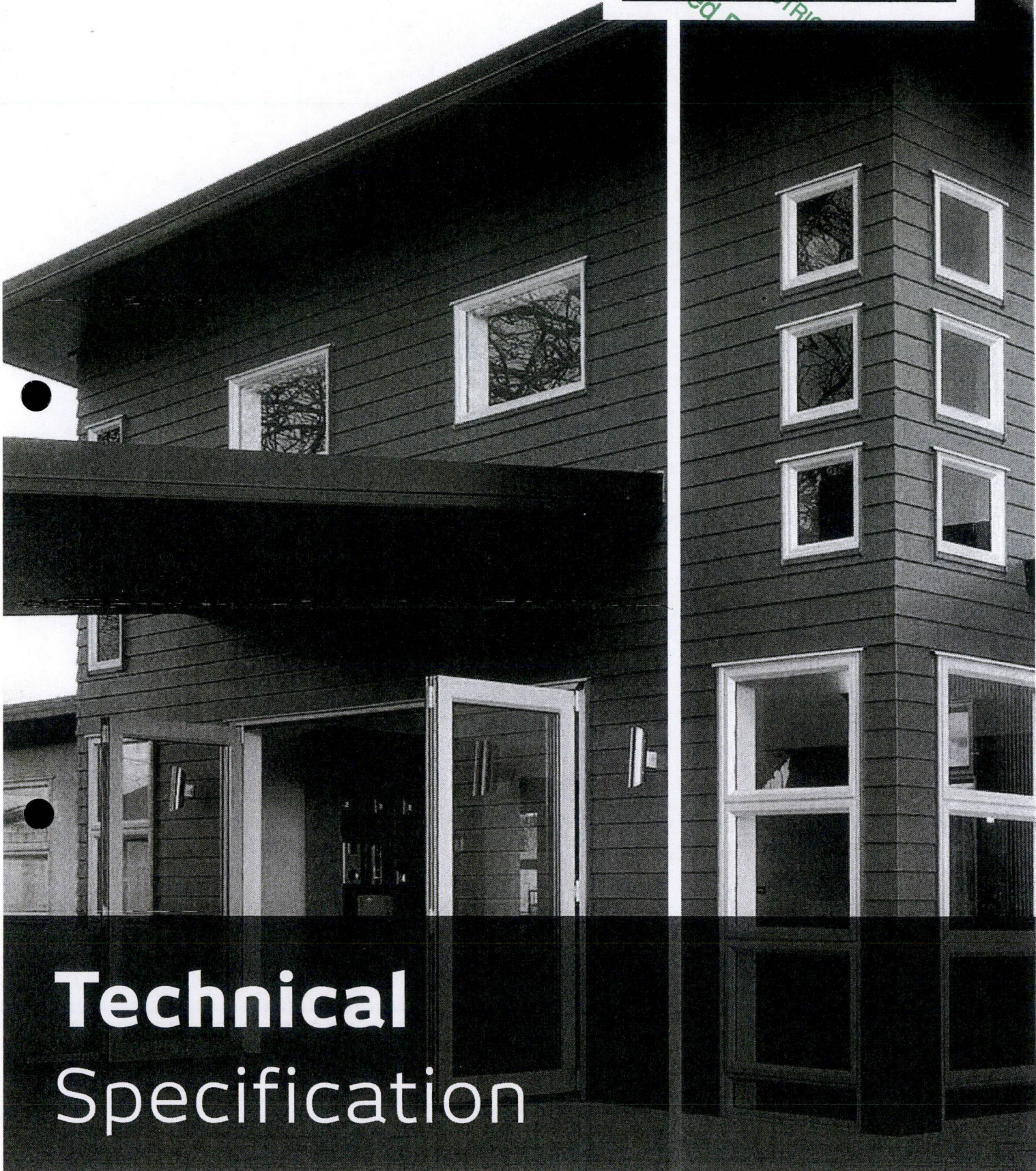
The Tender Documents show the extent of the work but there is no warranty expressed or implied that they show each and every minor detail or item required to be included by contractors submitting Tenders.

Should any material or work appear to be inadequately described, yet necessary for the neat and satisfactory completion of the whole, contractors shall include and allow for this in the Tender.

ATTACHMENTS

- Weatherboard Technical information

FARNORTH DISTRIBUTION
James Hardie®
WEATHERBOARDS



Technical Specification

FEBRUARY 2013 / NEW ZEALAND



James Hardie
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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™

Fax 0800 808 988

literaturefeedback@jameshardie.co.nz

1 Application and scope

1.1 APPLICATION

James Hardie Weatherboards are made of fibre cement and are pre-primed. They are categorised as a lightweight cladding product as per NZS 3604.

James Hardie Weatherboards are manufactured in different profiles ranging between smooth and patterned finishes such as:

SMOOTH WEATHERBOARD

Smooth Weatherboard (7.5mm) is available in three widths (180mm, 240mm and 305mm) and has a smooth finish.

RUSTICATED WEATHERBOARD

Rusticated Weatherboard (7.5mm) combines a rough-sawn texture with a smooth strip in the lap area. It is 205mm wide.

STYLELINE™ WEATHERBOARD

Styleline Weatherboard (7.5mm) has a texture of indented vertical and horizontal lines. It has a smooth strip in the area of the lap. It is 205mm wide.

FRONTIER WEATHERBOARD

Frontier Weatherboard (7.5mm) is available in two widths (245mm and 310mm). The board has a woodgrain textured surface.

IF YOU ARE A SPECIFIER

Or other responsible party for a project, ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

IF YOU ARE AN INSTALLER

Ensure that you follow the design, moisture management and associated details and material selection provided by the designer. All the details provided in this document must be read in conjunction with the specifier's specification.

MAKE SURE YOUR INFORMATION IS UP TO DATE

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

This specification covers the use of James Hardie Weatherboards for buildings that fall within the scope of NZS 3604 and NZBC Acceptable Solution 'E2/AS1', paragraph 1.1. This specification covers the use of James Hardie Weatherboards in both direct fixed and cavity construction methods. Please refer to 'E2/AS1' for further information regarding the selection of construction method for claddings.

1.3 DETAILS

Various James Hardie Weatherboards details are provided in the Details section of this document. This specification and details in CAD file are also available to download from our website at www.jameshardie.co.nz.

1.4 SPECIFIC DESIGN

For use of James Hardie Weatherboards outside the scope of this document, the architect, designer or engineer must undertake specific design. For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

James Hardie Weatherboards comply with section 9.5.2 of 'E2/AS1'. Information contained in this document regarding the installation of James Hardie Weatherboards are aligned with 'E2/AS1' of New Zealand Building Code (NZBC).

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification. For applications outside the scope of this literature and details which are not provided herein, the architect, designer or engineer must undertake specific design and it should be ensured that the intent of their design meets the requirements of the NZBC.

All dimensions shown are in millimetres unless noted otherwise. All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conduct stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution 'E2/AS1' 'Surface Water'. Foundation design must comply with the requirements of NZS 3604 'Timber Framed Buildings' or be as per specific engineering design. The grade of adjacent finished ground must slope away from the building to avoid the possibility of water accumulation in accordance with NZBC requirements.

2.4 GROUND CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

James Hardie Weatherboards must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604.

James Hardie Weatherboards must have a minimum clearance of 100mm from paved ground and 175mm from unpaved ground.

On the roofs and decks the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls shall include those provisions as required by the NZBC Acceptable Solution 'E2/AS1' 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashing for waterproofing. The other materials, components and installation methods used to manage moisture in the walls, must comply with the requirements of relevant standards and the NZBC. For further information in relation to designing for weathertightness, refer to the Building Research Association of New Zealand (BRANZ) and the Department of Building and Housing (DBH) updates on the following websites, respectively www.branz.co.nz and www.dbh.govt.nz.

2.6 STRUCTURE

Timber-framed buildings must be designed in accordance with NZS 3604 (Timber Framed Buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be equivalent to or more than the stiffness requirements of NZS 3604.

2.7 WIND LOADING

James Hardie Weatherboards cladding is suitable for use in all New Zealand wind zones up to and including EH as defined in NZS 3604.

A specific design is required for all situations where a building falls in a specific engineering design (SED) wind zone.

2.8 FIRE RATED WALLS

Walls clad with James Hardie Weatherboards using a direct fix or cavity construction method can achieve fire ratings of up to 60/60/60 when constructed in accordance with this literature, including the fire rated system requirements as specified in James Hardie 'Fire and Acoustic' Design Manual. Refer to this design manual for further information about fire rated systems.

2.9 ENERGY EFFICIENCY

External walls constructed using James Hardie Weatherboards, bulk insulation, where the area of glazing is 30% or less of the total wall area and constructed as per this technical specification complies with the requirements for walls in NZBC Acceptable Solution H1/AS1 (NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table 1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall gets affected when the depth of the timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2
Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.		
# To achieve higher R-Values, the wall insulation must be replaced with an insulation material having higher R-Values to suit the requirements.		
For further guidance on insulation requirement refer to current edition of 'House Insulation Guide' published by BRANZ.		

3 Framing

3.1 GENERAL

This James Hardie Weatherboards technical specification is only suitable for timber-framed buildings. Other framing materials are outside the scope of this specification.

3.2 DIMENSIONS

A 35mm minimum stud width is required unless noted otherwise in this specification.

3.3 STRUCTURAL GRADE

Minimum timber grade requirements are No.1 framing or MSG6 grade in accordance with NZS 3631 'New Zealand Timber Grading Rules' or equivalent.

3.4 DURABILITY

To comply with the NZBC requirements the external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round and Sawn Timber) for minimum timber treatment selection and treatment requirements. Also refer to framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturer's.

Note: Refer to NZS 3602 for information about the allowable moisture contents in timber.

3.5 FRAME CONSTRUCTION

All timber framing sizes and set-out must comply with NZS 3604 and stud, nogs/dwangs centres as required by this specification:

Use of timber framing must be in accordance with framing manufacturer's specifications.

3.5.1 Direct Fix Construction Method

The following framing must be provided for direct fixed construction method:

- Studs must be provided at 600mm centres maximum.
- Nogs must be provided at 1200mm centres maximum.
- Double studs will be required at internal corners for fixing weatherboards without drilling the weatherboard ends.

3.5.2 Cavity Construction Method

The following framing must be provided for cavity construction method:

- When studs are at 600mm centres the nogs must be provided at 800mm centres maximum.
- When studs are at 400mm centres the nogs may be provided at 1200mm centres maximum.

- Double studs are required at internal corners.
- Extra packers may be required at external corners.

3.6 TOLERANCES

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true.

Framing tolerances must comply with the requirements of NZS 3604.

4 Preparation

4.1 HOMERAB® PRECLAD™ LINING OR BUILDING UNDERLAY

HomeRAB PreClad Lining or building underlay must be provided as per the requirements of the NZBC Acceptable Solution 'E2/AS1' 'External Moisture' and NZS 3604.

The building underlays must comply with Table 23 of 'E2/AS1'. The building underlays must be fixed in accordance with 'E2/AS1', NZS 3604 and the underlay manufacturer's recommendations.

Walls which are not lined on the inside face e.g. garage walls or gable ends must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC 'Acceptable Solution' 'E2/AS1'. HomeRAB PreClad Lining is suitable for use in these applications. It must be installed in accordance with HomeRAB PreClad Lining Installation Manual.

4.2 RAB BOARD

For EH wind zone, RAB Board (6mm) must be used. Refer to James Hardie Rigid Air Barriers installation manual for information regarding its installation.

4.3 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to weatherboard installation. Please refer to moisture management requirements in Clause 2.5. The building underlays must be appropriately incorporated with penetration and junction flashings. Materials must be lapped in such a way that water tracks down to the exterior on the face of building underlay. James Hardie will assume no responsibility for water infiltration within the wall due to poor installation of flashings or building underlays.

The selected flashing materials must comply with the durability requirements of Table 20 of Acceptable Solution 'E2/AS1'.

4.4 VENT STRIP

The James Hardie uPVC cavity vent strip has opening area of 1000m²/m length and must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities.

4.5 CAVITY BATTENS

Buildings with a risk score of 7-20 calculated in accordance with the NZBC Acceptable Solution 'E2/AS1' Table 3 requires James Hardie Weatherboards to be installed on a cavity.

The battens provide airspace between the frame and cladding and are considered a 'packer' only in this specification.

The timber battens must be minimum H3.1 treated in accordance with NZS 3640 (Chemical preservation of round and sawn timber) to comply with the durability requirements of B2/AS1.

Cavity battens must comply with 'E2/AS1' and

- be minimum 18mm thick
- be minimum as wide as the width of studs
- be fixed by the cladding fixings to the main framing through the building underlay
- until claddings are fixed the battens need only to be tacked to framing. (Batten fixing is required temporarily to keep them straight on the wall during construction.)

The cavity battens are installed as described below:

- Fix cavity battens to studs.
- Battens must be fixed with 40 x 2.8mm galvanised nails at 800mm centres maximum.

4.6 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the building underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using one of the following options as per E2/AS1:

- intermediate cavity batten between the studs
- 75 mm galvanized mesh
- polypropylene tape at 300mm centres fixed horizontally and drawn taut

No intermediate supports are required where

- studs are at 400mm centres or
- rigid air barriers instead of building underlays are used.

4.7 CORNERS

Anticipated joist shrinkage must be allowed for in the design process. Do not run trims or aluminium extrusions continuously across solid floor joists. Trims or extrusions to be flashed to best trade practice at these locations.

4.8 EXTERNAL CORNERS

James Hardie Weatherboards can be finished at external corners using uPVC or aluminium corner mould, corner soakers and box corner. Refer to Figures 5, 6, 7, 19, 20 and 21.

4.9 INTERNAL CORNERS

James Hardie Weatherboards can be finished at internal corners using uPVC or aluminium 'W' mould. Refer to Detail 8, 9, 22 and 23.

4.10 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for James Hardie Weatherboards which meet the requirements of E2 'External Moisture' approved document of the NZBC. Refer to Figures 11 to 13 and Figures 25 to 33.

5 Fixing James Hardie Weatherboards

5.1 GENERAL

The horizontal lap of James Hardie Weatherboards must be 30mm minimum. James Hardie Weatherboards must be kept dry and under cover whilst in storage prior to and during fixing.

Cut ends which are exposed or where sealant is applied to the boards such as box corners, internal corners etc. must be primed prior to installation. Dust and loose material must be removed before priming.

An H3.1 treated timber cant strip must be provided to support the bottom board on the wall. Refer to Figures 3 and 17.

5.2 FASTENER DURABILITY

Fasteners must meet the durability requirements of NZ Building Code. NZS 3604 specifies requirements for fixing material to be used in relation to the exposure conditions and are summarised in Table 2.

Table 2

Exposure conditions and nail selection prescribed by NZS 3604		
Nail Material		
Zone D*	Zone C outside sea spray zone and Zone B and Geothermal hot spots	Bracing — All zones
Grade 316 Stainless	Hot-dipped galvanised or 316 stainless	Grade 316 Stainless

* (Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made). Microclimate conditions as detailed in NZS 3604, Paragraph 4.2.4 require SED.

7 Finishing

Also refer to the NZBC Acceptable Solution 'E2/AS1' Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

5.3 NAIL SIZES AND FIXING METHOD

James Hardie Weatherboards must be fixed to studs with the types of nails specified in Table 3, in accordance with the following requirements

- All nails must be driven flush with the board surface.
- When fixing weatherboard at the ends, nail must be driven at a minimum distance of 20mm from the end.
- For nails driven 50mm or closer from the end edges of James Hardie Weatherboards, holes must be pre-drilled using a 3mm Titanium drill bit.

When using rigid air barrier like HomeRAB PreClad Lining or RAB Board, the cladding fixing nails must be increased in length equal to the thickness of the rigid air barrier.

Table 3

Nail requirements for James Hardie Weatherboards	
DIRECT FIXED TO FRAME	
Face Nailing	
50 x 2.8mm HardieFlex™ nails	Finish flush with the board surface
CAVITY CONSTRUCTION	
Face Nailing	
75 x 3.15mm HardieFlex™ nails	Finish flush with the board surface

5.4 GUN NAILING

James Hardie Weatherboards can be gun-nailed for face nailing fixing methods. Nails must be finished flush with board surface.

Round head nails must be used and the size of these nails must comply with the requirements of Table 3.

Nails must be fired at a minimum distance of 50mm from the ends of boards when gun nailing is used — double studs will be required.

Note: Do not use 'D' head nails.

6 Jointing

The ends of James Hardie Weatherboards are jointed off-stud using a back soaker. The joints may be located centrally between studs but no closer than 150mm from the studs. The joints must be staggered by 600mm minimum. Flexible silicone sealant must be used with back soakers for jointing. Refer to Figures 4 and 18.

Protective coating of James Hardie Weatherboards is required in order to meet the durability requirements of the New Zealand Building Code.

7.1 PREPARATION

Remove any surface dirt, grime or other contaminants and ensure the James Hardie Weatherboards are dry before painting.

7.2 SEALANTS

All sealants must demonstrate the ability to meet the relevant requirements of the NZBC. Application and use of sealants must comply with manufacturer's instructions. Sealants, if coated, must be compatible with the paint system.

7.3 PAINTING

All James Hardie Weatherboards are pre-primed on their face and bottom edge with a factory-applied acrylic base coat.

James Hardie Weatherboards must be painted within 90 days of installation. All exposed faces, including the top edges under the sills and bottom edges of James Hardie Weatherboards and accessories must be finished with two coats of quality exterior paint system complying with any of parts 7, 8, 9, and 10 of AS 3730.

James Hardie Weatherboards can be painted dark colours when installed with aluminium mouldings only.

When using uPVC corner moulds or flashings, the light reflective value of the colour used must be more than 40% as required under section 4.3.1 of 'E2/AS1'. Dark colours cause excessive movements and deteriorate the cladding performance.

Some environments require special coatings. Paint selection and specifications is dependant on the paint system chosen. Refer to the paint manufacturer.

7.4 STAINING

Stains containing linseed oil are specifically designed for wood and may not be suitable for fibre cement cladding products, primed or unprimed. Semi-transparent stains can vary in uniformity of appearance depending on method of application and conditions and will require a high level of skill and craftsmanship to achieve a uniform appearance. Clear coats have not proven durable in exterior exposure and James Hardie considers them a maintenance item that may require application of a refurbishing sealer at regular intervals. James Hardie does not warrant the appearance and durability of the use of semi-transparent stains and clear coats.

For further information contact the stain manufacturers. Refer to Section 13 for stain manufacturer details.

8 Storage and handling

James Hardie Weatherboards must be laid flat on a smooth level surface. To ensure optimum performance, store weatherboards under cover and keep dry prior to fixing. If the weatherboards should become wet, allow to dry thoroughly before fixing.

Do not carry weatherboards on the flat, always carry in the vertical position to avoid excessive bending.

9 Maintenance

It is the responsibility of the specifier to determine normal maintenance requirements to comply with the NZBC Acceptable Solution B2/AS1.

The extent and nature of maintenance will depend on the geographical location and exposure of the building.

As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*,
- Re-applying exterior protective finishes**,
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants.
- Cleaning out gutters, blocked pipes and overflows as required,
- Pruning back vegetation which is close to or touching the building.

**Do not use a water blaster to wash down the cladding.*

***Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.*

10 Product information

10.1 MANUFACTURING AND CLASSIFICATION

James Hardie New Zealand is an ISO 9001 Telarc certified manufacturer. James Hardie Weatherboards is manufactured to meet the requirements of AS/NZS 2908.2: 2000 'Cellulose-Cement Products', James Hardie Weatherboards has a classification of Type A Category 3 in accordance with this standard.

