BACKYARD SHACKS INSTALLATION MANUAL

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THINGS YOU'LL NEED TO KNOW

General notes to be read before you use this manual.

1. This Manual has been prepared for a range of roof framing designs using Backyard Shacks™ building components manufactured or supplied by BlueScope Steel, its licensed manufacturers or dealers.
2. The Backyard Shacks™ Building System has been designed as a complete system.
3. All erection and connection details must be made in accordance with the relevant standard connection drawing details contained in this Manual or its supplements, or drawings output from the our software.
4. Before commencement of any fabrication or construction develop a safety management plan to cover key risks. Key risks include, but are not limited to:
   a. Working at heights
   b. Electrical safety
   c. Cuts and scratches
5. Consider and install the appropriate level of safety equipment to manage identified risks. Safety equipment that may be required includes:-

a. Personal protective equipment including safety glasses, gloves, hearing protection (when using power tools) and sunscreen;

b. Appropriate fall protection equipment including guard rails, scaffolds, ladders, elevated platforms, safety mesh, and fall restraint harnesses

6. A temporary earth should be established during the construction of steel frames and, upon completion, the steel house frames must be permanently earthed in accordance with the requirements of local electricity authorities.
7. You should check with your local workplace health and safety authority to see what safety measures you need to put in place prior to and during construction. It is the responsibility of the installer/erector to ensure all local safe work practices are adhered to and the safety of the whole site is maintained at all times.
8. For wiring in steel wall frames, nylon grommets shall be installed to run electrical cables through.

Where insufficient detail is included in this manual for your project, seek specialist advice.

9. Before you commence construction:

a. you should check with your local government authority to see if any form of prior permission or approval is required;

b. if you want to build or construct any attached structure, you should seek advice from a suitably qualified engineer to verify the capacity of your existing structure to withstand any additional load arising from the attached structure. You should also check with your local government authority to determine any specific requirements for the attachment to existing structures;

c. you should check with your local workplace health and safety authority to see what safety measures you need to put in place prior to and during construction. It is the responsibility of the installer/erector to ensure all local safe work practices are adhered to and the safety of the whole site is maintained at all times.

6. To ensure maximum lifespan of your house frame, consult your nearest Backyard Shacks™ fabricator for information regarding maintenance, handling, storage and any other technical assistance you may require.

Important disclaimer about this construction manual

Date of Issue

This Manual was issued on November, 2014. Ranbuild may make changes to this Manual in its sole discretion. You should check you are using the current version of the Manual before you start construction. Refer to www.backyardshacks.com.au to check for the latest version.

Conditions of Use

If you use this Manual, you acknowledge and agree that your use is subject to the terms and conditions in this Manual. BlueScope Steel, its agents, officers, employees, subcontractors or consultants make no representations, either expressed or implied, as to the suitability of the information and data in this Manual for your particular purposes. It's your responsibility to ensure the design you use is appropriate for your needs, the products you have purchased, your site and structural limitations and your building and construction capabilities. It is recommended that you obtain qualified expert advice.

Use of Genuine Materials

Structures in this Manual should only be built or constructed using Backyard Shacks™ made from TRUECORE® steel or recommended third party products. Except as otherwise provided in these terms, any warranties only apply to you (if at all) if you use the genuine BlueScope Steel or recommended third party products and method of construction.

Check Delivery

It is important that you check all materials delivered to site against your invoice before you use them in your building or construction to ensure all components have arrived, are of the appropriate quality and are ready for installation.

Limitation of Liability

By using this Manual, you accept the risks and responsibility for all losses, damages, costs and other consequences resulting directly or indirectly from using this Manual. Except to the extent to which liability may not lawfully be excluded or limited, BlueScope Steel will not be under or incur any liability to any person for any direct or indirect loss or damage (including, without limitation, consequential loss or damage such as loss of profit or anticipated profit, loss of use, damage to goodwill and loss due to delay) however caused (including, without limitation, breach of contract, negligence, breach of statute and/or in equity), which may be suffered or incurred in connection with this Manual.

Table of Contents: Section 1 - Wall Frame Installation

Section 2 - Roof truss Installation

Section 3 - Cladding Installation

1.0 Scope of manual

This manual has been prepared for the construction of steel framed walls within the following parameters:

Only Backyard Shacks™ components made from TRUECORE® steel and supplied by Ranbuild can be used.

Erection details in this manual covers construction for non-cyclonic buildings. (See Table below.)

Standard stud spacings are at 600mm, 450mm or 300mm (max) centres dependent on stud design limitations. Other spacings may require additional engineering. Limitations apply to stud heights.

Suitable for both sheet wall cladding and brick veneer construction.

Product performance

The BACKYARD SHACKS™® wall framing system has been designed in accordance with relevant Australian Standards and the requirements of the Building Code of Australia.

The wall framing system will perform in accordance with Backyard Shacks™® design documentation if installed in accordance with the recommendations and details set down in this manual and related references.

This manual contains vital information. PLEASE READ IT CAREFULLY.

For more information and technical support, contact:
www.backyardshacks.com.au

Refer to www.truecore.com.au for locations where Backyard Shacks™ can be warranted.