The weatherboards are supplied pre-primed on their face and bottom edge with an acrylic primer. The bottom front edge is square machine trimmed. The top covered edge is square water-jet trimmed.

James Hardie Weatherboards are identified by the printing of the name at regular intervals on the back face.

10.2 DURABILITY

James Hardie Weatherboards, when installed and maintained as per the technical specification, will meet the durability requirements for claddings as required in the NZBC Approved Document B2 'Durability'.

10.2.1 Resistance to Moisture/Rotting

James Hardie Weatherboards demonstrates resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2

- Water Permeability (Clause 8.2.2)
- Warm Water (Clause 8.2.4)
- Heat Rain (Clause 6.5)
- Soak Dry (Clause 8.2.5).

10.2.2 resistance to fire

James Hardie Weatherboards has the following Early Fire Hazard Indices (tested to AS 1530 Part 3).

Table 4

Early fire hazard indices	
Flammability (FI)	0
Spread of Flame Index (SFD)	0
Heat evolved index	0
Smoke developed index (SDI)	0 - 1

10.2.3 ALPINE REGIONS

In regions subject to freeze/thaw conditions, James Hardie Weatherboards must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter is expected.

The James Hardie Weatherboards have been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

10.3 PRODUCT SIZES AND MASS

Available sizes of James Hardie Weatherboards and their weights are given in Table 5. James Hardie Weatherboards are classified as a light weight wall cladding (not exceeding 30kg/m²) in accordance with NZS 3604.

11 Safe working practices

WARNING — DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA

James Hardie products contain sand, a source of respirable crystalline silica which is considered by some international authorities to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling: (1) work in outdoor areas with ample ventilation; (2) minimise dust when cutting by using either 'score and snap' knife, fibre cement shears or, where not feasible, use a HardieBlade™ Saw Blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area to avoid breathing dust; (4) wear a properly-fitted, approved dust mask or respirator (e.g. P1 or P2) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods — never dry sweep. For further information, refer to our installation instructions and Safety Data Sheets available at www.jameshardie.co.nz.

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

James Hardie recommended safe working practices

CUTTING OUTDOORS

1. Position cutting station so wind will blow dust away from the user or others in working area.
2. Use one of the following methods based on the required cutting rate:

BEST

- Score and snap
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and HEPA vacuum extraction

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade.

CUTTING INDOORS

- Cut only using score and snap, hand guillotine or fibreshears (manual, electric or pneumatic).
- Position cutting station in a well-ventilated area.

SANDING/REBATING/DRILLING/OTHER MACHINING

When sanding, rebating, drilling or machining you should always wear a P1 or P2 dust mask and warn others in the immediate area.

IMPORTANT NOTES

1. For maximum protection (lowest respirable dust production), James Hardie recommends always using "Best" — level cutting methods where feasible.
2. NEVER use a power saw indoors.
3. NEVER use a circular saw blade that does not carry the HardieBlade™ logo.
4. NEVER dry sweep — Use wet suppression or HEPA vacuum.
5. NEVER use grinders.
6. ALWAYS follow tool manufacturers' safety recommendations.

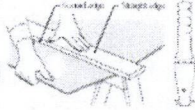
P1 or P2 respirators should be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at www.jameshardie.co.nz to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

Working instructions

Refer to recommended Safe Working Practices before starting any cutting or machining of product.

Score and Snap

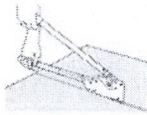
Score and Snap is a fast and efficient method of cutting the product using special tungsten tipped Score and Snap knife.



Preferably score on the face side of the product. Score against a straight edge and repeat the action to obtain adequate depth for clean break — normally 1/3 of sheet thickness. Snap upwards to achieve break. Smooth any rough edges with a rasp.

Hand guillotine

Make guillotine cut on the off-cut side of line to allow for the thickness of the blade.



Fibreshear heavy duty

An electrically powered, fast, clean and effortless way of cutting James Hardie building products, especially around curves such as archways. Make Fibreshear cut on the "off-cut" side of the line to allow for the thickness of the shear.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw connected to a HEPA vacuum is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.



Hole-forming

For smooth clean cut circular holes:

Mark the centre of the hole on the sheet.

Pre-drill a 'pilot' hole.

Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.

For irregular holes:

Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face. Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.



Storage and handling

All James Hardie building products should be stored to avoid damage, with edges and corners of the sheets protected from chipping. James Hardie building products must be installed in a dry state and be protected from rain during transport and storage. The product must be laid flat under cover on a smooth level surface clear of the ground to avoid exposure to water or moisture, etc.

Quality

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

12 Product sizes

Table 5

Product information								
				Coverage information				
Product	Length (mm)	Width (mm)	Thickness (mm)	Effective cover	No. of planks/ metre height	Mass kg/ lineal m (approx. at EMC)	Mass kg/m2 approx. at EMC)	Pallet weight kg (60/120 units/pack)
Smooth	4200	180	7.5	150	6.7	2.4	16.0	600/1170
	4200	240	7.5	210	4.8	2.6	13.7	770/1540
	4200	305	7.5	275	3.6	3.6	12.9	950/1900
Rusticated	4200	205	7.5	175	5.7	2.6	14.9	700/1350
Styleline	4200	205	7.5	175	5.7	2.6	14.9	700/1350
Frontier	4200	245	7.5	215	4.7	3.1	14.4	790/1580
	4200	310	7.5	280	3.6	3.8	13.6	970/1950

Note: All dimensions provided are based on nominal only and subject to manufacturing tolerances.

*The effective thickness of finished 7.5mm James Hardie Weatherboards on the wall at the lap is approx 17-19mm.

13 Accessories

Table 6

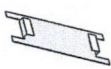
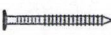
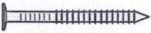
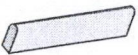
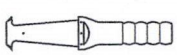
Accessories supplied by James Hardie for James Hardie Weatherboards						
	Accessory and Material Number			Size (MM)	Material/Appearance	
	External Corner Soaker				Etch Primed	
	- 310	303930	310	Aluminium Self colour		
	- 245	303931	245			
	- 180	303932	180			
	Concealed Back Soaker				Etch Primed	
	- 310	303933	310	Aluminium Self colour		
	- 245	303934	245			
	- 205	303935	205			
	- 180	303936	180			
	External Flashing (box)		- 3000	300852	3000	uPVC
	External Corner (box) Mould					Etch Primed
	- 3000	300380	3000	Aluminium		
	- 2700	300378	2700			
	External Corner Mould 135°					Etch Primed
	- 2700	300375	2700	Aluminium		
	Weatherboard Cap Mould		- 3000	300995	3000	uPVC
	Internal 'W' Corner Mould		- 2700	300870	2700 long	uPVC
	Internal Corner Mould 135°					Etch Primed Aluminium
	- 2700	300383	2700 long			
	Corner Underflashing		- 50 x 50	303745	3000 long	uPVC
	Vent Strip			302490	3000 long	PVC White
	Internal 'W' Corner		- 2700	300386	2700 long	Etch Primed Aluminium
	HardieFlex™ nail		- 5kg	304253	75 x 3.15mm	316 Stainless Steel
	HardieFlex™ nail		- 5kg	304251	75 x 3.15mm	Hot Dip Galvanised
	HardieDrive™ Screw		100 jar	300928	7g x 30mm	316 Stainless Steel
	- self drilling and embedding timber screw					

Table 7

Accessories not supplied by James Hardie for James Hardie Weatherboards

James Hardie recommends the following products for use in conjunction with its Weatherboards. James Hardie does not supply these products. Please contact component manufacturer for information on their warranties and further information on their products.

	Accessory and Material Number	Size (MM)	Material/Appearance
	HardieFlex™ nail	40 x 2.8mm and 50 x 2.8mm	316 Stainless Steel
	HardieFlex™ nail	40 x 2.8mm and 50 x 2.8mm	Hot Dip Galvanised
	Flexible sealant ie: Sikaflex AT Facade	Tube	Cured rubberised compound
	PEF Rod Sika Boom or similar	Polyethylene foam	Semi rigid foam
	Flashing Tape Tyvek, Protecto Wrap or similar	Proprietary tape to adhere to building underlay	
	Flashing to Table 20 'E2/AS1'	Refer Figure 13	Flashing fabricator
	Timber Scriber	As required	H3.1 Treated Timber. Timber merchant or cut on site
	Cant Strip Redway Developments 03 358 5775	To suit	uPVC
	Stain available from Timberkote Tel: 0800 724 642 Wattyl Tel: 0800 735 551	To suit	
	Scoring Knife		

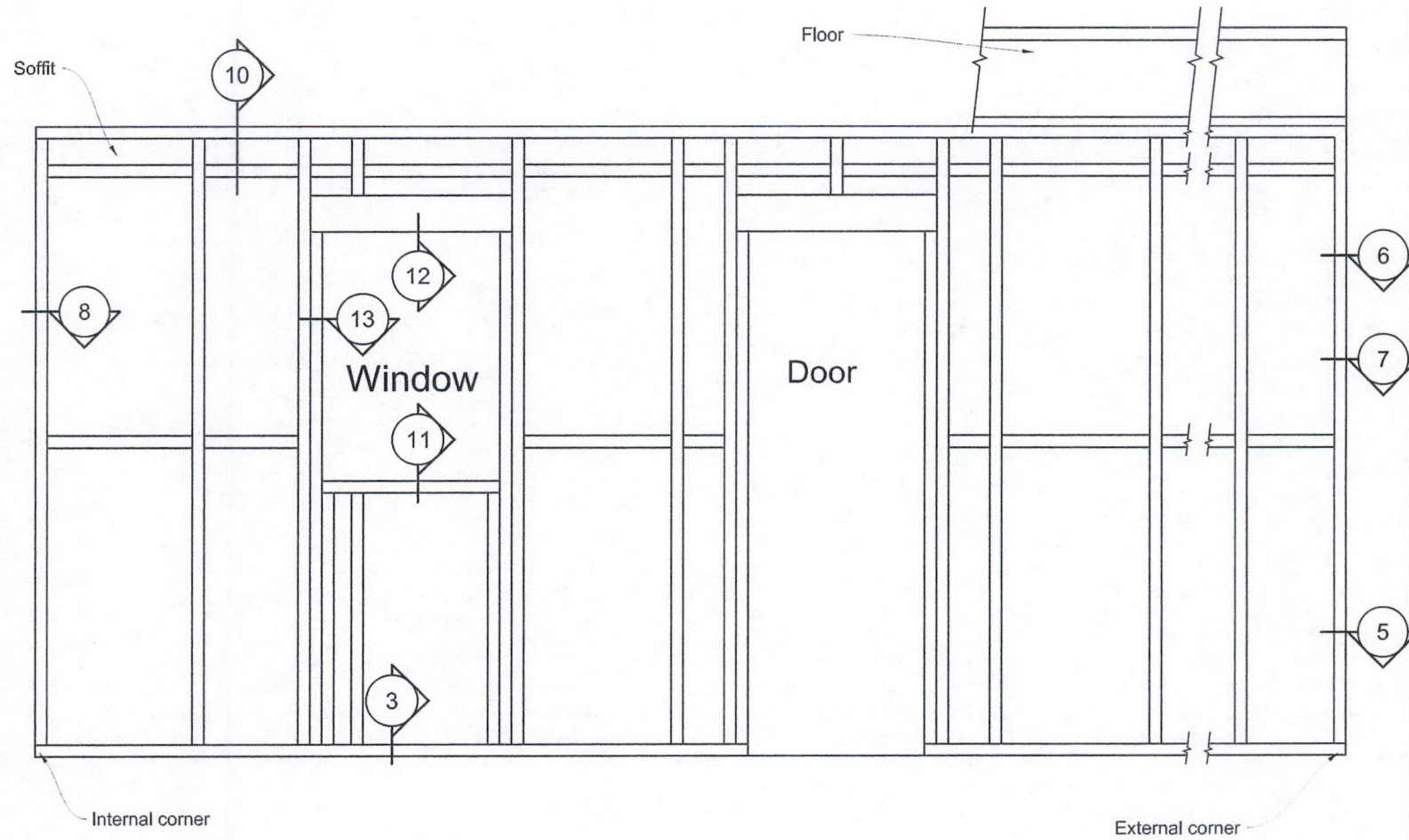
14 Details

Various details outlined in the following table are available on Pages 15 to 38.

Table 8

Details				
DESCRIPTION	DIRECT FIXED		CAVITY CONSTRUCTION	
	FIGURE	PAGE	FIGURE	PAGE
Framing Setout	Figure 1	15		
Sheet Fixing Setout	Figure 2	16	Figure 16	26
Concrete Footing	Figure 3	17	Figure 17	27
Weatherboard Fixing	Figure 4	18	Figure 18	28
uPVC or Aluminium Box Corner	Figure 5	19	Figure 19	29
External Boxed Corner	Figure 6	19	Figure 20	29
External Corner Soaker	Figure 7	20	Figure 21	30
Internal 90° uPVC or Aluminium 'W' Mould	Figure 8	20	Figure 22	30
Internal 135° Aluminium 'W' Mould	Figure 9	21	Figure 23	31
Soffit Detail	Figure 10	21	Figure 24	31
Sill Flashings without Facings	Figure 11	22	Figure 25	32
One Piece Head Flashing without Facings	Figure 12	22	Figure 26	32
Jamb Flashing without Facings	Figure 13	23	Figure 27	33
Batten Setout			Figure 14 and 28	24 and 34
Batten Fixing			Figure 15	25
Parapet Flashing			Figure 29	35
Meter Box at Head			Figure 30	35
Meter Box at Sill			Figure 31	36
Meter Box at Jamb			Figure 32	36
Pipe Penetration			Figure 33	37
One Piece Apron Flashing Joint			Figure 34	38

Figure 1: Direct fix framing setout



Wall Elevation

Note!

Section notations refer to dwg numbers.

Figure 2: Direct fix sheet fixing setout



Figure 3: Direct fix concrete footing

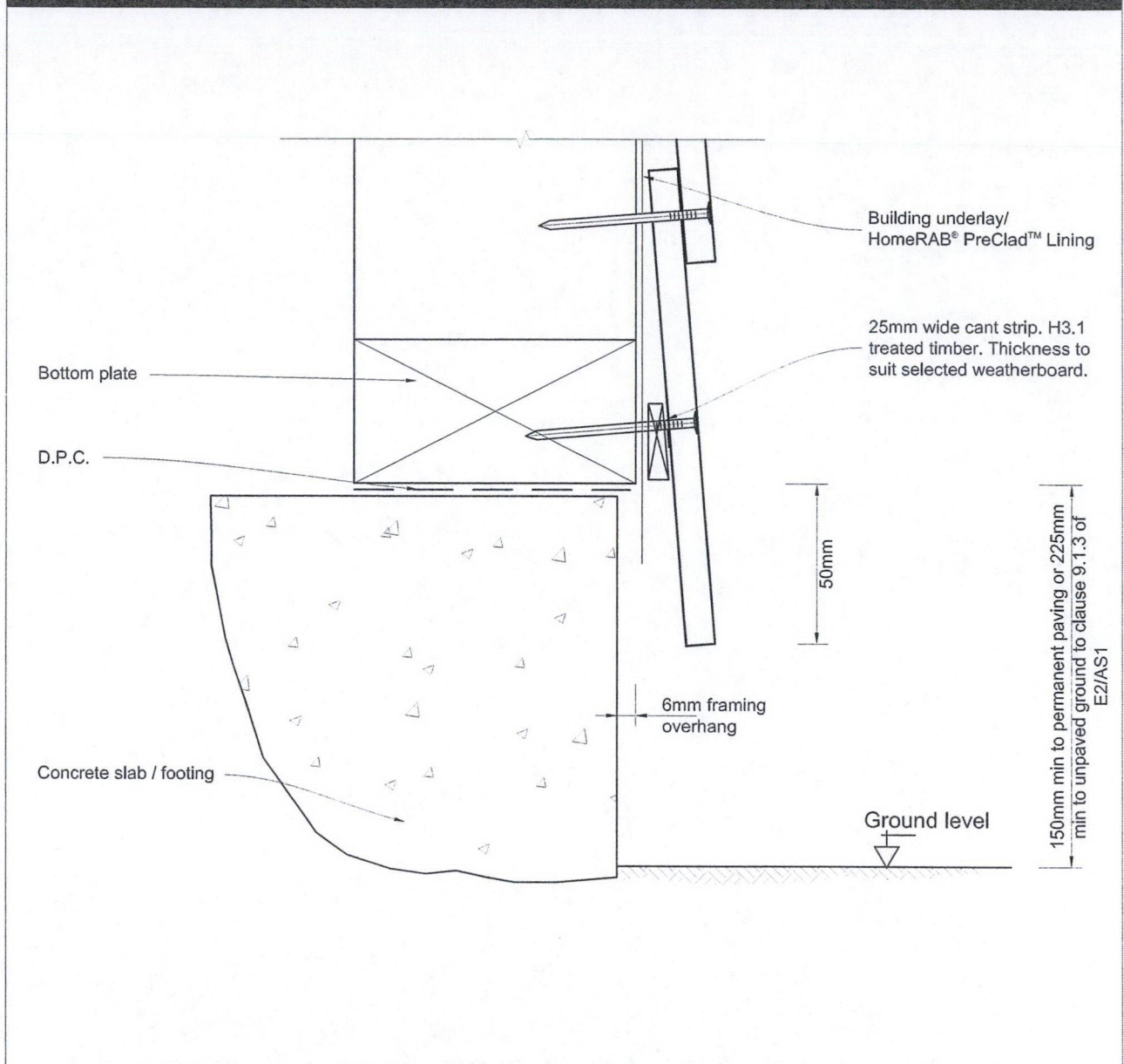
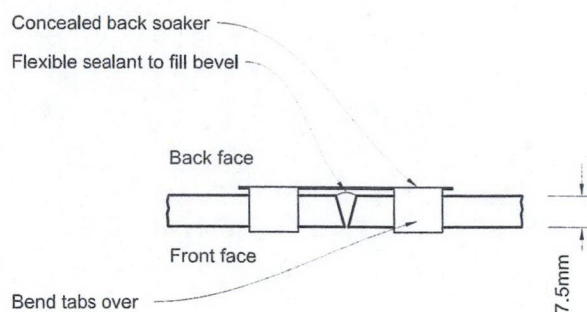
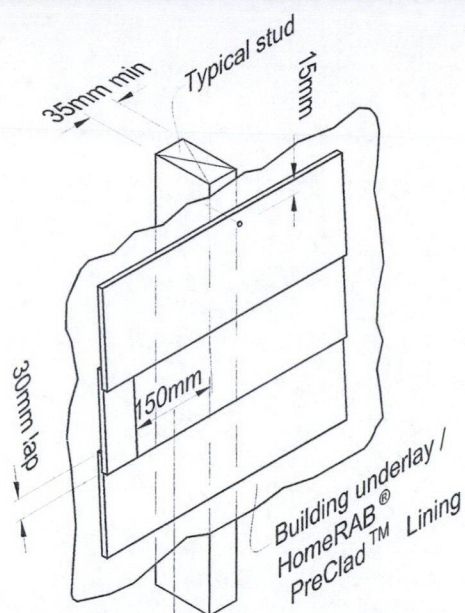


Figure 4: Direct fix weatherboard fixing

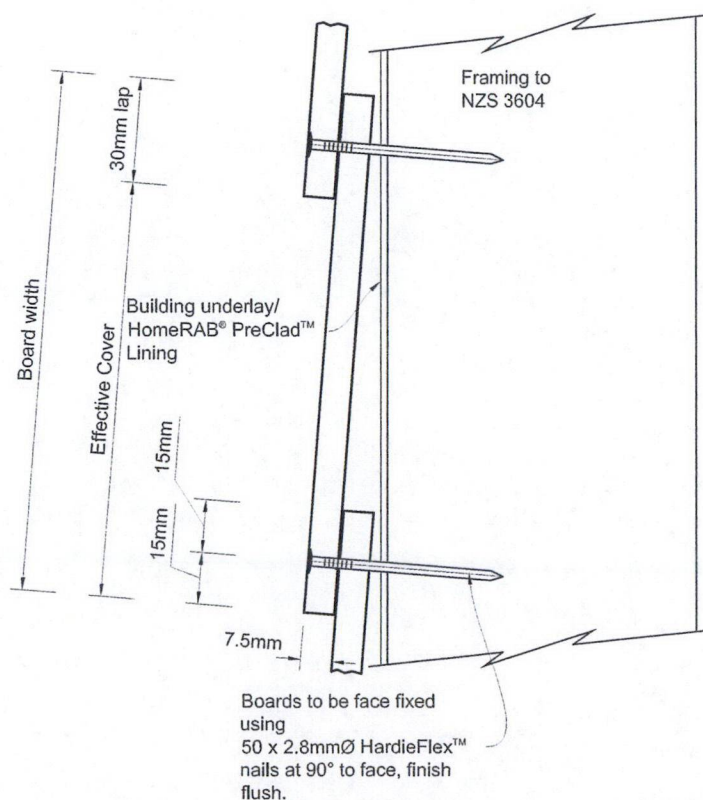


Concealed Back Soaker Joint

Concealed back soaker join in weatherboard to be 150mm minimum from side of stud.

Joints must be staggered by 600mm minimum

Jointing Off Stud



Face Nailing

Figure 5: Direct fix uPVC or aluminium box corner

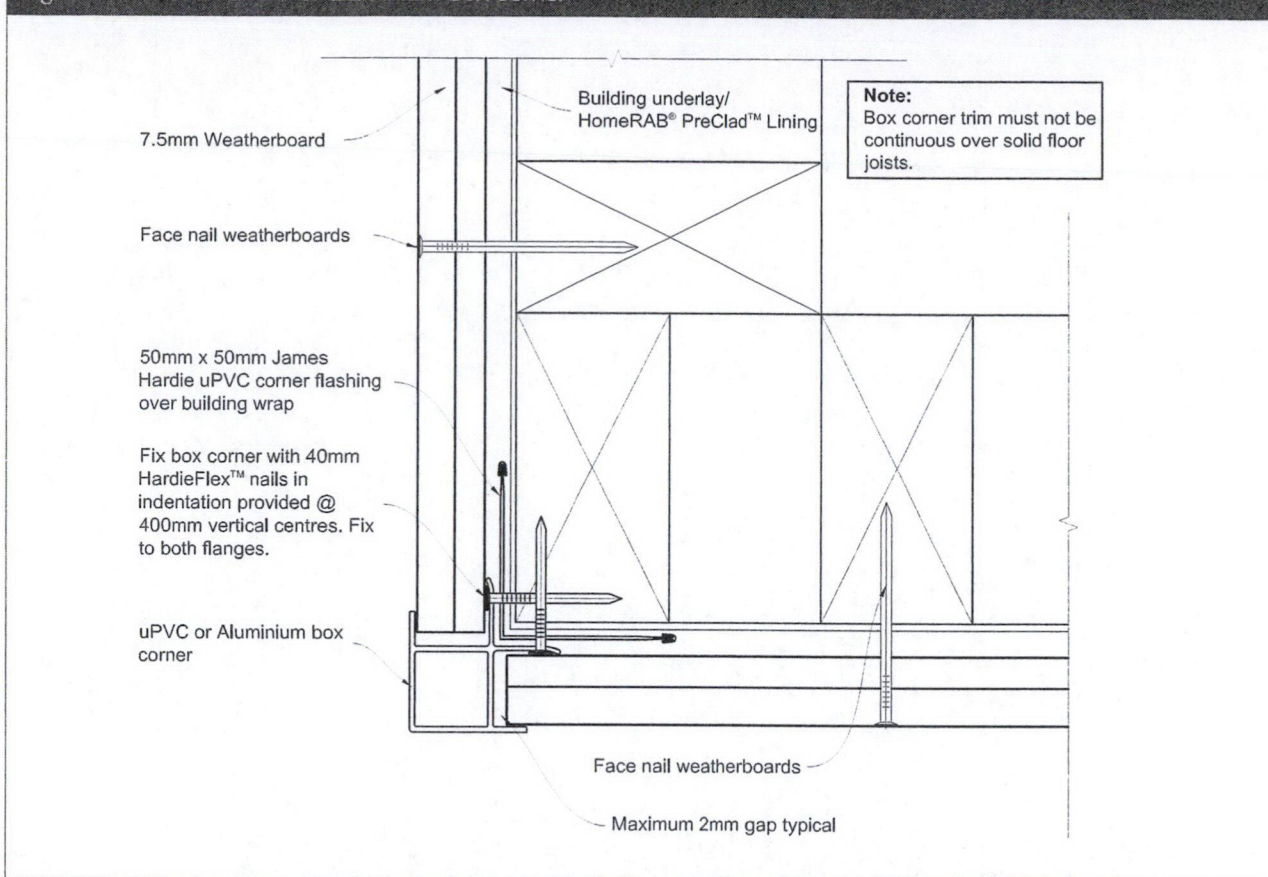


Figure 6: Direct fix external boxed corner

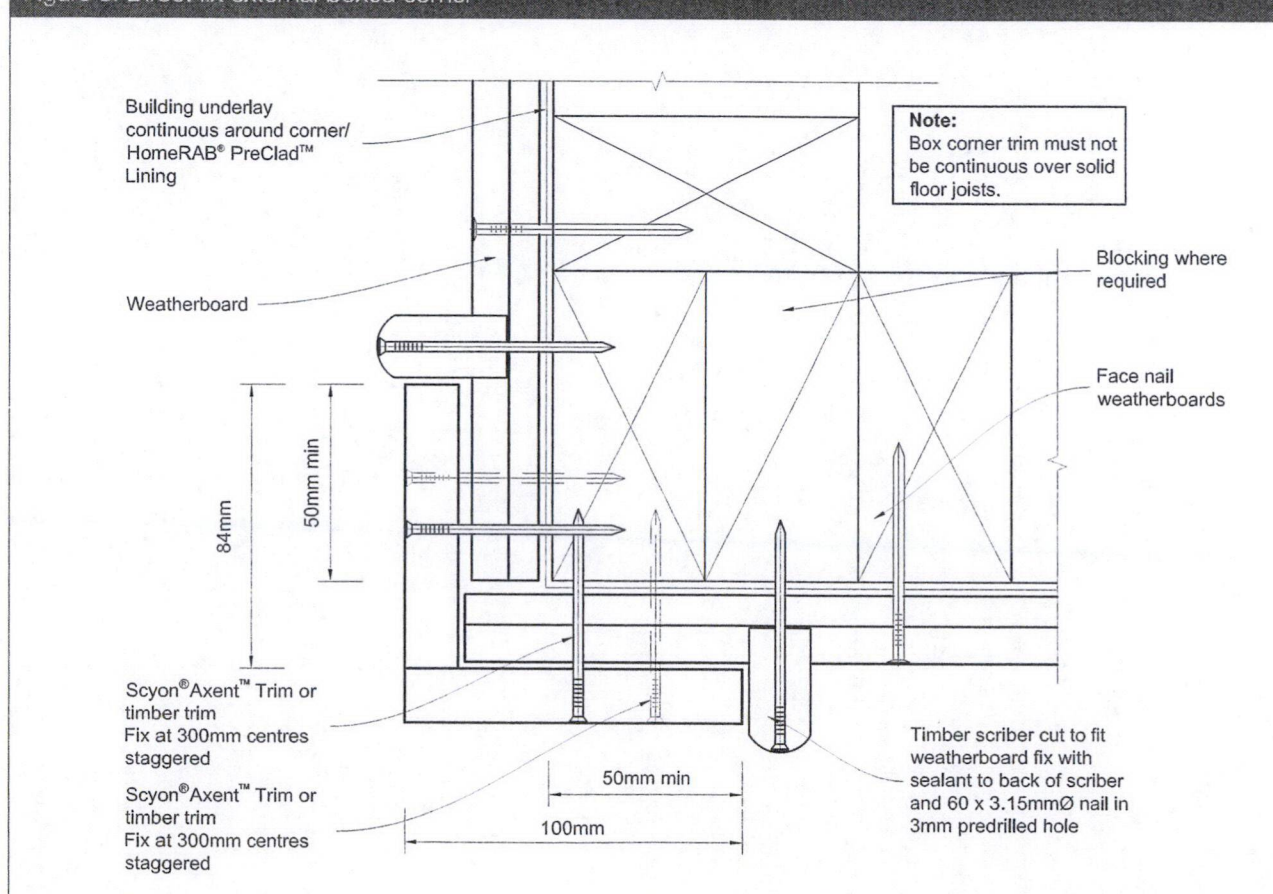
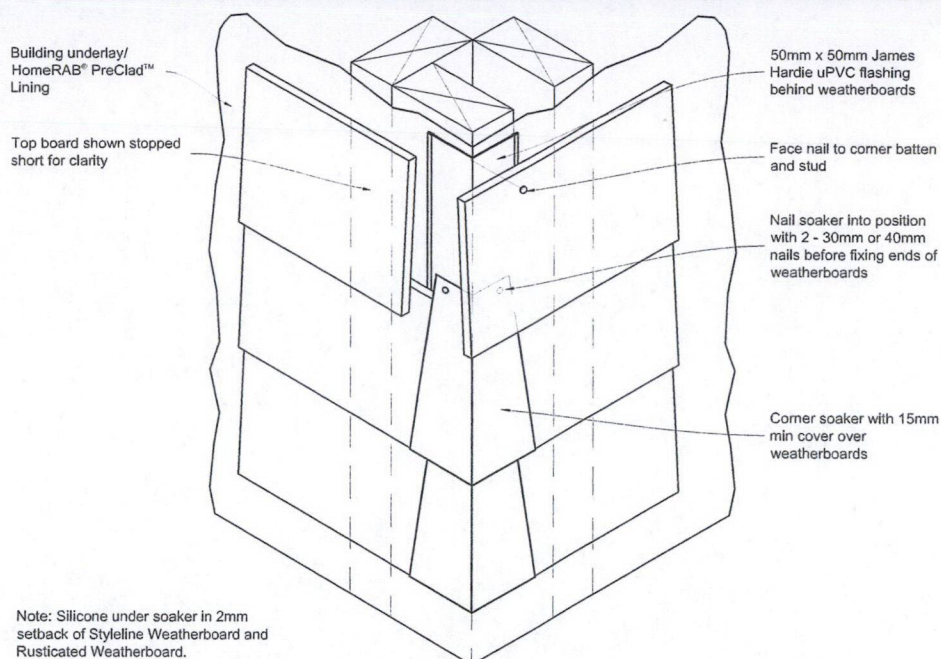


Figure 7: Direct fix external corner soaker



Corner Soaker

Soaker material	Nail material
Aluminium or Galvanised Steel	Hot dip galvanised or Stainless Steel as required for durability