Installation videos

Installation videos are available online at:
www.backyardshacks.com.au and http://tradies.truecore.com.au

1.1 Reference Standards

AS/NZS 4600:2005 – Cold Formed Steel Structures

AS/NZS 1170.0:2011 – Structural Design Actions, Part 0 - General Principles

AS/NZS 1170.1:2011 – Structural Design Actions, Part 1 - Permanent, Imposed or Other Actions

AS/NZS 1170.2 :2011 – Structural Design Actions, Part 2 - Wind Actions

AS 4055:2012 – Wind Loads for Housing

AS1397:2011 – Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium

AS4440:2004 Installation of nail plated timber roof trusses

AS3566.1:2002 Self-drilling screws for the building and construction industries

NASH Handbook Low Steel Framing, National Association of Steel Framed Housing 2014 Part 1, Design Criteria

Taken from AS/NZS 1170.2 :2011 – Structural Design Actions, Part 2 - Wind Actions

Figure 2.1 Frames stacked vertically

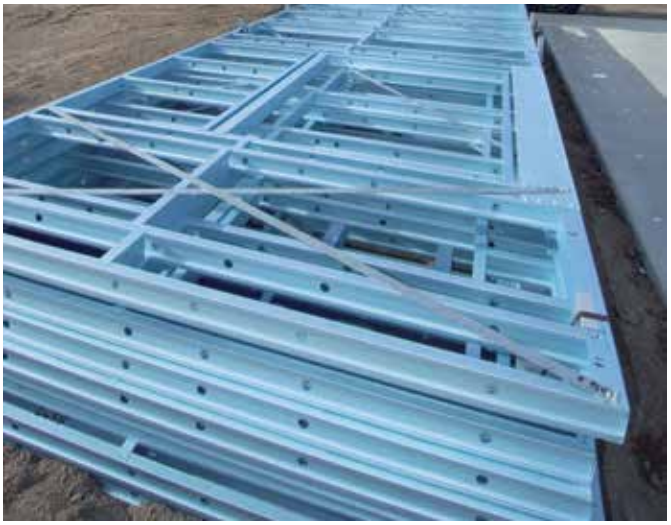


Figure 2.2 Frames stacked horizontally

2.0 On-site handling

Slings

Lifting, loading and transportation of steel frames shall be accomplished with sufficient care to prevent damage. Frames must be fully supported in either horizontal or vertical planes when being transported. Care must be taken when tying down and lifting wall frames not to put an excessive pressure on joints.

Most wall frames for single storey work may be lifted by hand, however where cranage is required, sling frames at plate and stud connections. When a crane is used to unload, suitable lifting methods are required to minimise racking loads or local distortion of members.

Slings should be located at equal distances from frame centrelines and be approximately one-third to one-half the frame length apart.

Note: When manoeuvring any materials by hand, take care not to damage components. Components should be inspected on arrival to site. Damaged components may affect structural integrity.

2.1 Wall frames exposure and storage

2.1.1 Where frames are stored on site, they should be blocked above the firm ground to protect them from ground water as follows:

a) If the frames are stored horizontally, the blocking should be at 1.0m to 1.5m centres or as required at joints, to prevent bending of the frames. (Figure 2.2)

b) If the frames are stored vertically, they should be supported at the designed support locations and in a manner that will prevent them from tipping or toppling.

(Figure 2.1)

3.0 Tools & equipment

Power tools

- Rotary hammer drill (for concrete drilling up to ø20mm) plus appropriate drill bits to suit drill and anchor fixing
- Hand held grinder and metal blades to suit
- Explosive powered (Ramset type) nailing gun, preferably with collated charges for shooting plates to concrete (plus mickey pins and nails)
- Cordless impact drivers each with driver tips to suit framing screws, and/or
- Cordless drills with torque settings and driver tips to suit
- Minimum 185mm portable circular cold saw with suitable ferrous cutting blades
- Min 250mm metal cut off saw and blades

Tool accessories

- 15 amp electrical safety pack and electrical leads (of suitable length)
- 5/16" driver tips to suit hex type
- No.3 Phillips bits
- Spanner & socket sets
- Screw gun Extension bit (length up to 150mm)

Hand tools

- Double action Tin snips (2 pair each left hand and righthand)
- 2000 mm spirit level and 1200mm spirit level
- Pack 10 oil based marker pens (Fine)
- String lines (chalked & unchalked) and line marking chalk
- Adjustable G cramps / vice grips
- Measuring Tapes
- Hammer
- Hacksaw and blades
- Old carpenters chisel
- Suitable cold chisel
- Duck bill pliers

Essential safety equipment

- 2400mm high step ladders
- Fall protection harness
- Carpenters trestles (saw horses) 750mm or 900mm in height
- 3600mm high aluminium trestles
- 5000mm aluminium planks
- Ply sheeting 2700mm x 1200mm x 15mm (Make platform for fabrication and re-use as scaffold deck for installation)
- Eye protection
- Hearing protection (when using power tools)
- Protective gloves
- Earth leakage circuit breaker for electrical tools

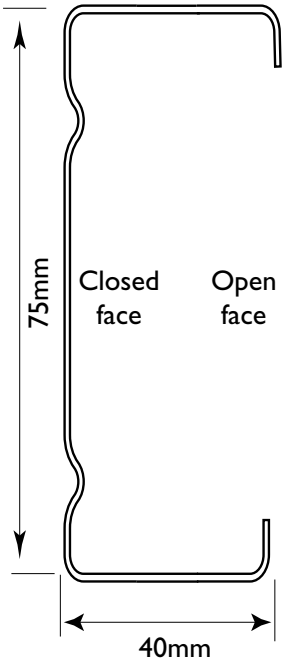

Tin snips


Metal cutting saw

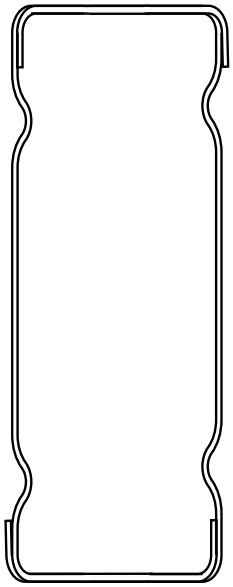

Angle grinder


Screw gun (shown with extended hex head bit)

Hand held metal cutting saw



Ribbed Cee Section
Thicknesses: 0.55mm, 0.75mm, 1.0mm and 1.2mm



Boxed Cee Section
Thicknesses: 0.55mm, 0.75mm, 1.0mm and 1.2mm

Figure 4.1 Section dimensions

4.0 General points before construction begins

4.1 Frame and Slab/Sub-Floor dimensions MUST be compatible

Check that the layout matches the building and that all setout dimensions and identification marks have been provided.