Figure 8: Direct fix internal 90° uPVC or aluminium 'W' mould

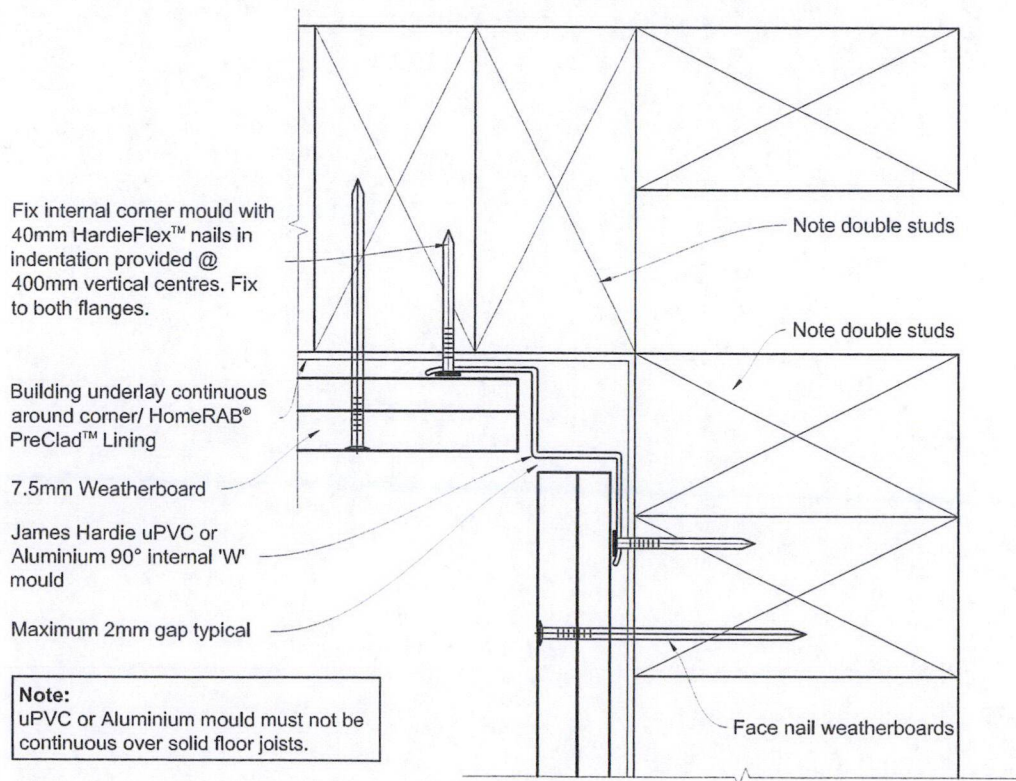


Figure 9: Direct fix internal 135° aluminium 'W' mould

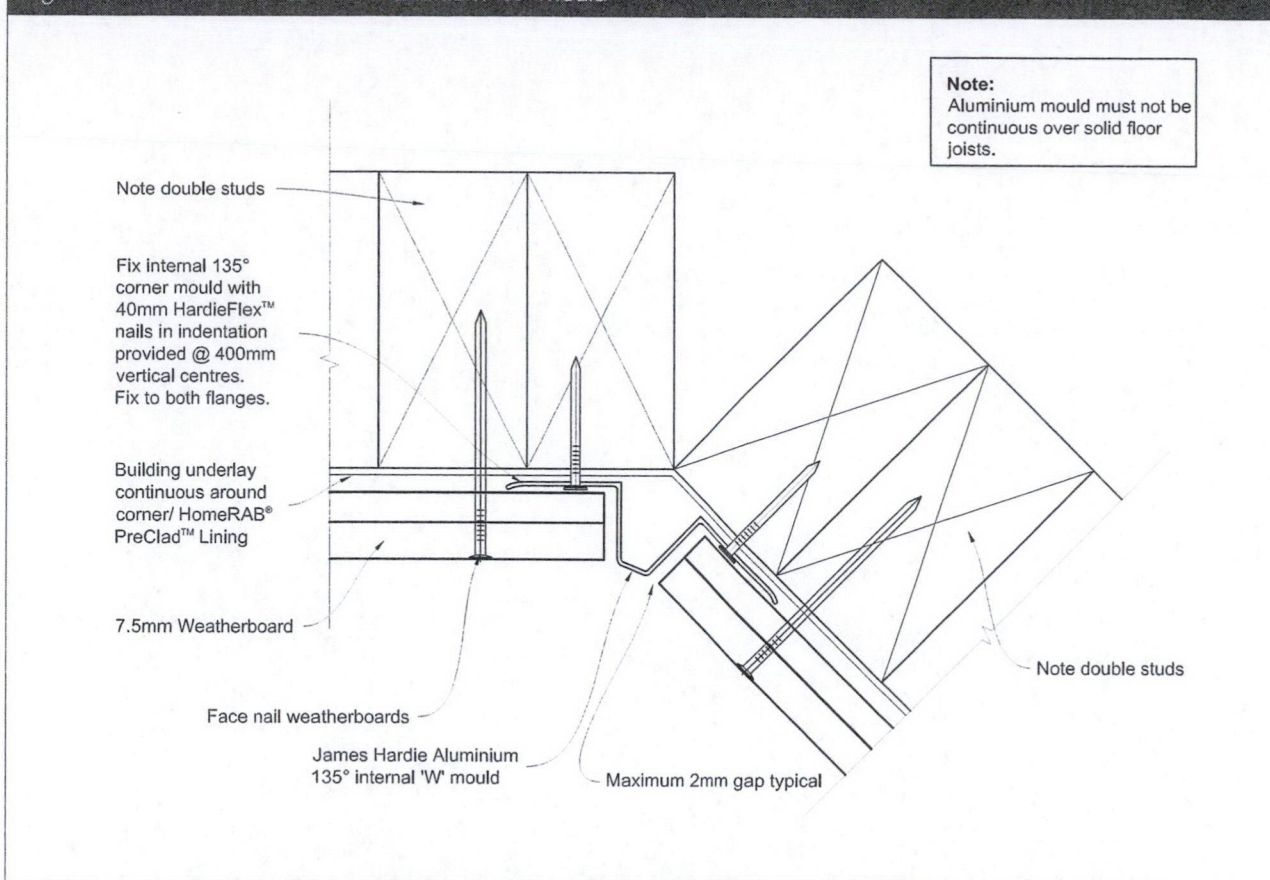


Figure 10: Direct fix soffit detail

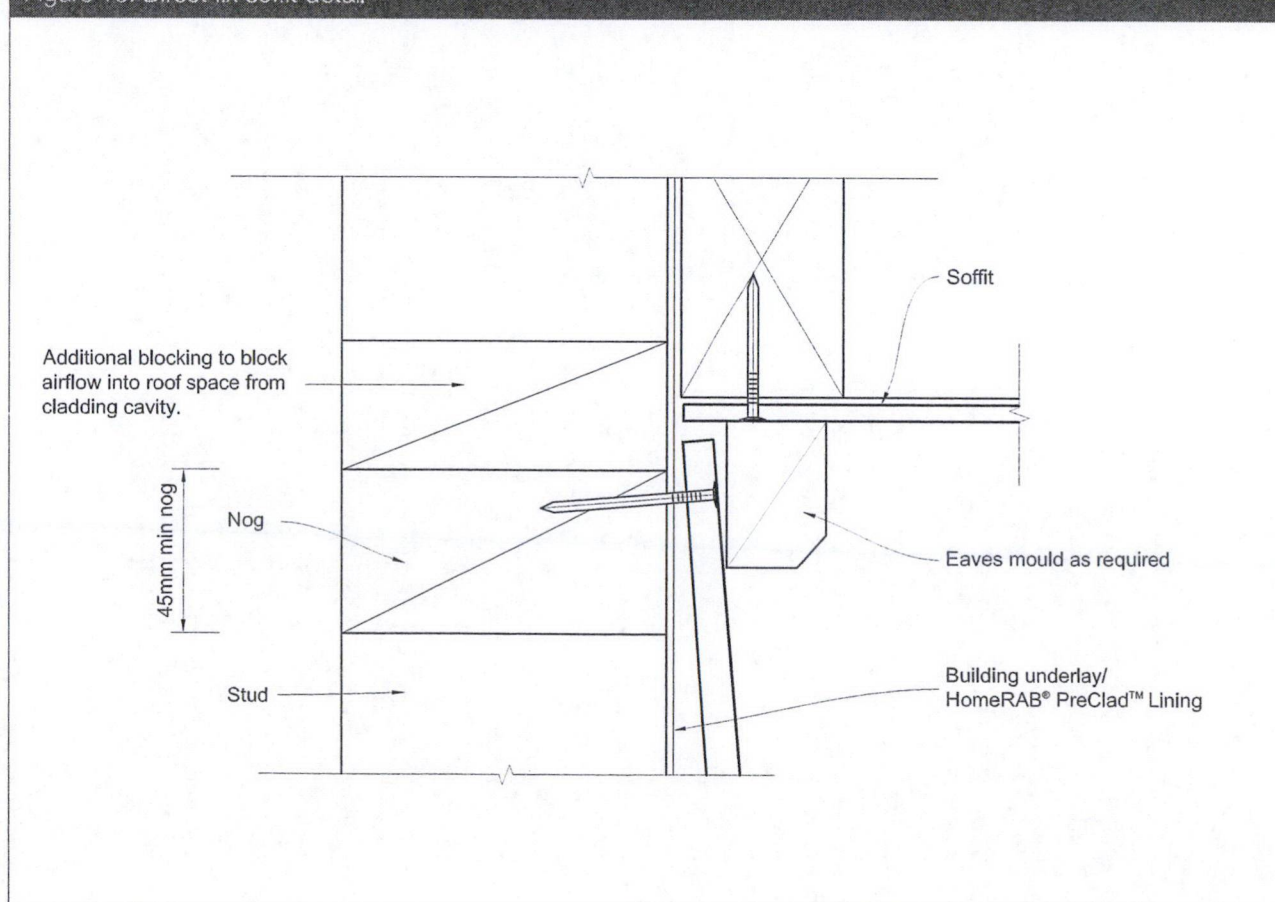
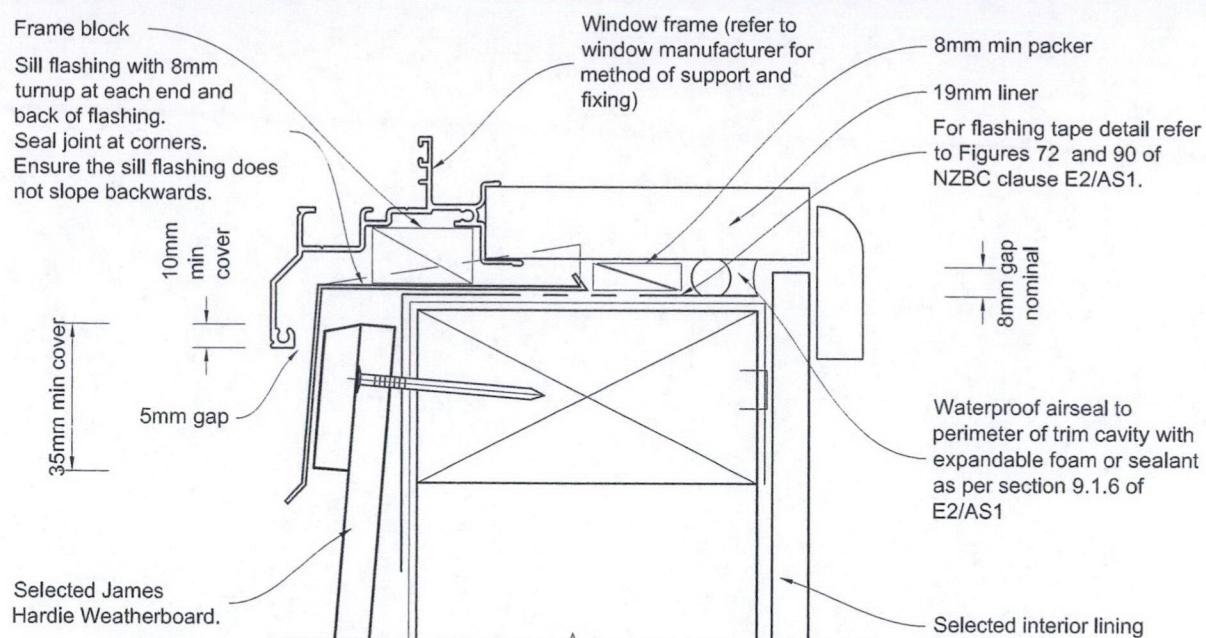


Figure 11: Direct fix window sill flashings without facings



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC 'E2/AS1'.
2. Building underlay must comply with acceptable solution 'E2/AS1' and NZS 3604.
3. Flashing tape must have proven compatibility with the selected building underlay and other materials with which it comes into contact as per Table 21 of 'E2/AS1'.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 12: Direct fix one piece head flashing without facings

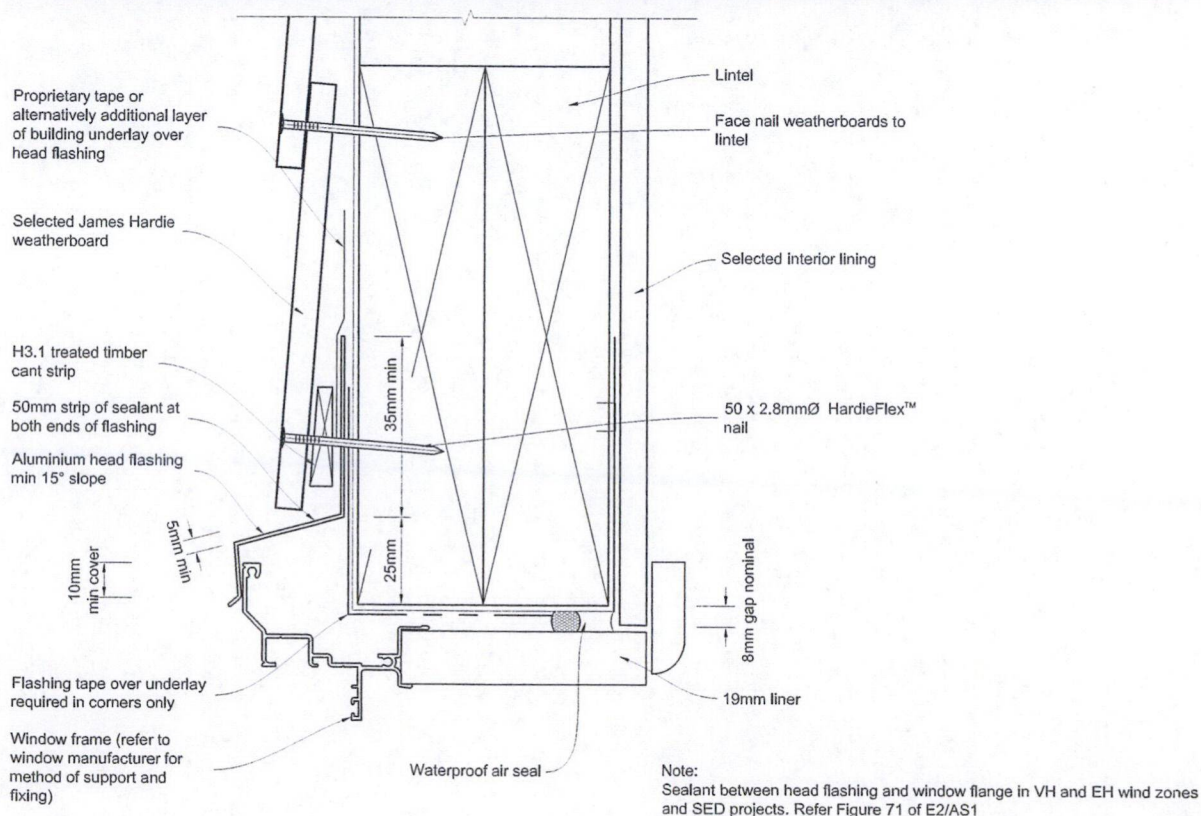
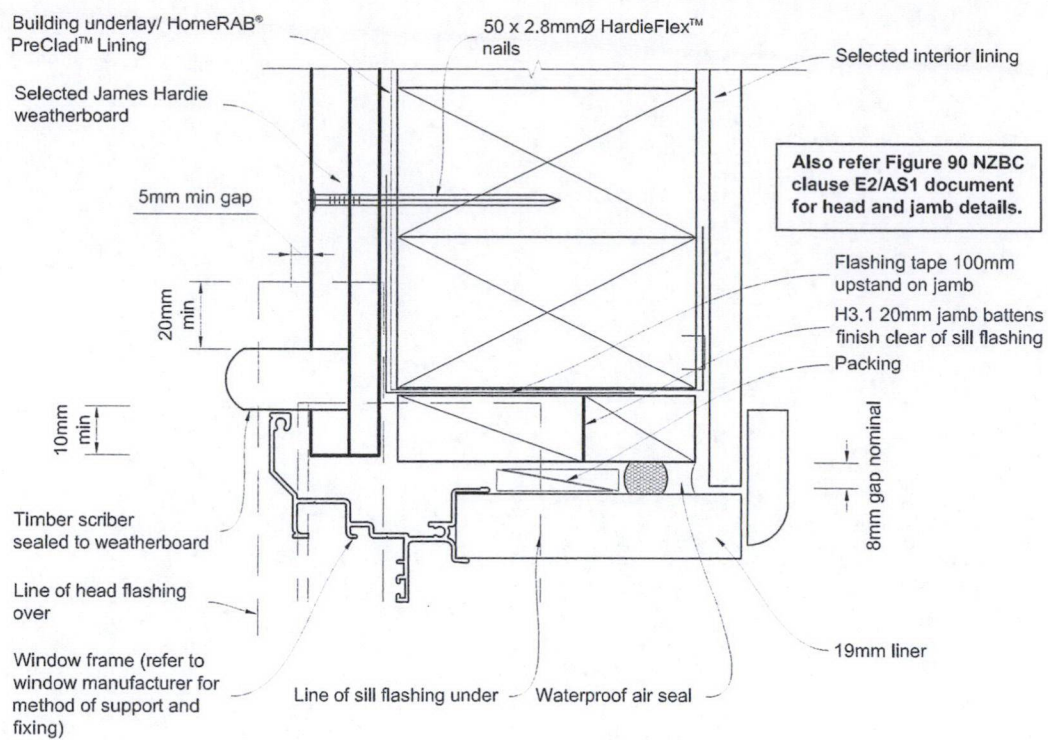
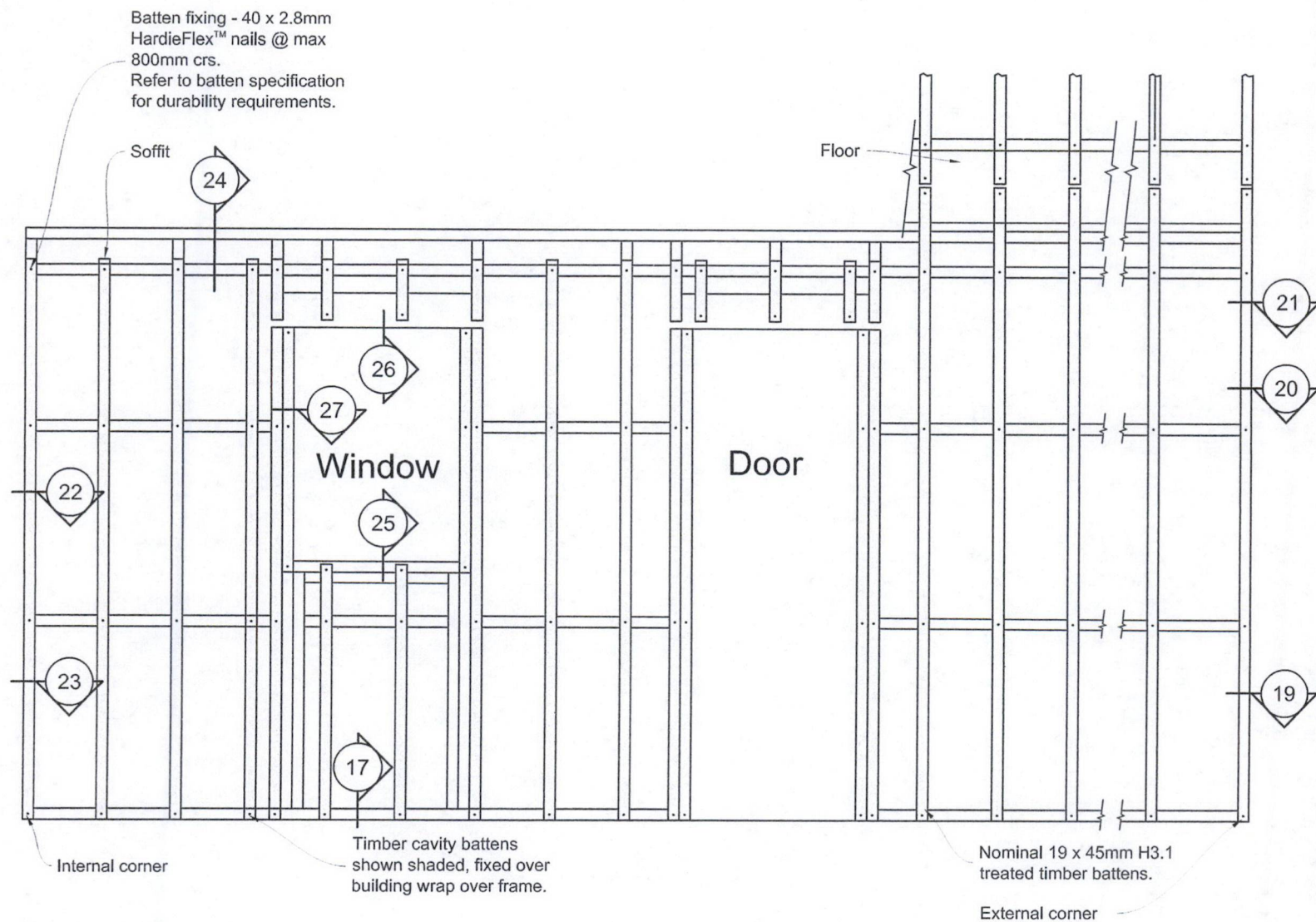


Figure 13: Direct fix jamb flashing without facings





Note: If studs are placed at 400mm centres no intermediate battens are required and nogs may be placed at max 1200mm centres.

Wall Elevation

Note!
Section notations refer to Figure numbers.

Figure 14: Cavity framing and batten setout

Figure 15: Cavity framing batten fixing

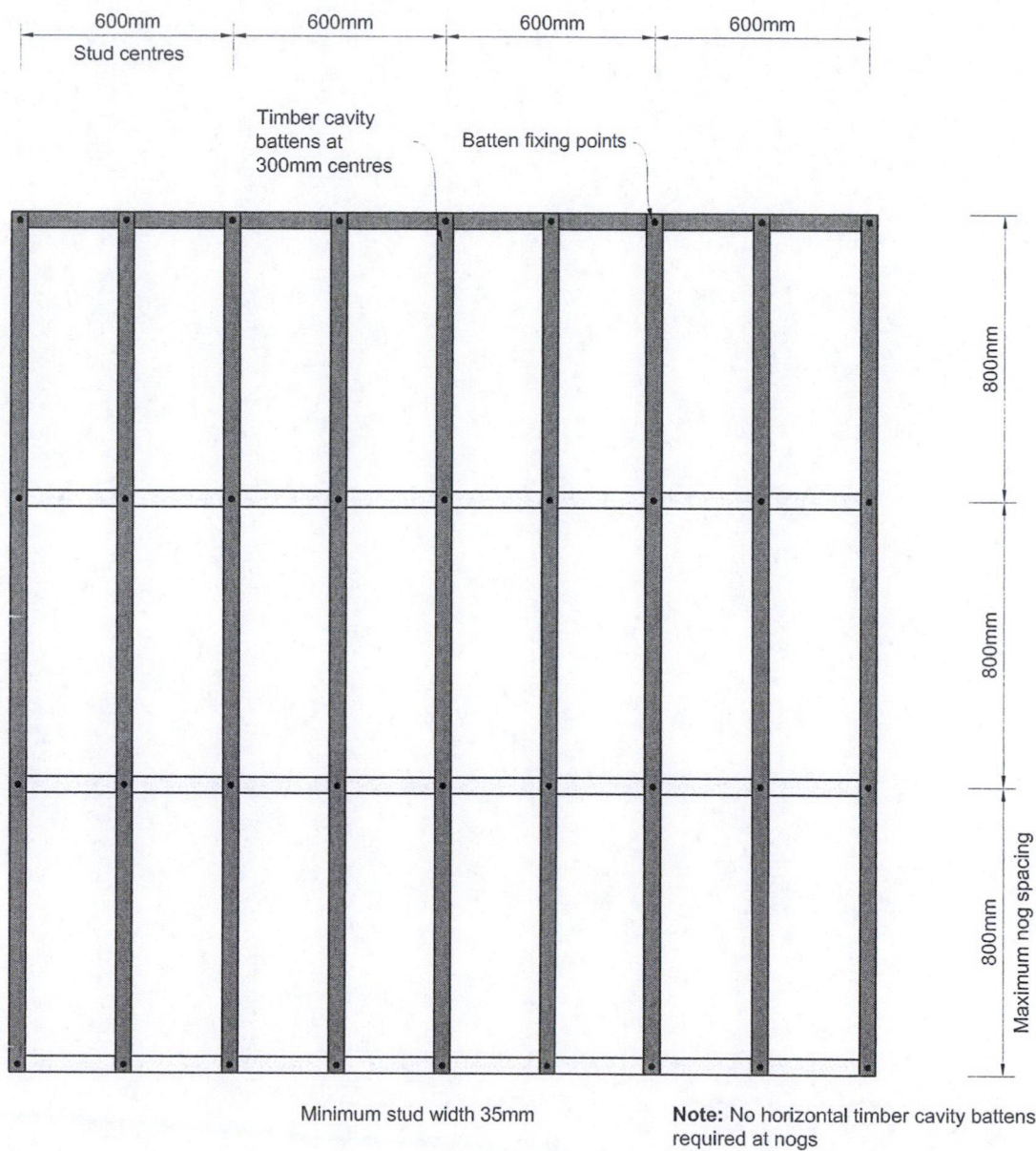


Figure 16: Cavity weatherboard fixing setout

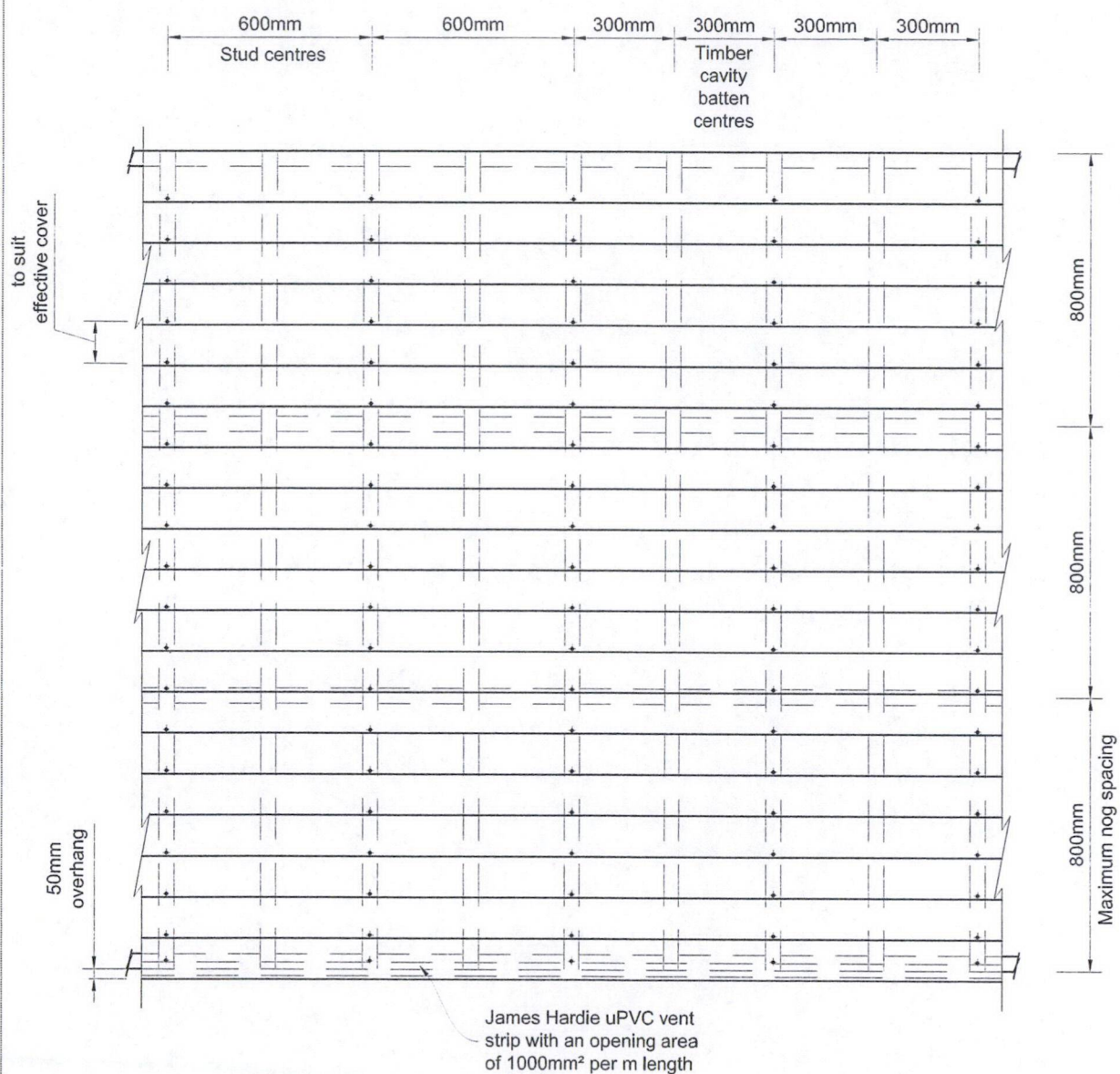


Figure 17: Cavity concrete footing

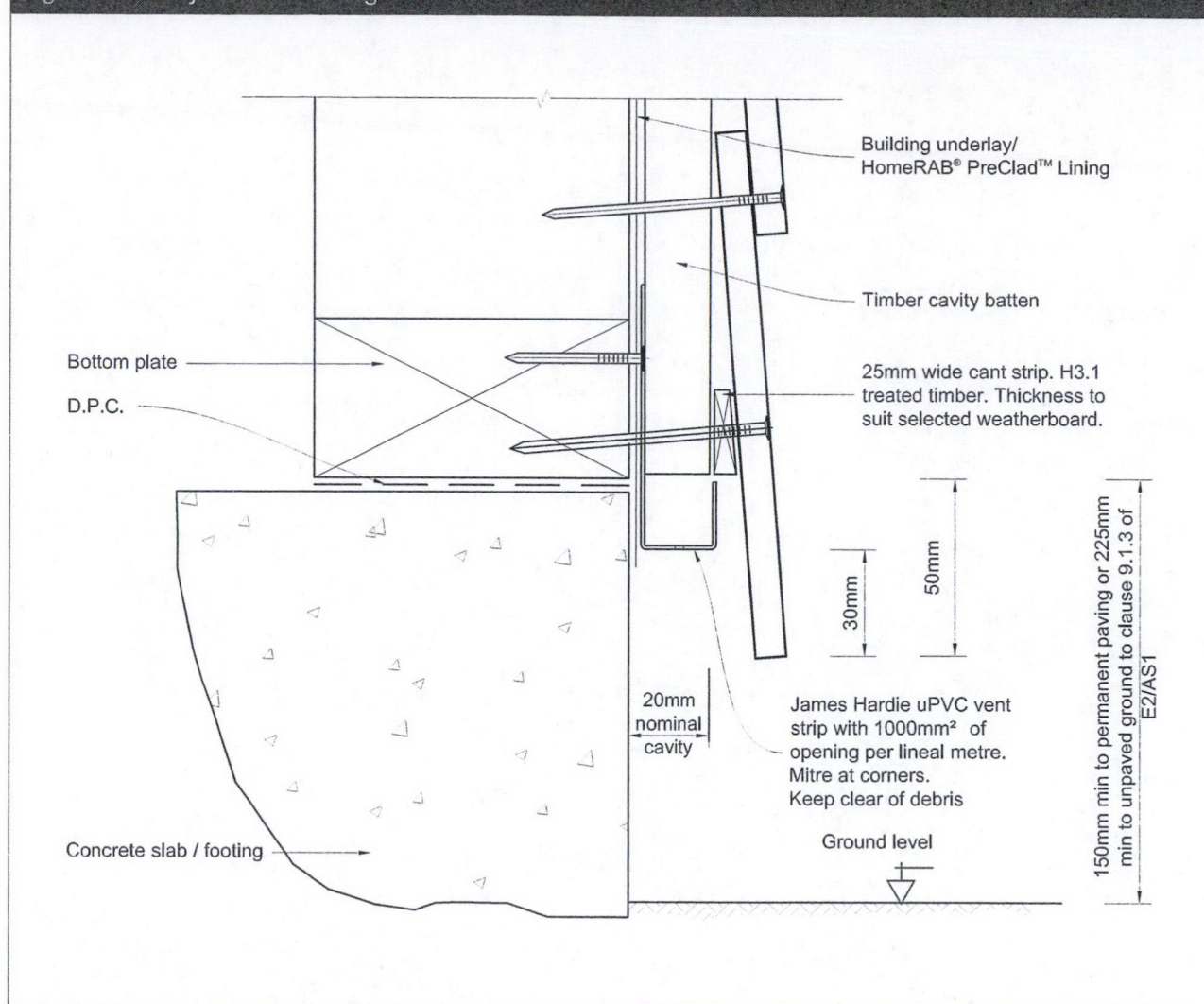
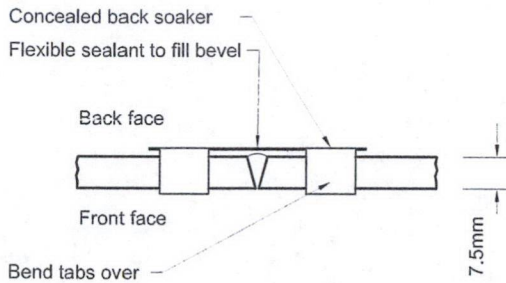
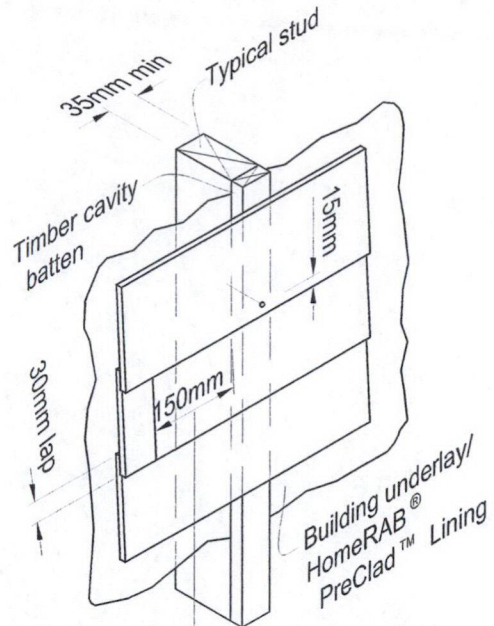


Figure 18: Cavity weatherboard fixing



Concealed Back Soaker Joint



Concealed back soaker join in weatherboard to be 150mm minimum from side of stud.
Joints must be staggered by 600mm minimum

Jointing off Stud

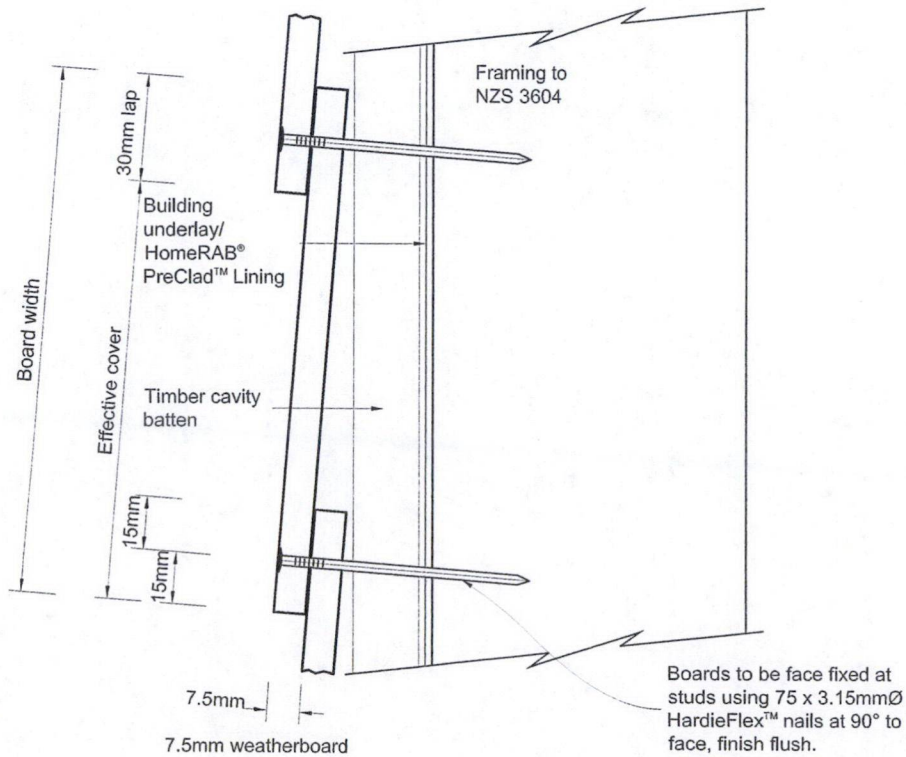


Figure 19: Cavity uPVC or aluminium box corner

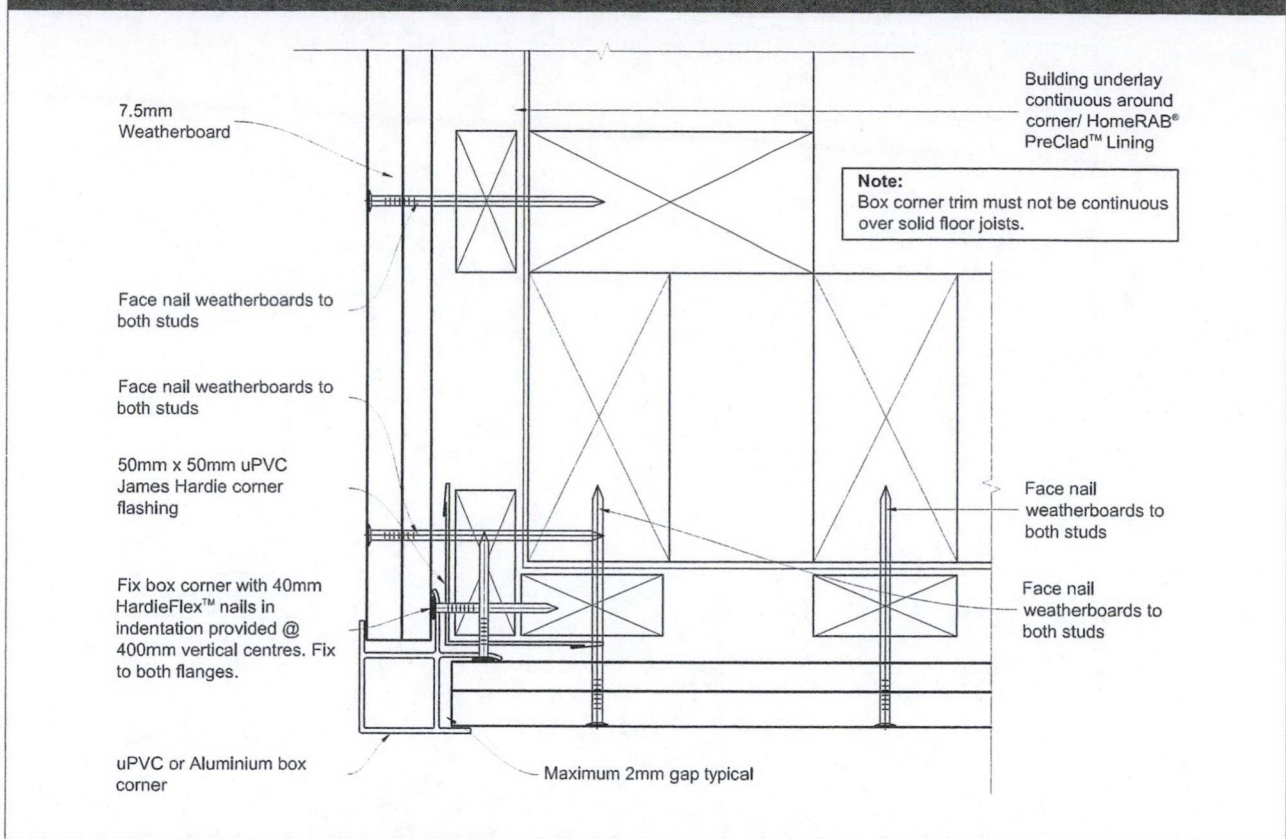


Figure 20: Cavity boxed corner

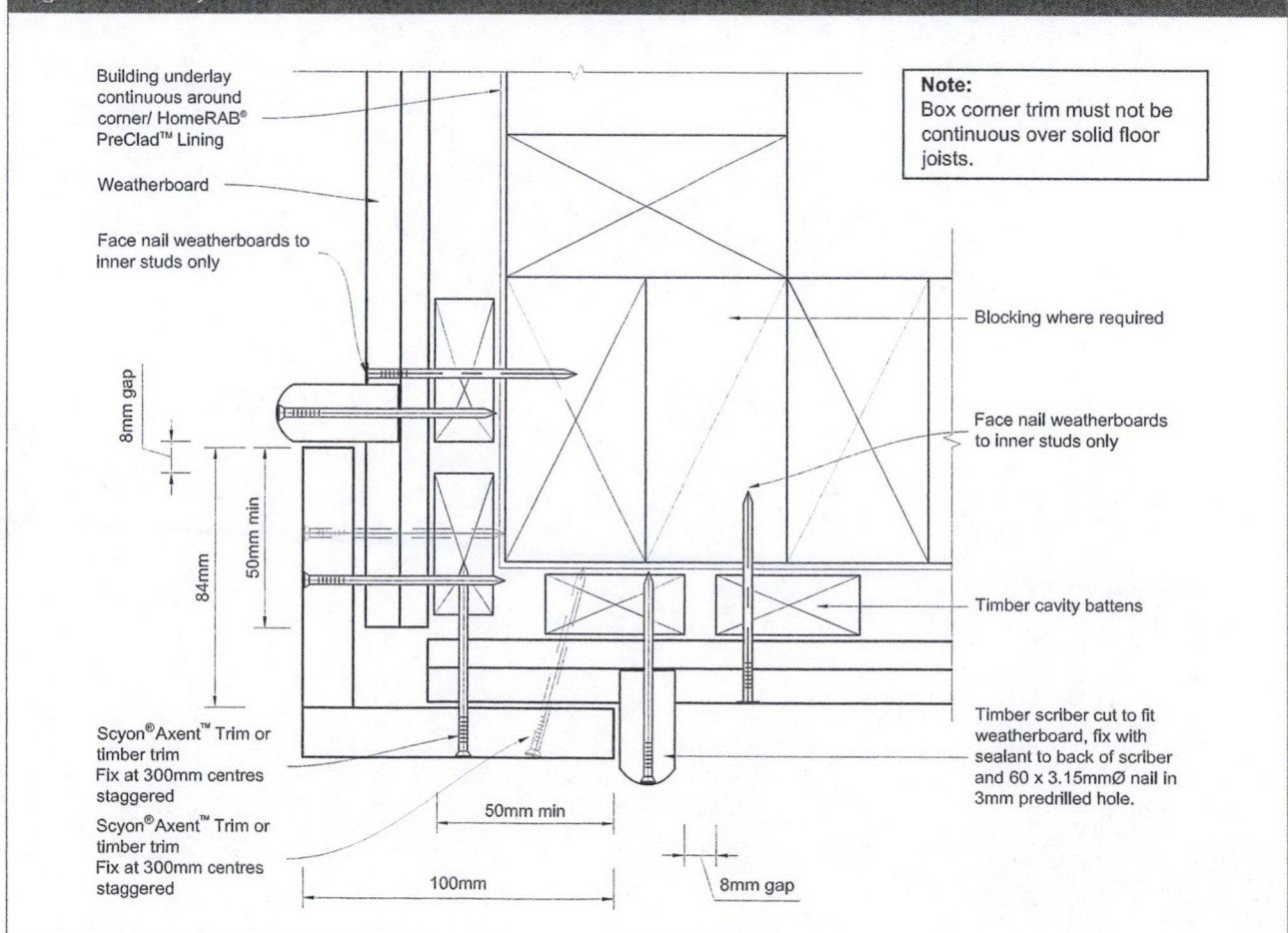
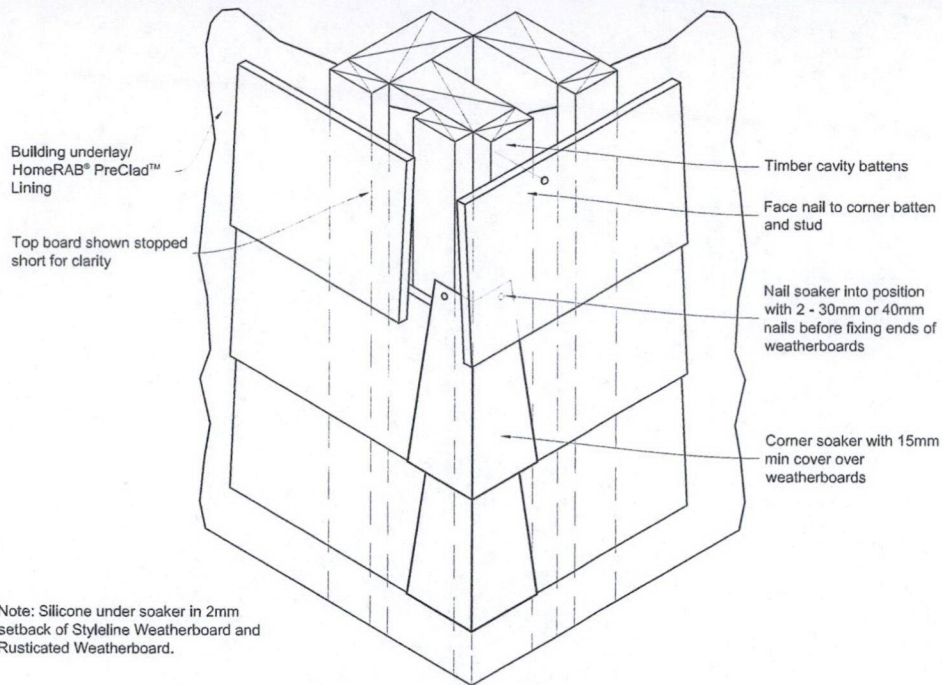


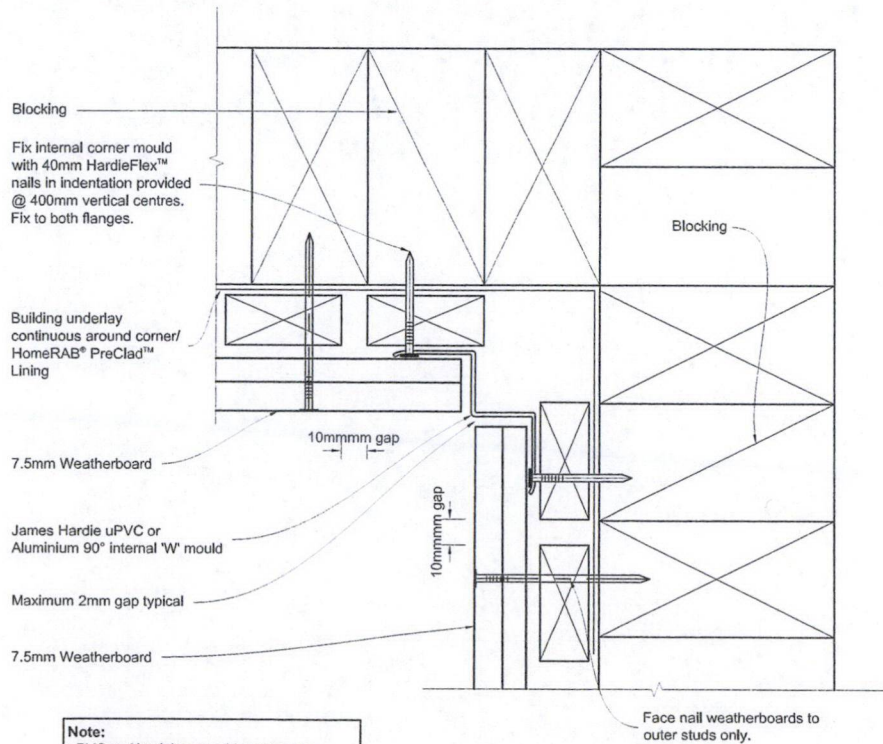
Figure 21: Cavity external corner soaker



Corner Soaker

Soaker material	Nail material
Aluminium or Galvanised Steel	Hot dip galvanised or Stainless Steel as required for durability

Figure 22: Cavity internal 90° uPVC or aluminium 'W' mould



Note:
uPVC or Aluminium mould must not be continuous over solid floor joists.