Measure your slab or floor platform to ensure the frame will sit comfortably within its dimensions. This will highlight any discrepancies between the two that must be catered for during set-out.

Slab tolerances are essential because if length, flatness and square of the slab are incorrect, then the frame will not fit together correctly.

4.1.1 Concrete specification

Slabs

Maximum deviation from any specified height, plan or cross-sectional dimension to be greater of 1/200 times specified dimension or 5mm in accordance with AS3600. Surface level to be within +/-5mm of specified level. Exposed edges to be Class 3 in accordance with AS3610. Flatness - maximum deviation from a 3m straight edge placed anywhere on the surface: 5mm.

Footings - Exposed

"As for 'concealed' above plus - Maximum deviation from plumb to be greater of 1/200 times specified dimension or 5mm in accordance with AS3600. Maximum deviation of any point on the surface from a straight line joining any two points on the surface to be the greater of 1/250 times length of the line or 10mm in accordance with AS3600.

4.1.2 Frame set-out MUST be as per correct plan

Set-out must be made using the architectural plans to ensure all relevant measurements are transferred to the slab/sub-floor.

4.1.3 Frames MUST be installed Right Way Up & Right Way Around

The wall frame numbering system and wall framing layout will ensure each wall frame is installed correctly on-site. Markings on the plates indicate the front of the panel as shown by the arrow on the layout drawings.

4.1.4 Site modifications MUST be checked

Minor modifications to wall frames are easily made on-site if required. However, check with the design engineer for any structural implications.

4.1.5 Statutory regulations MUST be adhered to

Following trades must ensure that all statutory regulations are complied with during the construction process.

4.1.6 Correct direction of Backyard Shacks™ profile

The direction of the channel section used for the frame should be as depicted on Frame Assembly diagrams.

4.1.7 Material specification

Sections are roll-formed from TRUECORE® steel complying with AS1397:2011. In the grade shown, the number prefixed with G indicates minimum yield stress in MPa; and the number prefixed with Z or AM indicates minimum coating mass in g/m^2.

- 0.55mm BMT, TRUECORE® G550 AM125 steel
- 0.75mm BMT, TRUECORE® G550 AM125 steel
- 1.0mm BMT, TRUECORE® G550 AM125 steel
- 1.2mm BMT, TRUECORE® G550 AM125 steel

Concrete Columns & Walls

Within +/-15mm of specified position and +/-5mm of plumb.

4.1.8 Frames must be installed plumb and straight

While erecting the wall, frames must be fixed plumb and straight. After fixing, if a bow or tilt is evident, the frames have not been installed correctly. In this case, the problem must be rectified before proceeding further.

4.1.8.1 Straightness

Walls, specified as straight, must not deviate by more than 5mm over a 3m length as shown in Figure 4.2. Where wall panels join for form a continuous wall, the critical face or faces of the panel must not deviate by more than +/- 2mm at the joint.

4.1.8.2 Plumb

Out of plumb at any point along the length of the wall frame from top to bottom, must not exceed the minimum of h/600 or 3mm unless the frames are specifically designed to be installed out of plumb. (See Figure 4.3 at right) Columns & Walls must be within +/-15mm of specified position and +/-5mm of plumb

4.1.8.2.1 Square the frames

Square the frames by measuring diagonals for equal dimensions or 3,4,5 check or by clamping into a square jig.

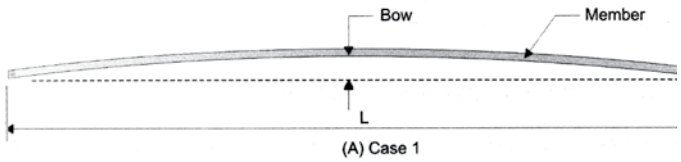
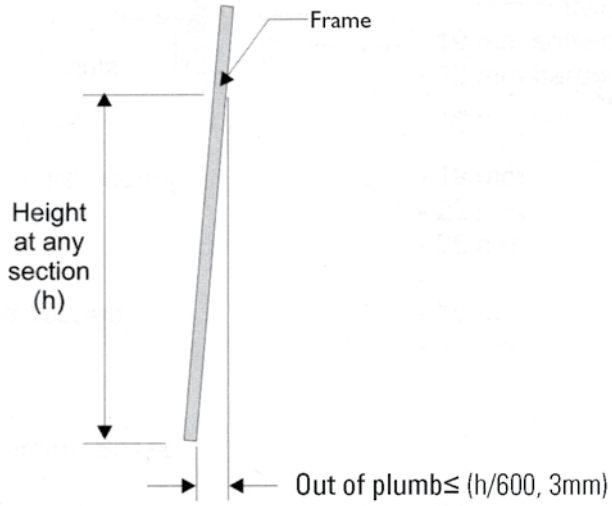


Figure 4.2 Straightness



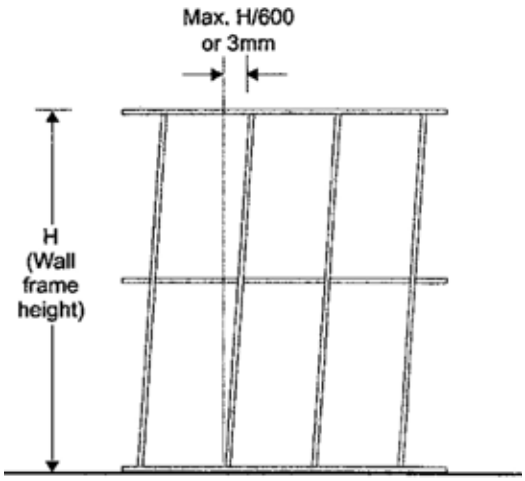


Figure 4.3 Plumb

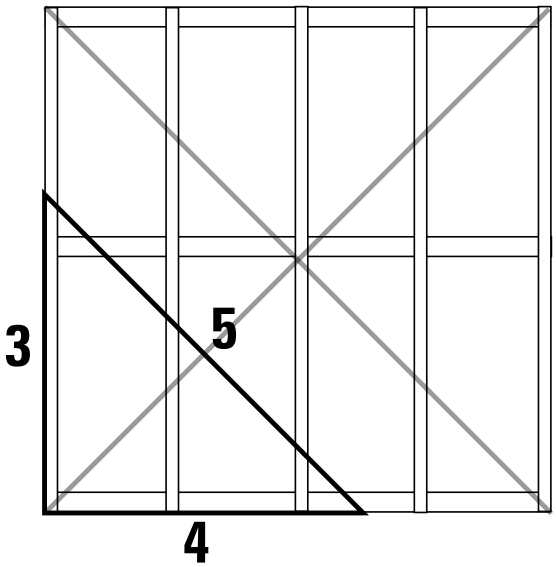


Figure 4.3.1 Square the frames

5.0 Definition of terms

Load Bearing Wall: A Load Bearing wall is one which carries vertical loads from the construction above or lateral loads resulting from the wind. These loads may act separately or in combination. Both internal and external walls may be load bearing.

Non-Load Bearing walls: Internal walls which do not support truss loads are considered non load-bearing. However internal walls may be used as lateral bracing walls.

Common studs: These studs support the vertical loads applied to the top wall plates by rafters and trusses, ceiling joists and horizontal wind and seismic loads.

Jamb Studs: These studs are provided on each side of an opening. They support loads from lintel over the opening and the horizontal wind load across the width of the opening.

Studs supporting concentrated loads: These studs are installed in addition to common studs (or jamb studs) to carry concentrated vertical loads arising from support for principal roof and floor supporting members.

Nogging: Noggings provide lateral and torsional restraint to the studs. In addition nogging must be designed to support an imposed concentrated load of 1.1 kN placed anywhere on its span to produce the maximum action effect during construction.

Wall Plates: Load bearing wall plates are designed to transfer vertical loads to studs when the trusses or floor joists are not directly in line with the studs. Wall Plates are not designed to transfer horizontal loads vertically to brace walls. Ceiling and floor diaphragms perform this function.

The reaction due to roof or floor loads may be ignored in the design of the plates if the system is such that the loads are transferred directly to the studs.

Lintels: Lintels are designed to transfer vertical loads applied over the opening to the jamb studs on the sides of the opening.

Lintels in single and upper storey walls are designed to support rafters, trusses or any other load carrying members that are located over the opening.

Lintels in lower storey walls of two storey construction are designed to support the loads from the wall above including the roof loads and floor loads from the storey above.

Lintels can be designed as a part of a system that includes top wall plates and other structural components located directly above and connected to the lintel.

Wall Bracing: Wall bracings are required to transfer all the horizontal forces from roof, walls and floors to the appropriate ceiling and floor diaphragms. These forces arise from wind or earthquake loads.

Bracing may be strap, channel or membrane type. Membranes may be flat or profiled steel, fibre cement, timber ply or plaster board.

Foundation Connection: Hold down fixings between wall plate and adjoining floor structure.

Tie-Down: Framing connection used to both locate frame components and resist wind uplift forces.

5.1 Bill of materials

Bill of Materials

Quote No. 1700-004752.00 Job No. 348007

Client	Site	Class
Sample 1234 Sample Street SAMPLE TOWN QLD 4000	1234 Sample Street SAMPLE TOWN QLD 4000	Parts-Only Order