Figure 23: Cavity internal 135° aluminium 'W' mould

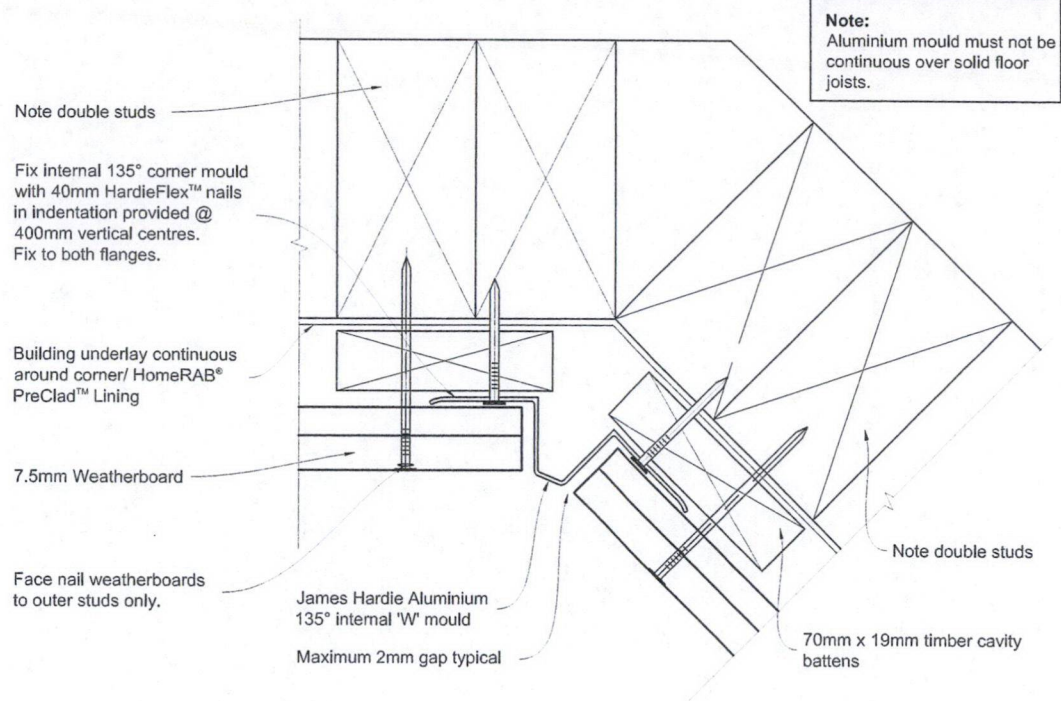


Figure 24: Cavity soffit detail

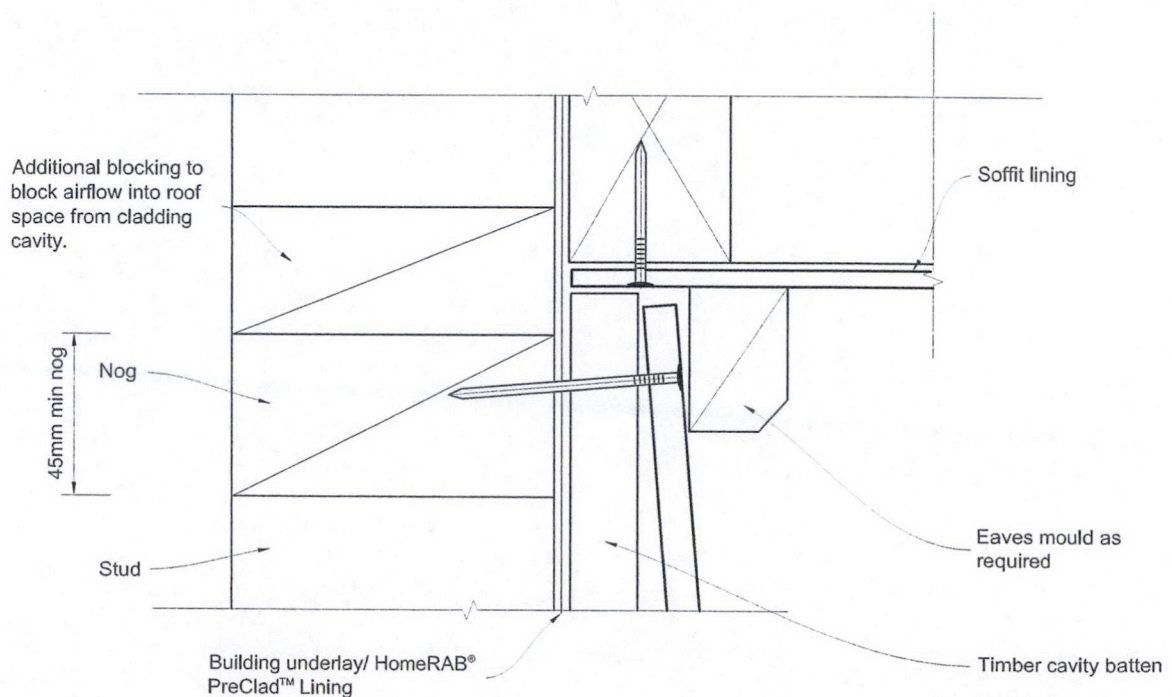
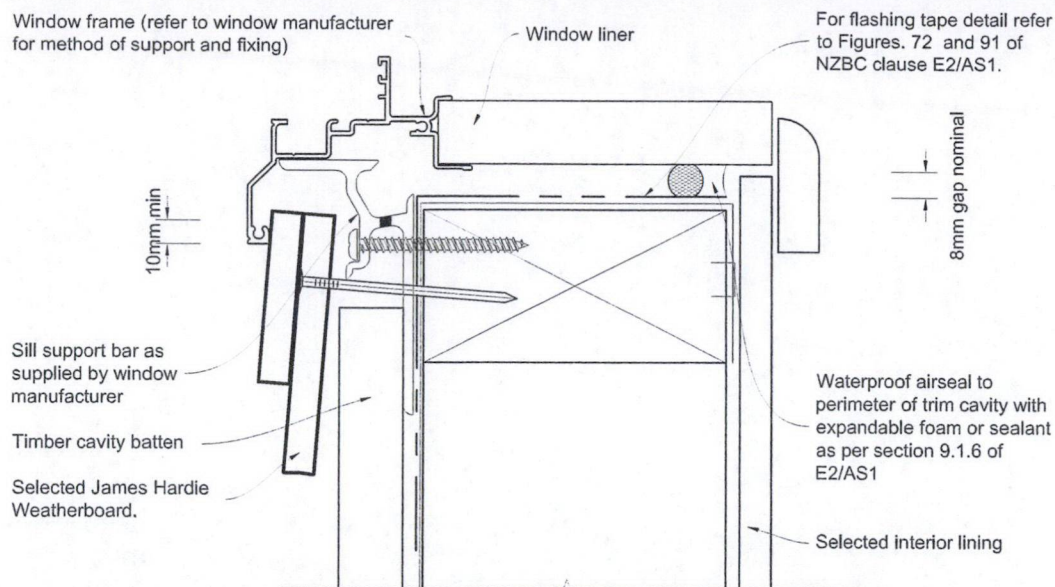


Figure 25: Cavity sill flashings without facings



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC 'E2/AS1'.
2. Building underlay must comply with acceptable solution NZBC 'E2/AS1' and NZS 3604.
3. Flashing tape must have proven compatibility with the selected building underlay and other materials with which it comes into contact as per Table 21 of 'E2/AS1'.
4. Sill support bars must comply with EM6, E2/AS1 and B2/AS1

Refer to the manufacturer or supplier for technical information for these materials.

Figure 26: Cavity one piece head flashing without facings

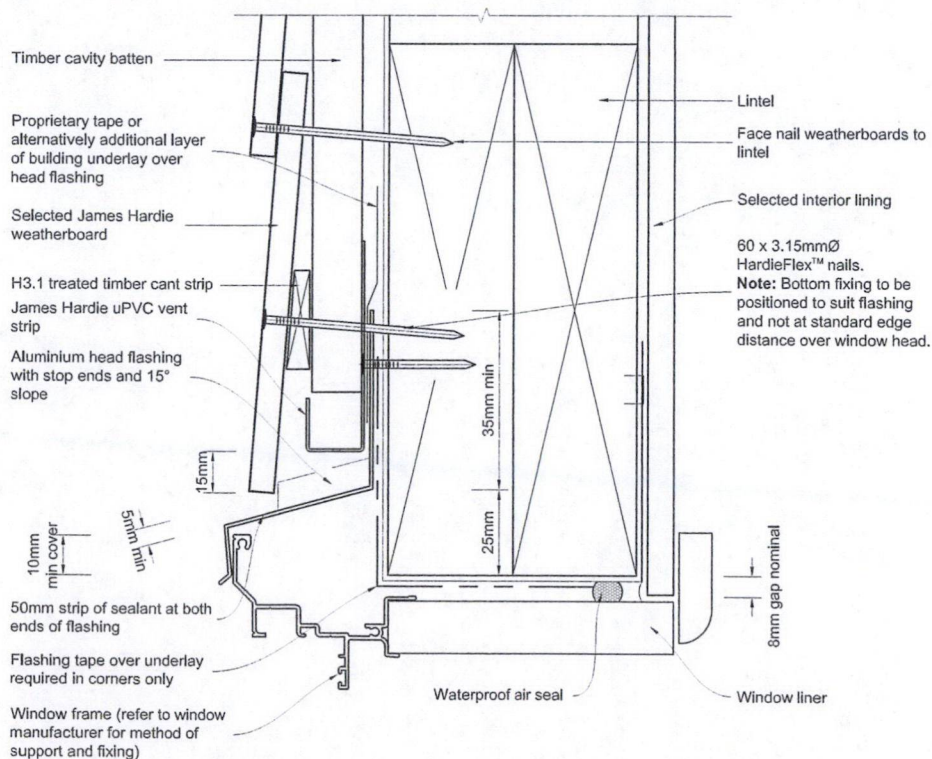


Figure 27: Cavity jamb flashing without facings

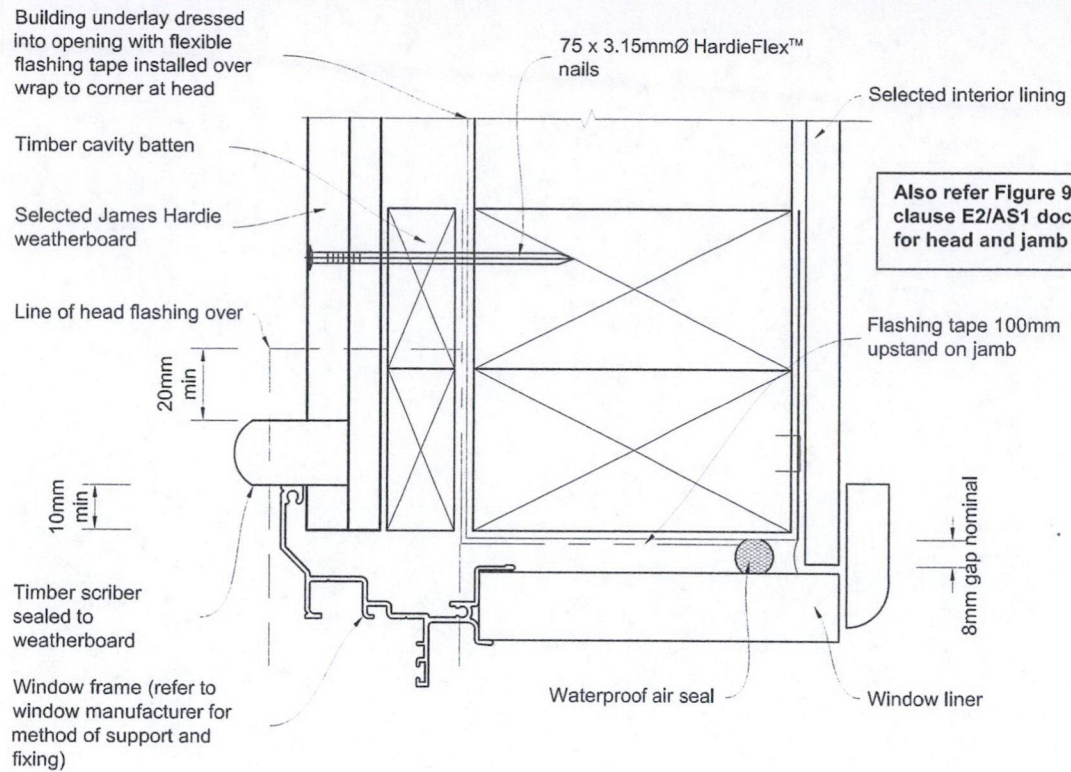
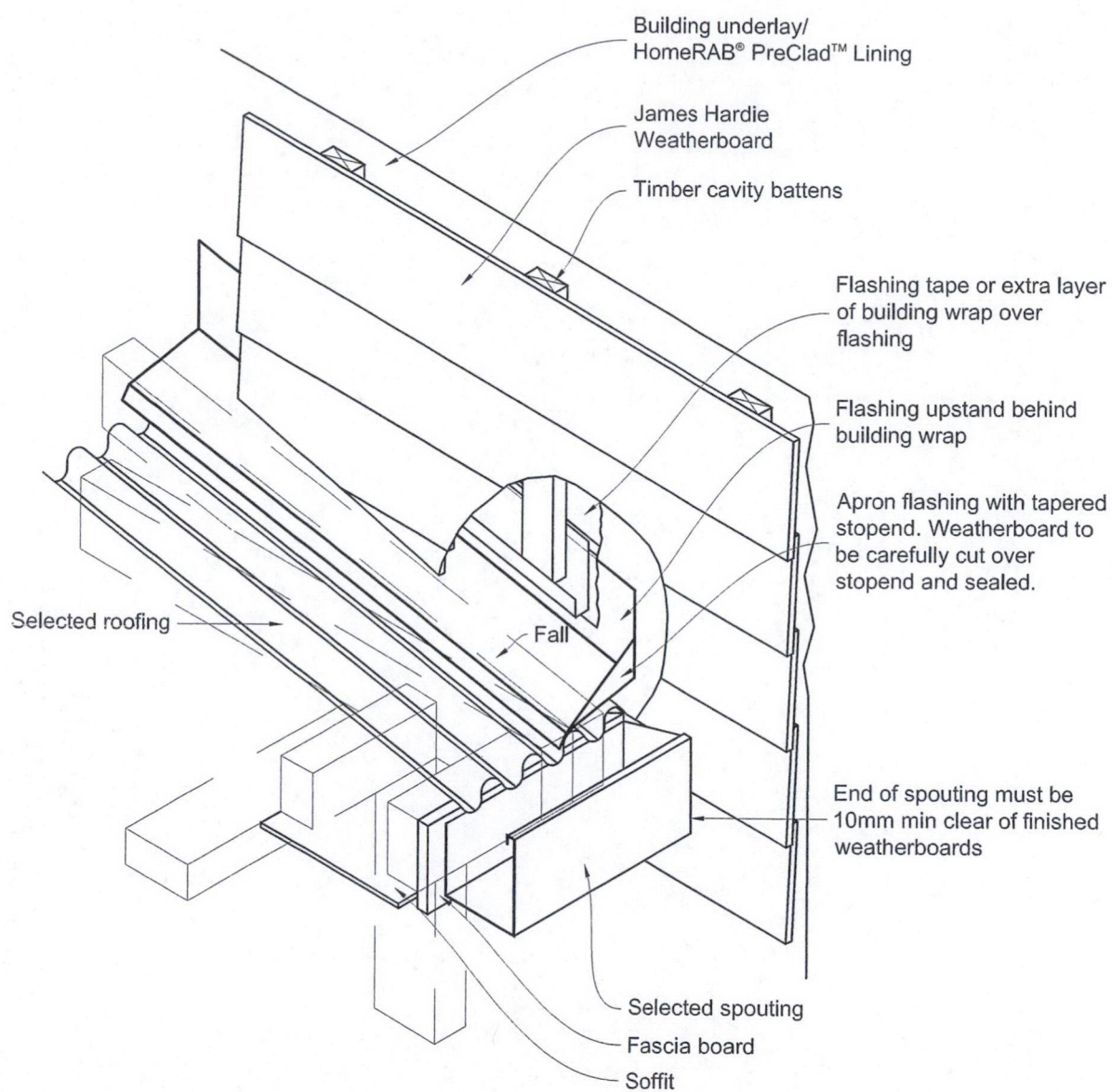


Figure 28: Cavity framing and batten setout



*
When 50 year durability for flashing is required refer Table 20 NZBC
E2/AS1 document.