Qty	Description	Measure	Mark	Colour
2	Sheeting, 0.47tct Mini Orb Profile, C/B (SGCOR/MIRB)	4930mm	SL1	SH
2	Sheeting, 0.47tct Mini Orb Profile, C/B (SGCOR/MIRB)	5060mm	SL2	SH
1	Sheeting, 0.47tct Mini Orb Profile, C/B (SGCOR/MIRB)	2410mm	SL3	SH
1	Sheeting, 0.47tct Mini Orb Profile, C/B (SGCOR/MIRB)	5509mm	SL4	SH
13	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	5490mm	SS1	GY
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	525mm	SS10	CV
6	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	6200mm	SS11	CV
2	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	795mm	SS12	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	1570mm	SS13	CV
2	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	3185mm	SS14	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	3330mm	SS15	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	1050mm	SS16	CV
13	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	2310mm	SS2	GY
6	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	9290mm	SS3	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	1190mm	SS4	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	1480mm	SS5	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	3880mm	SS6	CV
2	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	3590mm	SS7	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	3280mm	SS8	CV
1	Sheeting, 0.47tct Corrugated Profile, C/B (SGCOR/AACB)	935mm	SS9	CV
3	Flashing, Apron C/B (SGAP/CB)	3250mm	AF1	GY
4	BYS, Flashing, Side Barge (BYS_SBF)	2895mm	BF1	SH
2	BYS, Flashing, Side Barge (BYS_SBF)	2410mm	BF1	SH
3	BYS, Flashing, Upper Barge suit 10 º Roof Pitch (BYS_UBF_10)	3450mm	BF2	SH
2	BYS, Flashing, Upper Barge to suit 05 º Roof Pitch (BYS_UBF_05)	400mm	BF2	SH
2	BYS, Flashing, Corner (BYS_CF)	2980mm	CF1	CV
4	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	2980mm	CF2	CV
2	BYS, Flashing, Corner (BYS_CF)	2890mm	CF3	CV
2	BYS, Flashing, Corner (BYS_CF)	630mm	CF4	CV
4	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	2890mm	CF4	CV
4	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	630mm	CF4	CV
3	BYS, Flashing, Lower Fascia to suit 5º Roof Pitch (BYS_LFF_05)	3450mm	FF1	SH
3	BYS, Flashing, Lower Fascia Suit 10º Roof Pitch (BYS_LFF_10)	3450mm	FF1	SH
2	BYS, Flashing Window Head (BYS_WHF)	1910mm	HF1	CV
3	BYS, Flashing Window Head (BYS_WHF)	1610mm	HF1	CV
1	BYS, Flashing Window Head (BYS_WHF)	1310mm	HF1	CV
2	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	1910mm	HFST1	CV
3	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	1610mm	HFST1	CV
1	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	1310mm	HFST1	CV
10	BYS, Flashing Window Mullion (BYS_WMF)	1300mm	MF1	CV
2	BYS, Flashing Window Mullion (BYS_WMF)	1000mm	MF1	CV
10	BYS, Flashing, Standard Sheet Trim (BYS_SSTF)	1300mm	MFST1	CV

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Figure 5.1 Typical Bill of Materials identify parts which should be included in the kit

6.0 Backyard Shacks™ Frame Assembly

6.1 Backyard Shacks™ marking and branding

All Backyard Shacks™ parts are coded with information to assist erectors in the assembly process. This matches the part information shown on the assembly drawings.

All Backyard Shacks™ parts are coded in the following order:

Job Name/Number, Frame Number, Part Number and Part Usage. For short parts, some of this information is deleted.

With this information, erectors can identify what the part is and where it is intended to be used in the structure. The illustration below shows how the coding works:

Figure 6.1 Marking and branding

Job name/number is Test_Walls, 5 is the panel number, 001 is the part number and TOPPLATE is usage.