Figure 29: Cavity parapet flashing

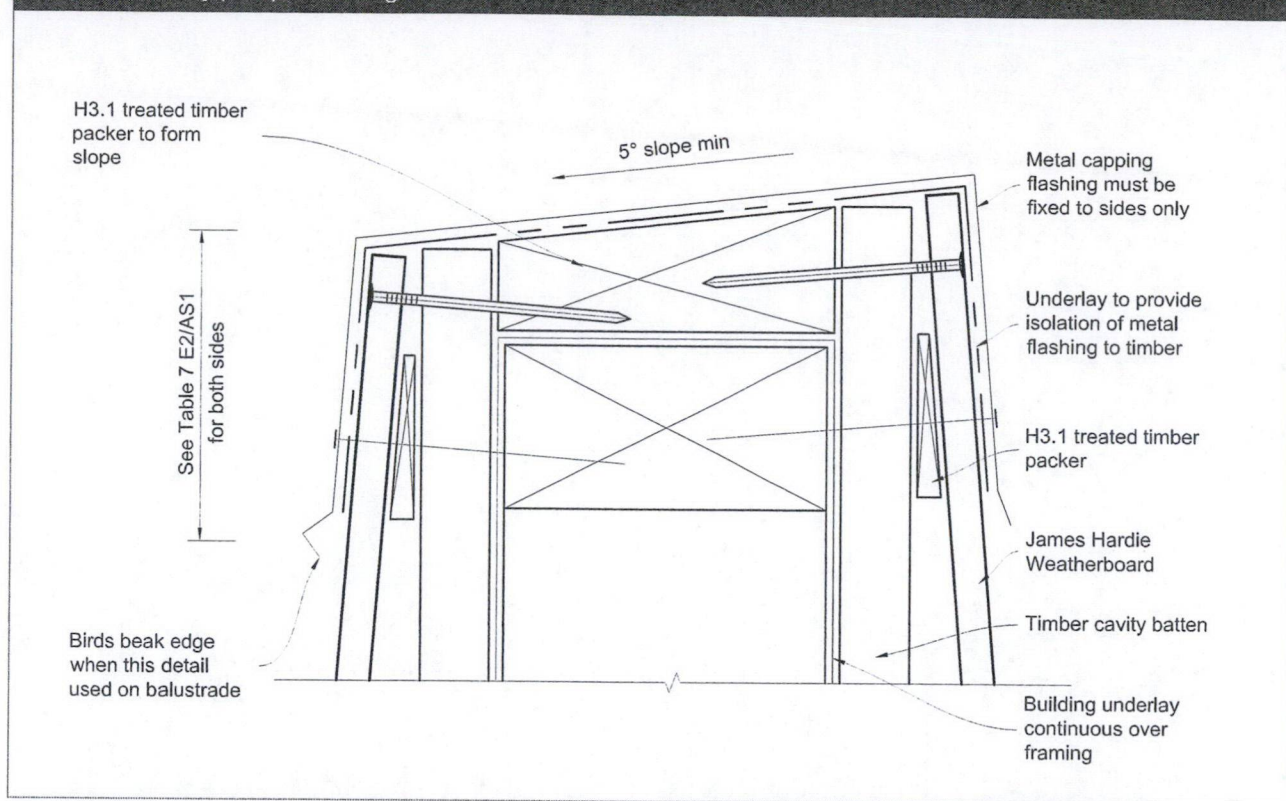


Figure 30: Cavity meter box at head

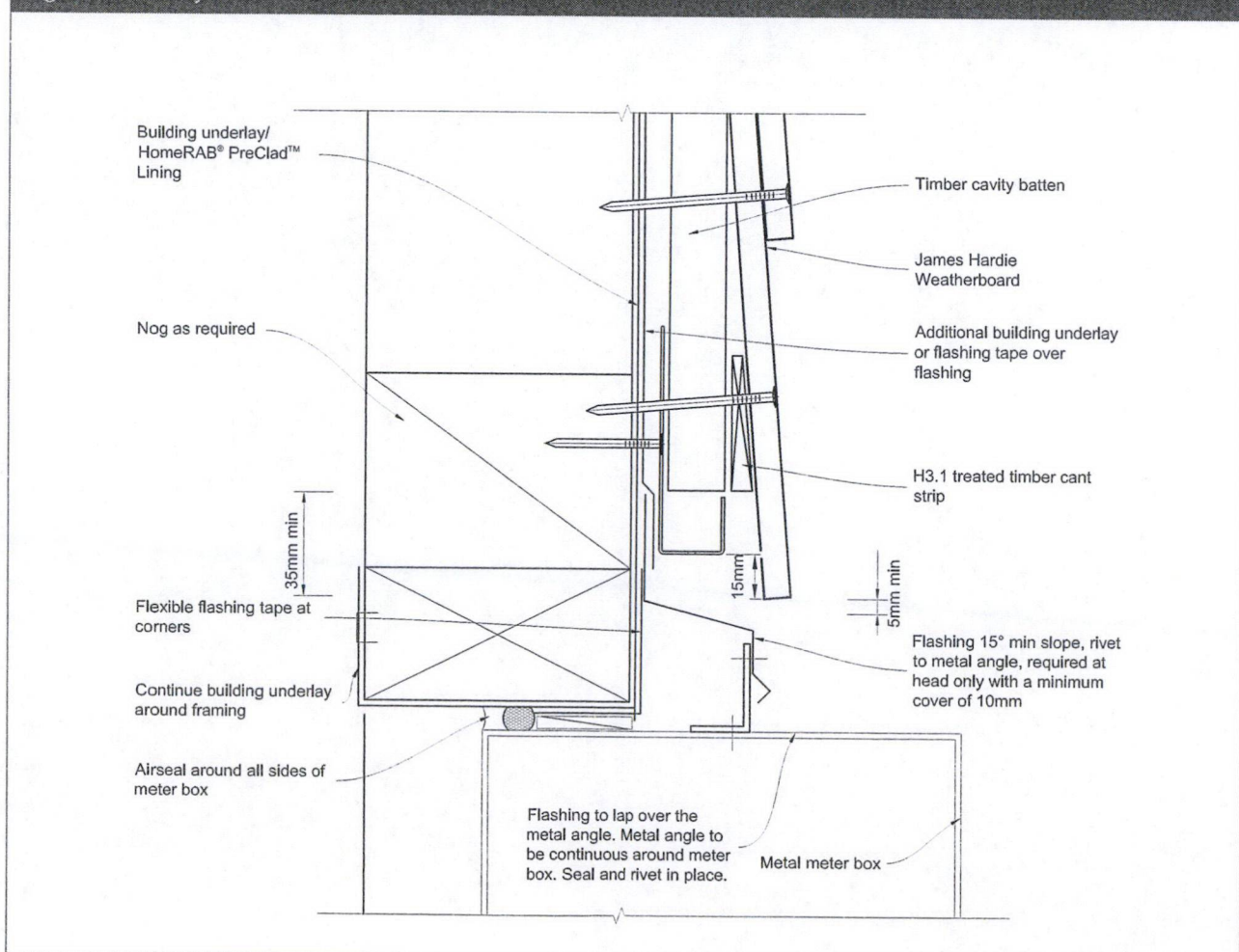


Figure 31: Cavity meter box at sill

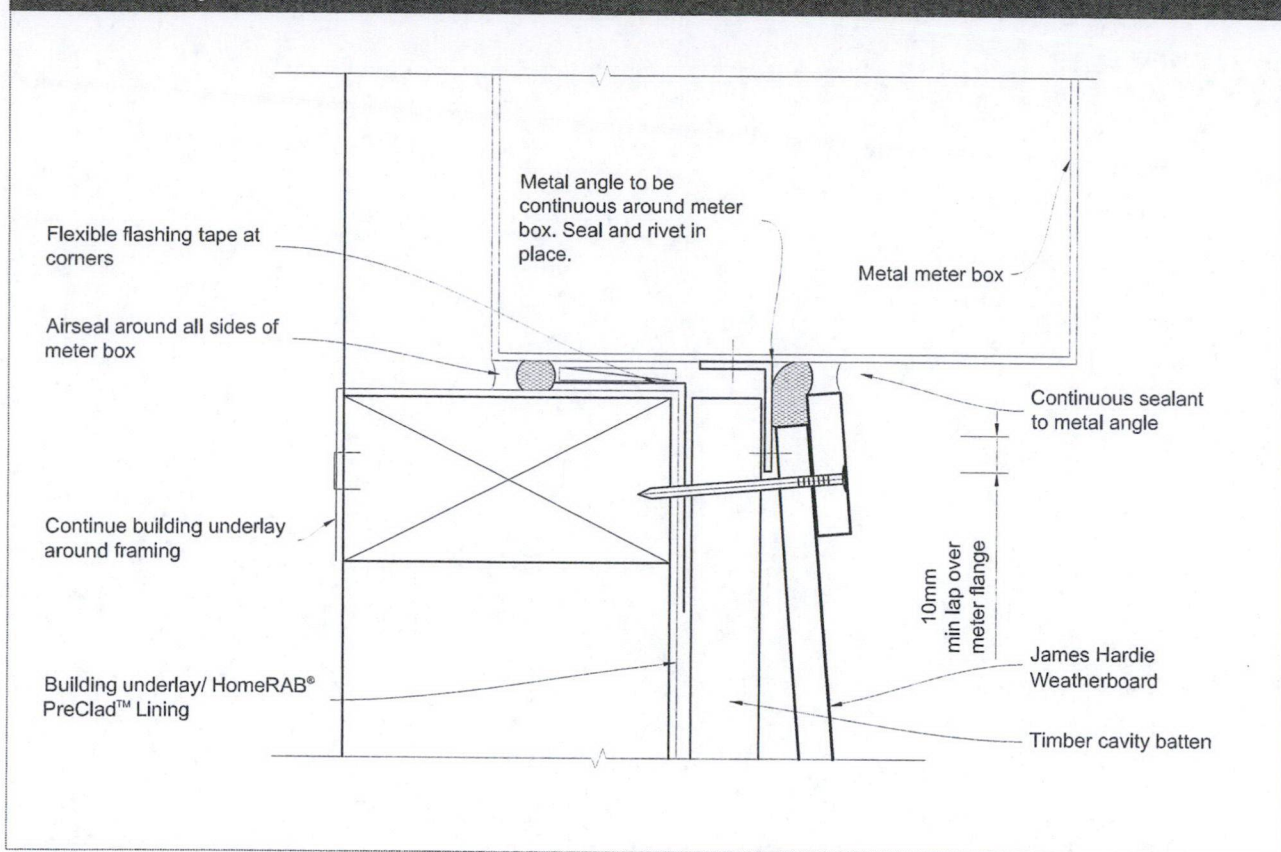


Figure 32: Cavity meter box head flashing at jamb

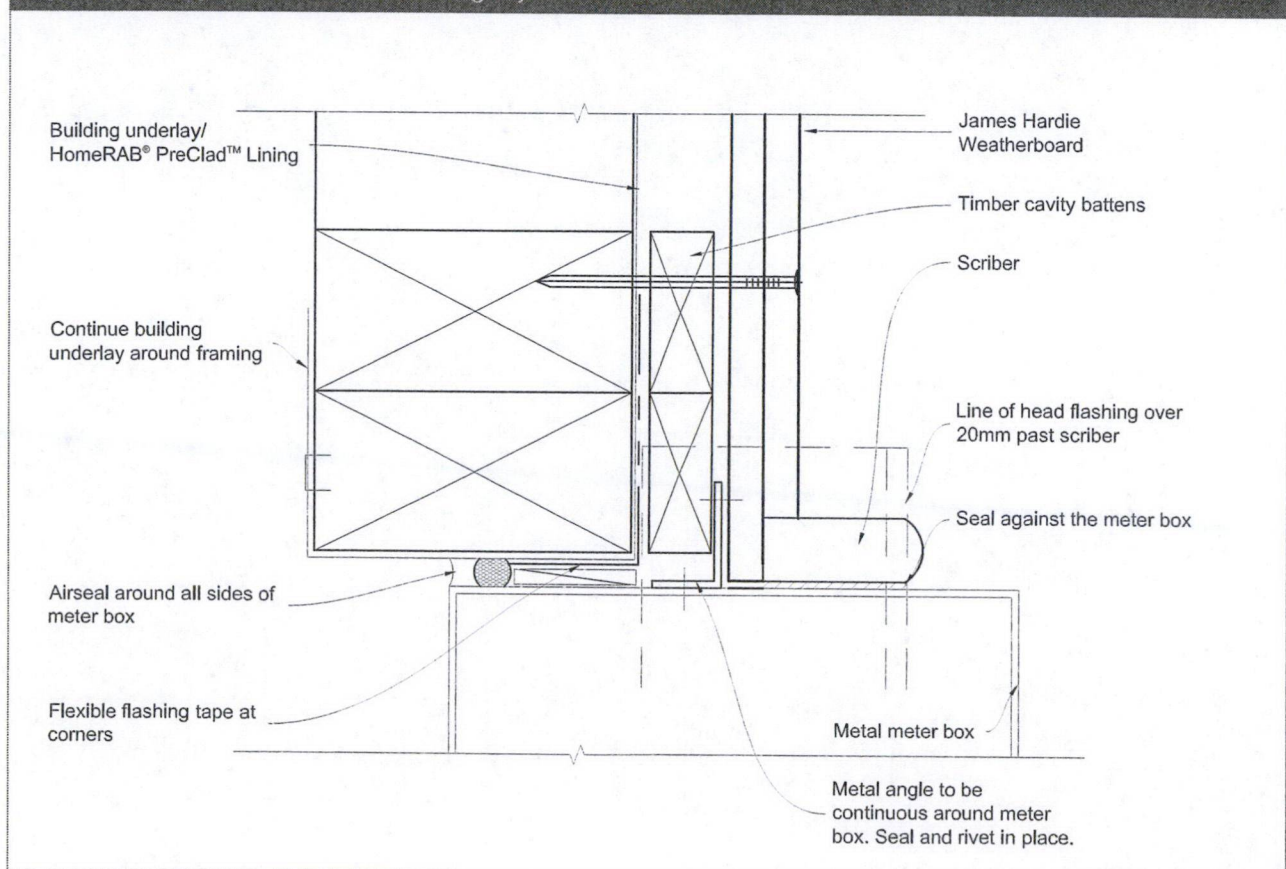


Figure 33: Cavity pipe penetration

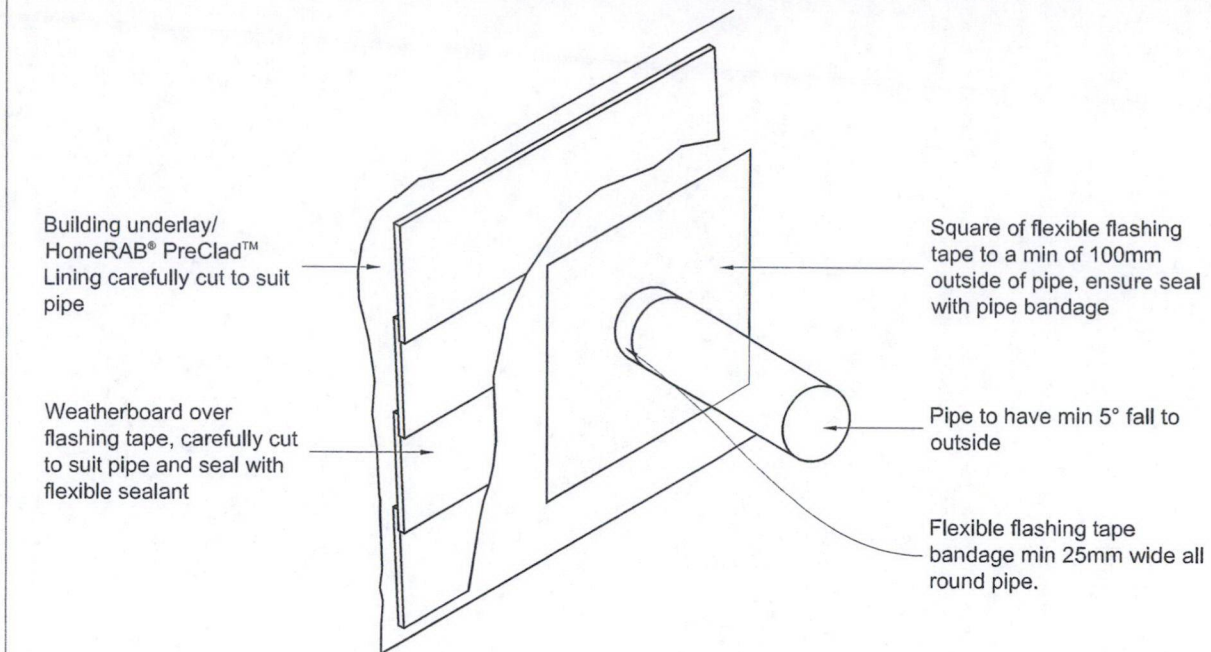
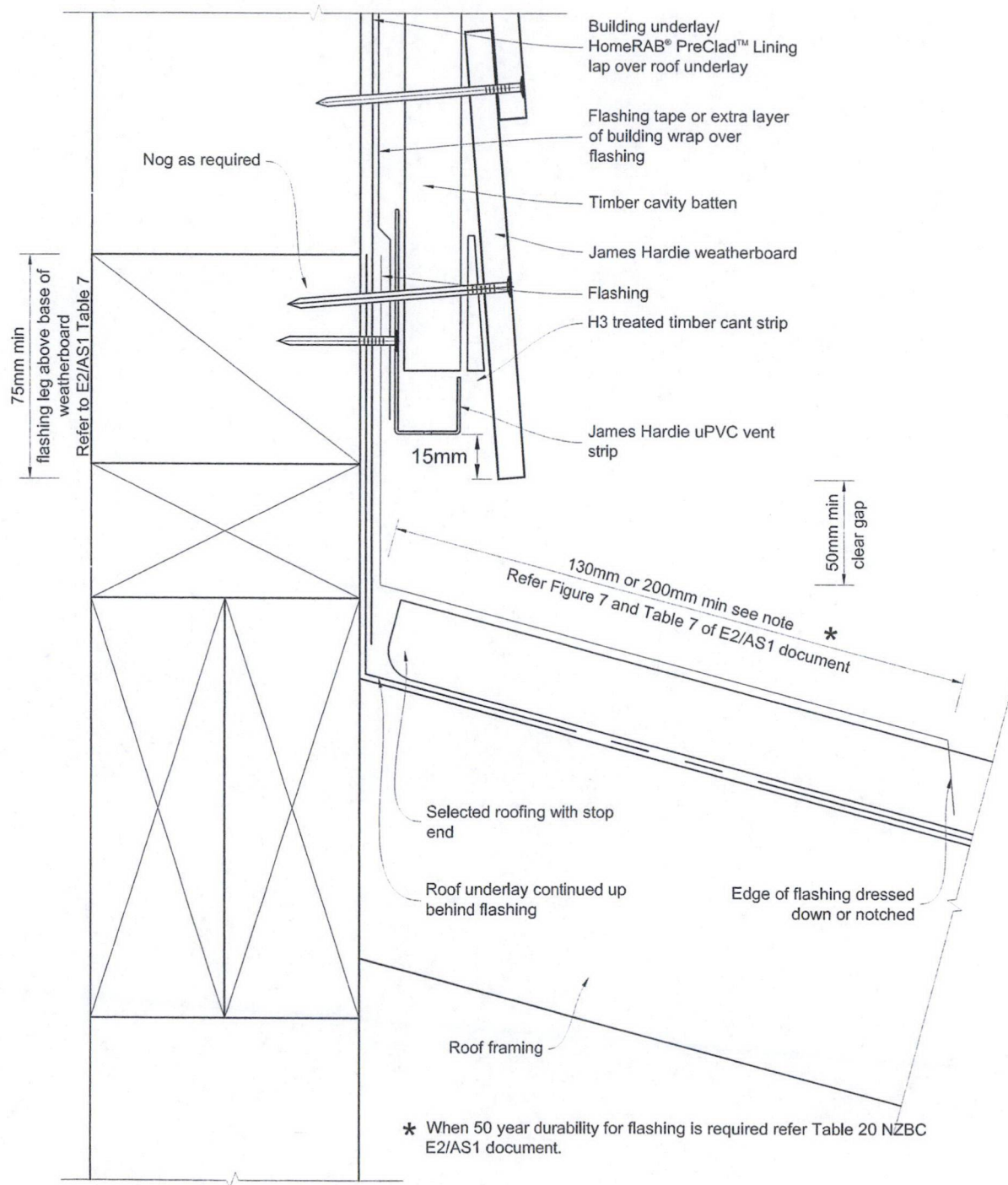