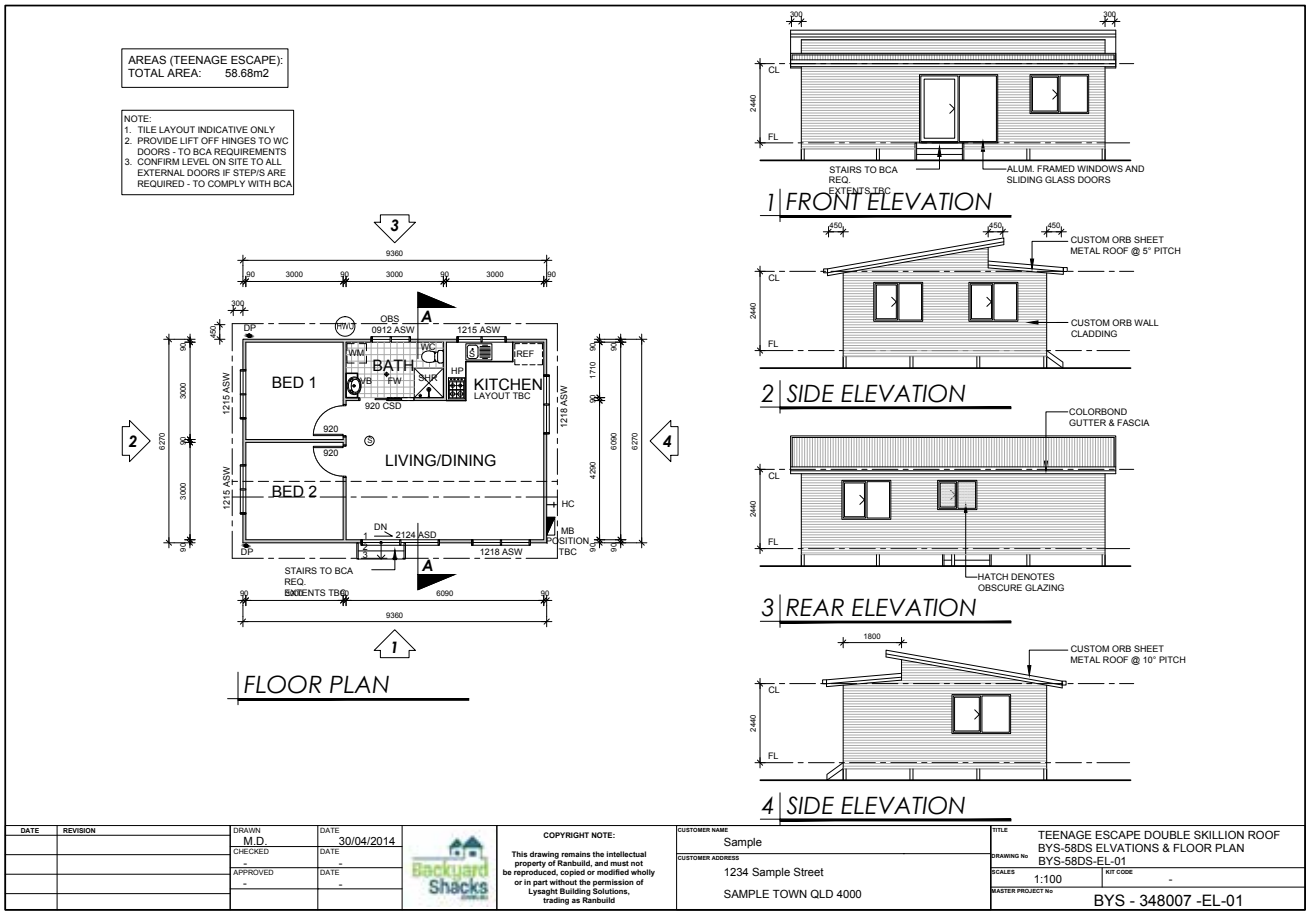


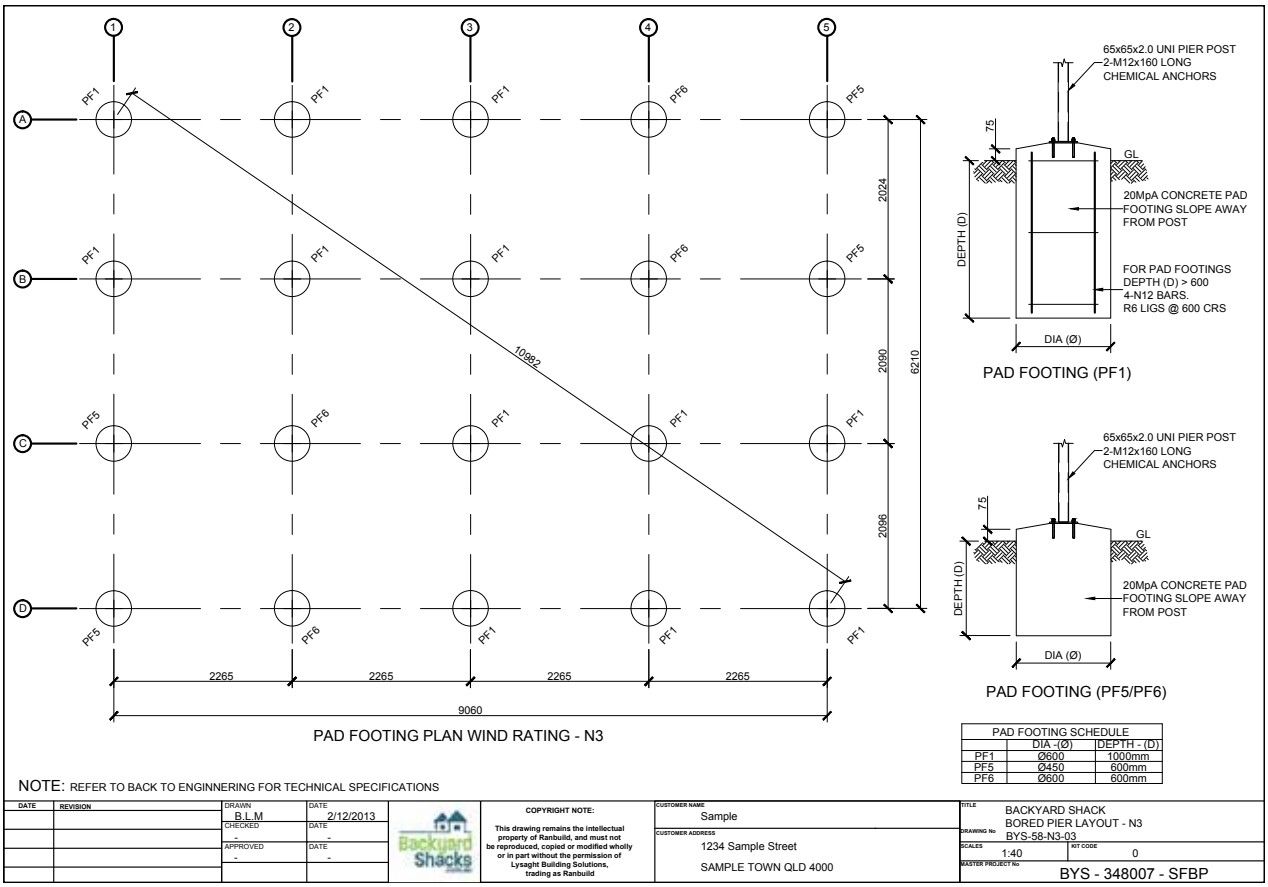
Figure 6.2 Elevation drawings provide construction overview

COMPLETE_MATERIAL_LIST						DETAILER	DETAILED
						scarrola	09-05-2014
SHEET 1 of 3						Job Number	
						58DSN3	
ITEM TYPE	COMPONENTS	PRODUCT CODE	UNIT LENGTH(mm)	QTY	WEIGHT (kg)		
50x50x3-EQ-ANGLE	TIEDOWN	0453		24	0		
50x50x3-EQ-ANGLE		0453	1	24			
ANG-1.5-200x35	LINTEL	3056	2799	1	7.6889		
ANG-1.5-200x35	LINTEL	3056	3000	3	8.241		
ANG-1.5-200x35	LINTEL	3056	3090	1	8.4882		
ANG-1.5-200x35	LINTEL	3056	3419	1	9.392		
BRA-1.0x70-250	WALLBRACE	0345	2700	2	1.485		
BRA-1.0x70-250	WALLBRACE	0345	2823	2	1.5527		
BRA-1.0x70-250	WALLBRACE	0345	3031	2	1.6671		
BRA-1.0x70-250	WALLBRACE	0345	3393	4	1.8662		
BRA-1.0x70-250	WALLBRACE	0345	3541	2	1.9476		
BRACE-ANG-20x20x1	ROOFBRACE		31560	1			
BRACKET-WALL-INT		5112	1	13			
C9075ra	STUD	0353	196	2	0.2113		
C9075ra		0353	200	24			
C9075ra	ENDCHORD	0353	206	12	0.22		
C9075ra	STUD	0353	212	2	0.2285		
C9075ra	STUD	0353	236	3	0.2544		
C9075ra	STUD	0353	286	2	0.3083		
C9075ra		0353	290	24			
C9075ra	ENDCHORD	0353	293	12	0.32		
C9075ra	STUD	0353	294	2	0.3169		
C9075ra	STUD	0353	296	2	0.3191		
C9075ra	STUD	0353	306	4	0.3299		
C9075ra	STUD	0353	318	2	0.3428		
C9075ra	WEB	0353	336	7	0.3622		
C9075ra	STUD	0353	336	7	0.3622		
C9075ra	STUD	0353	338	2	0.3644		
C9075ra	WEB	0353	371	12	0.4		
C9075ra	STUD	0353	389	2	0.4193		
C9075ra	WEB	0353	402	12	0.43		
C9075ra	STUD	0353	423	2	0.456		
C9075ra	WEB	0353	516	12	0.56		
C9075ra	WEB	0353	522	1	0.5627		
C9075ra	WEB	0353	524	2	0.5649		
C9075ra	WEB	0353	526	1	0.567		
C9075ra	STUD	0353	529	2	0.5703		
C9075ra	WEB	0353	570	2	0.6145		
C9075ra	WEB	0353	571	2	0.6155		
C9075ra	WEB	0353	573	2	0.6177		
C9075ra	BOXCHORD	0353	584	12	0.63		
C9075ra	WEB	0353	587	1	0.63		
C9075ra	WEB	0353	612	12	0.66		
C9075ra	WEB	0353	630	12	0.68		
C9075ra	STUD	0353	635	2	0.6845		
C9075ra	STUD	0353	734	1	0.7913		
C9075ra	WEB	0353	735	11	0.79		
C9075ra	STUD	0353	741	1	0.7988		
C9075ra	STUD	0353	757	1	0.816		
C9075ra	WEB	0353	777	12	0.84		
C9075ra	WEB	0353	799	12	0.86		
C9075ra	STUD	0353	846	13	0.912		
Builder: Fabricator:							