Figure 34: Cavity one piece apron flashing joint



Product Warranty

James Hardie®
WEATHERBOARDS

February 2013

James Hardie New Zealand ("James Hardie") warrants for a period of 15 years from the date of purchase that the James Hardie Weatherboards (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

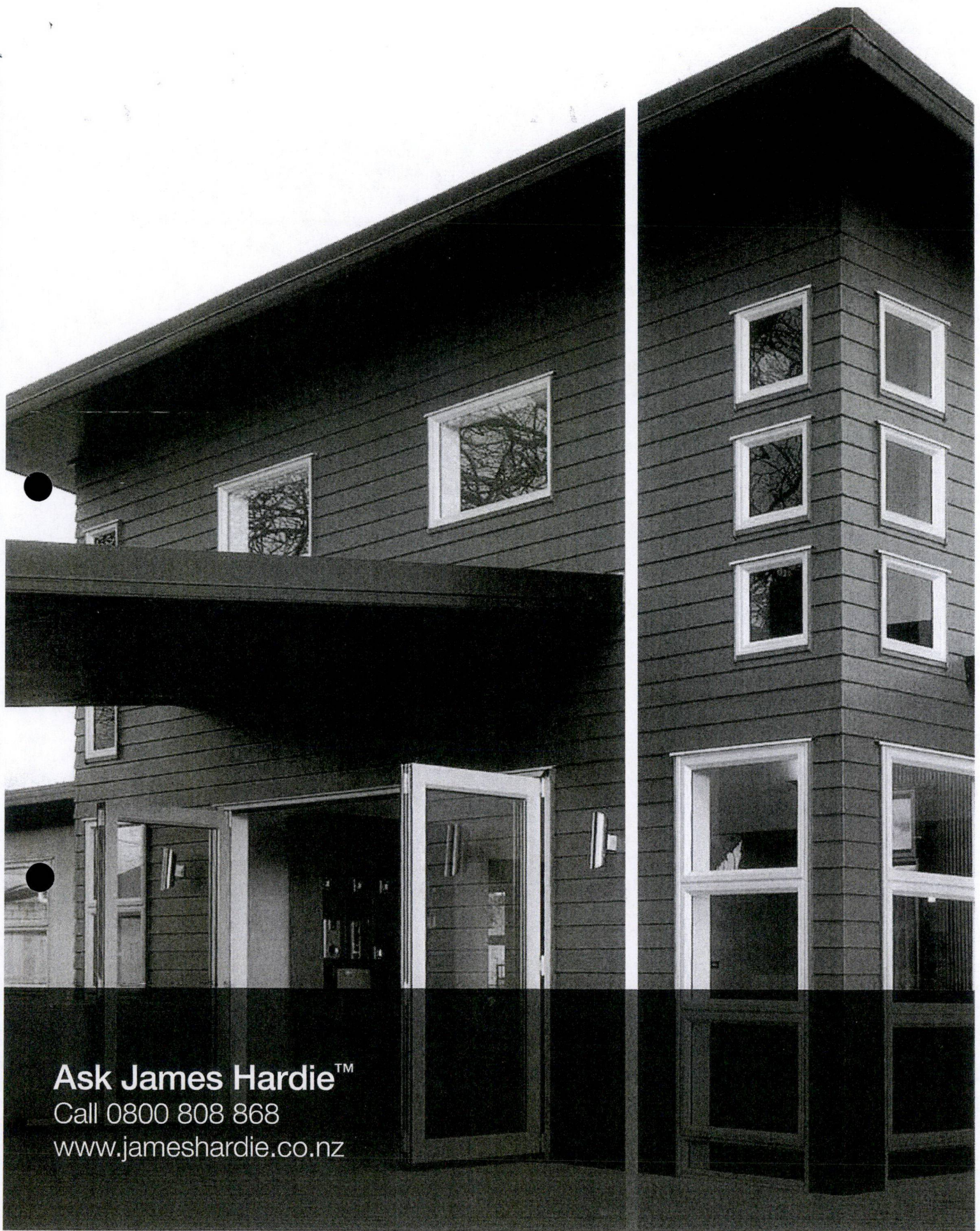
Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested the performance of James Hardie Weatherboards when installed in accordance with the James Hardie Weatherboards technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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a smarter way®



Ask James Hardie™

Call 0800 808 868

www.jameshardie.co.nz

GIB EzyBrace® 2011 Software



Demand Calculation Sheet

single storey

V06/11

Job Details

Name: Ording/Yardley
 Street and Number: SH10 Mangonui
 Lot and DP Number:
 City/Town/District: Mangonui
 Designer: TAS
 Company Name: Arcline
 Date: 22/11/2013



Select Lining Option

10 or 13 mm GIB® Plasterboard

Building Specification

Number of storeys: single
 Floor Loading: 2kPa
 Foundation Type: subfloor
 Cladding Weight (subfloor): light

Single Floor
 Cladding Weight: light
 Roof Weight: light
 Room in Roof Space: no
 Roof Pitch (degrees): 15
 Roof height above eaves (m): 1.2
 Building height to apex (m): 4.7
 Ground to lower floor level (m): 1.1

Complete Single Floor Column only

25
 1.0

Stud Height (m): 2.4
 Building Length (m): 6.6
 Building Width (m): 5.0
 Building Plan Area (m2): 32

3.0
 2.4
 20.0
 10.0
 200

Building Location

Wind Zone: Very High

Select by Building Consent Authority Map

or Preference: Very High
 Wind Region: Preference selected
 Lee Zone: Preference selected
 Ground Roughness: Preference selected
 Site Exposure: Preference selected
 Topographic Class: Preference selected

Earthquake Zone

1

Soil Type

D&E (deep to very soft)

Annual exceedance probability

1/500 (NZS3604:2011 default)

Bracing Units required for Wind

Demand W (BU)		
	subfloor	Walls single
along	494	251
across	595	273

Bracing Units required for Earthquake

Demand along / across E (BU)		
	Walls	
subfloor	single	
221	150	

[illegible]

GIB

V06/11

[illegible]

					Wind	Earthq.
Totals Achieved	W	138%	EQ	232%	377	349
Timber Floor, design limit of 120 BU/m					OK	OK
Totals Required (from Demand)					273	150

GIB EzyBrace® 2011 Software

Subfloor Bracing Calculation Sheet					Subfloor Along		V06/11
Along							
Bracing Line		Bracing Elements provided				Wind	Earthq.
1	2	3	4	5	6	8W	9EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Supplier	Bracing Type	Number or Length L (m)	BUs Achieved	BUs Achieved
a	line totals	1	NZS3604	anchor pile	2	320	240
W	320	2					
EQ	240	3					
b	line totals	1	NZS3604	anchor pile	1	160	120
W	160	2					
EQ	120	3					
c	line totals	1	NZS3604	braced piles	1	160	120
W	160	2					
EQ	120	3					
d	line totals	1					
W		2					
EQ		3					
e	line totals	1					
W		2					
EQ		3					
f	line totals	1					
W		2					
EQ		3					
g	line totals	1					
W		2					
EQ		3					
h	line totals	1					
W		2					
EQ		3					
i	line totals	1					
W		2					
EQ		3					
j	line totals	1					
W		2					
EQ		3					
					Wind	Earthq.	
Totals Achieved					640	480	
					OK	OK	
Totals Required (from Sheet A)					494	221	

GIB EzyBrace® 2011 Software

Subfloor Bracing Calculation Sheet					Subfloor Across		
					V06/11		
Along		Bracing Elements provided				Wind	Earthq.
Bracing Line							
1	2	3	4	5	6	8W	9EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Supplier	Bracing Type	Number or Length L (m)	BUs Achieved	BUs Achieved
m	line totals	1	NZS3604	anchor pile	1	160	120
W	320	2	NZS3604	braced piles	1	160	120
EQ	240	3					
n	line totals	1	NZS3604	anchor pile	2	320	240
W	320	2					
EQ	240	3					
o	line totals	1					
W		2					
EQ		3					
p	line totals	1					
W		2					
EQ		3					
q	line totals	1					
W		2					
EQ		3					
r	line totals	1					
W		2					
EQ		3					
s	line totals	1					
W		2					
EQ		3					
t	line totals	1					
W		2					
EQ		3					
u	line totals	1					
W		2					
EQ		3					
v	line totals	1					
W		2					
EQ		3					
						Wind	Earthq.
Totals Achieved						640	480
						OK	OK
Totals Required (from Sheet A)						595	221

Design Certificate – Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code, provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

References:

NZS 3603:1993 Timber Structures Standard. AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
NZS 3604:2011 Timber-framed buildings. AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
AS 1720.1 – 2010 Timber structures. Part 1: Design methods. AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.
AS 1684.1 – 1999 Residential timber framed construction. Part 1: Design criteria.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed

Version date: 22 August 2011

For further information or advice please contact: Carter Holt Harvey Woodproducts New Zealand
173 Captain Springs Road, Onehunga. Auckland
Telephone 0800 808 131
Facsimile 0800 808 132
Email: designit@chhwoodproducts.co.nz

Specifier details:

Supplier details:			
Specifier:		Arcline	
Business name:			
Address:			
Email:			
Phone:		Mobile:	Facsimile:

Project & Site details:

Project:	Ording & Yardley	Ref. no.:
At (address):	SH10 Mangonui	
For (owner/s):		
Wind zone:	Very high	
Snow loading	Snow region: N0, snow loading not applicable	

MEMBER DESIGN DETAILS

Member 1

- 1) Member code and description B1 - Bearer - Supporting single or upper storey external load bearing walls
- 2) Date prepared 22/11/2013
- 3) Serviceability criteria AS 1720.1-2010 and AS 1684.1-1999
- 4) Design inputs

Span	1.5 m - single
Floor load width 'FLW'	1.8 m
Roof load width 'RLW'	3.8 m
Roof type and mass	Light roof & ceiling - 40 kg/m ²
Floor dead load	40 kg/m ²
Floor live load	1.5 kPa/1.8 kN
Wall type and height	Light wall - 2.7 m

5) Member specification

Size, stress grade/product Use 2/190 x 45 SG8 Laserframe
 Material type Dry softwood, machine stress graded and verified (NZS 3622)
 Assumed design density < 480 kg/m³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G+ Ψ_L Q *	5.0 mm	1.8 mm (long term)	$\frac{5.0}{1.8} = 2.85$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	Limit states design reaction ^{2,3}	
	k_1 ¹	End ⁴ kN
1.35G	0.60	-3.7
1.2G + 1.5Q	0.80	-5.6
1.2G + 1.5Q	0.80	-5.2
1.2G + W _U + Ψ_C Q	1.00	-5.7
0.9G + W _U	1.00	2.2

See 'Notes for interpretation of reaction data' at the end of this report

8) Installation requirements

Provide at least 30 mm bearing at end supports
 Nail lamination required - refer AS 1684

Member 2

1) Member code and description B2 - Bearer - Supporting floor loads only

2) Date prepared 22/11/2013

3) Serviceability criteria AS 1720.1-2010 and AS 1684.1-1999

4) Design inputs

Span 2.3 m - continuous
 Floor load width 'FLW' 1.1 m
 Floor dead load 40 kg/m²
 Floor live load 2.0 kPa/1.8 kN
 Wall type and height Light wall - 2.7 m

5) Member specification

Size, stress grade/product Use 2/190 x 45 SG8 Laserframe
 Material type Dry softwood, machine stress graded and verified (NZS 3622)
 Assumed design density < 480 kg/m³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G+ Ψ_L Q *	7.7 mm	1.6 mm (long term)	$\frac{7.7}{1.6} = 4.91$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1 ¹	Limit states design reaction ^{2,3}	
		End ⁴ kN	Internal/ intermediate kN
1.35G	0.60	-1.7	-5.6
1.2G + 1.5Q	0.80	-3.4	-11.4
1.2G + 1.5Q	0.80	-3.3	-4.6

See 'Notes for interpretation of reaction data' at the end of this report

8) Installation requirements

Provide at least 30 mm bearing at end supports
Provide at least 45 mm bearing at internal supports
Nail lamination required - refer AS 1684

Notes for interpretation of serviceability data

- "average deflection" is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS/NZS 1170, AS 1684.1 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
- Deflection is the flexural response to load – 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS/NZS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!
- The limits referred are those specified in AS 1684.1 for the stated load case.
- 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1684.1

Notes for interpretation of reaction data

- Duration of load factor ' k_1 ' for strength as per NZ 3603:1993
- Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
- Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
- End reaction includes allowance for overhang/cantilever where one has been designed



MiTek New Zealand Limited

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PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

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

MiTek 20/20 Engineering 4.6.6.169

www.mitek.nz.co.nz

Printed: 20:00:33 26 Nov 2013

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

ISSUED BY: MiTek New Zealand Limited

TO: Northland Frame Truss Ltd

IN RESPECT OF: MiTek[®] Truss Designs

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

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

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

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence

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

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

On behalf of MiTek New Zealand Limited,

Date: Tuesday, 26 November 2013

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

Northland Frame Truss Ltd

Fabricator Design Statement : Page 1

Job: AL-ORDI

Client: Arcline Design

Site: Ording & Yardley

Description: AL-ORDI

Phone:

SH10

Building Consent No.:

Mangonui

MITek 20/20 Engineering 4.6.6.152

MITek New Zealand Limited

Phone:

Printed: 20:00:33 28 Nov 2013

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MITek accredited fabricator Northland Frame Truss Ltd, being licensed to use the MITek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MITek 20/20® TRUSS DESIGN DATA

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

Job Details

Roof Truss

Timber Group:

NFT2H1

Roof

Material: Galv Iron .5mm
Dead Load: 0.210 kPa
Restraints: 900 mm centres
Live Load: Q_{ur} = 0.250 kPa
Q_c = 1.100 kN

Importance Level : 2

Pitch: 15.000 deg

Ceiling

Material: Standard
Dead Load: 0.200 kPa
Restraints: 400 mm centres
Live Load: Q_c = 1.400 kN

Design Working Life : 50 years

Nominal Overhang: 600 mm

Wind

Area: Very High (50.0 m/s)
Pressure Coeff: C_{pe} = varies; C_{pi} = -0.30, 0.20

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

MITek® Truss List

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

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
ET1A	1	6600	15.000	900
T1	5	6600	15.000	900
ET1	1	6600	15.000	900

Total quantity : 7

The computer design input has been carried out by:

Signed: *Murray Webb*

Name of Detailer: *Murray Webb*

On behalf of:

Northland Frame Truss Ltd

Date: ...Tuesday, 26 November 2013....

Qualifications and Title: *MITek Detailer*

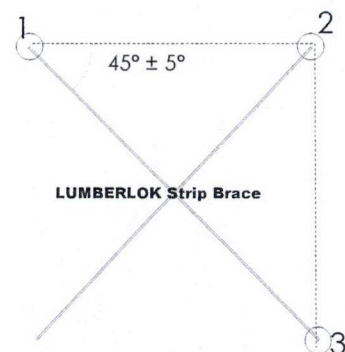
Truss Fixings

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

Roof Bracing

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

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



NOTES:

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

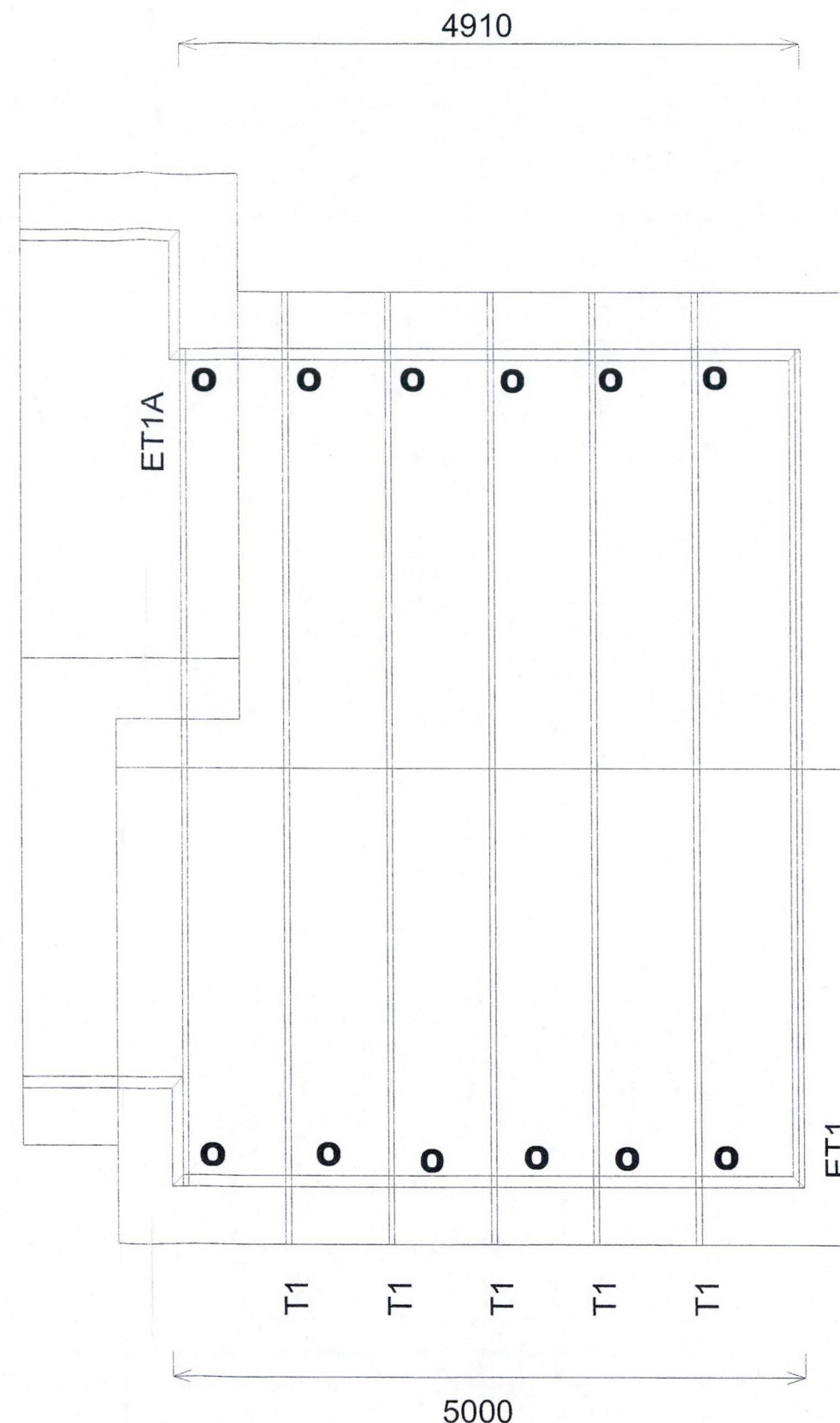
Refer to:
LUMBERLOK Timber Connectors Characteristic
Loadings Data brochure 03/4

FAR NORTH DISTRICT COUNCIL
Approved Documents

950

6600

770



FAR NORTH DISTRICT COUNCIL
Approved Documents

950

6600



Site Address :
Ording & Yardley
SH10
Mangonui

Sheet Title :
**For Building Consent
Truss Fixings**

Date : 26 Nov, 2013 Drawn : MPW
Scale : 1: 50 System : MiTek 20/20

Job Details:
Roof Pitch : 15.deg
Roof Material : Galv Iron .5mm
Ceiling Material : Standard
Wind Zone : Very High
Roof Snow Load : 0.000kPa

Truss Centres : 900mm
Roof Live Load : 0.250kPa
Floor Live Load :
Wind Speed : 50m/s
Overhang : 600mm



PrimeCad v4.6.6.169

Job Title :
AL-ORDI
Sheet :
1
Revision Number :