Endurocadd-9.001-28 Sheets 1.0.11.16694 9/05/2014 4:07:28 PM

Figure 6.3 Steel marking and branding for part identification

6.2 Backyard Shacks™ Assembly Diagrams



PAD FOOTING SCHEDULE

	DIA -(Ø)	DEPTH - (D)
PF1	Ø600	1000mm
PF5	Ø450	600mm
PF6	Ø600	600mm

Figure 6.4 A typical floor showing pier layout

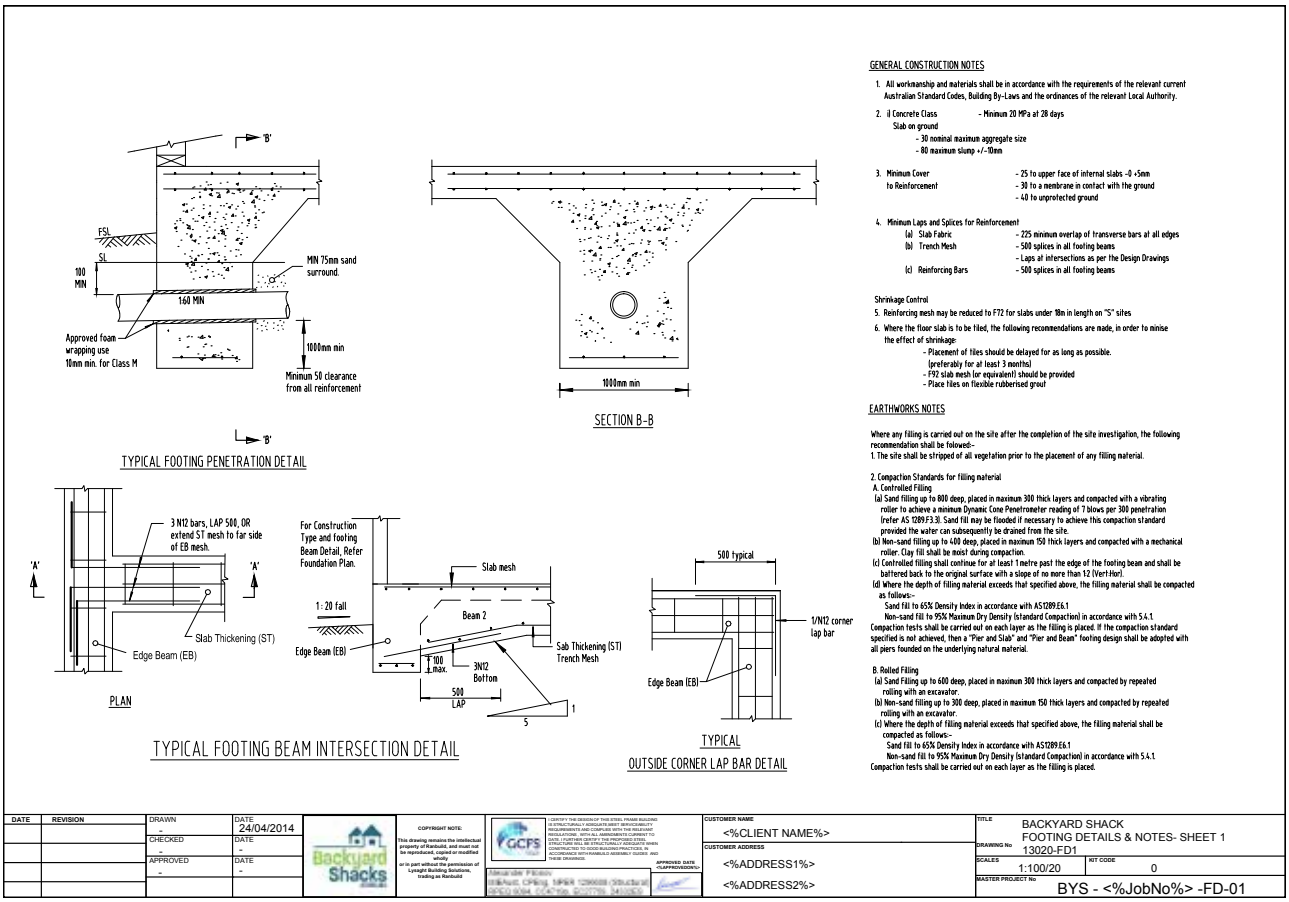


Figure 6.5 A typical footing diagram showing details of footings for typical installation.
NOTE: Soil type may require an engineered solution.

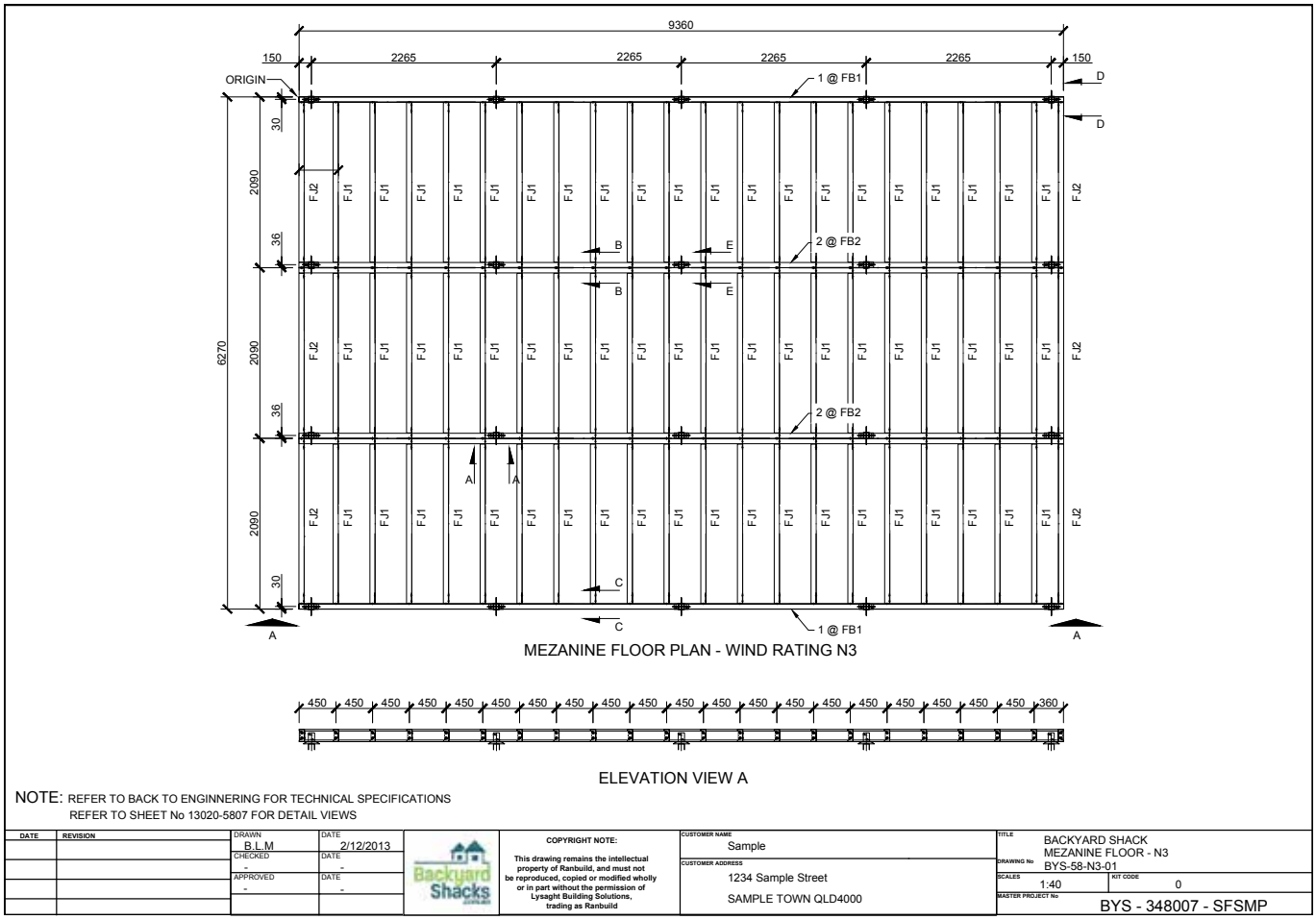


Figure 6.6 A typical floor showing mezzanine floor bearer/joist locations.

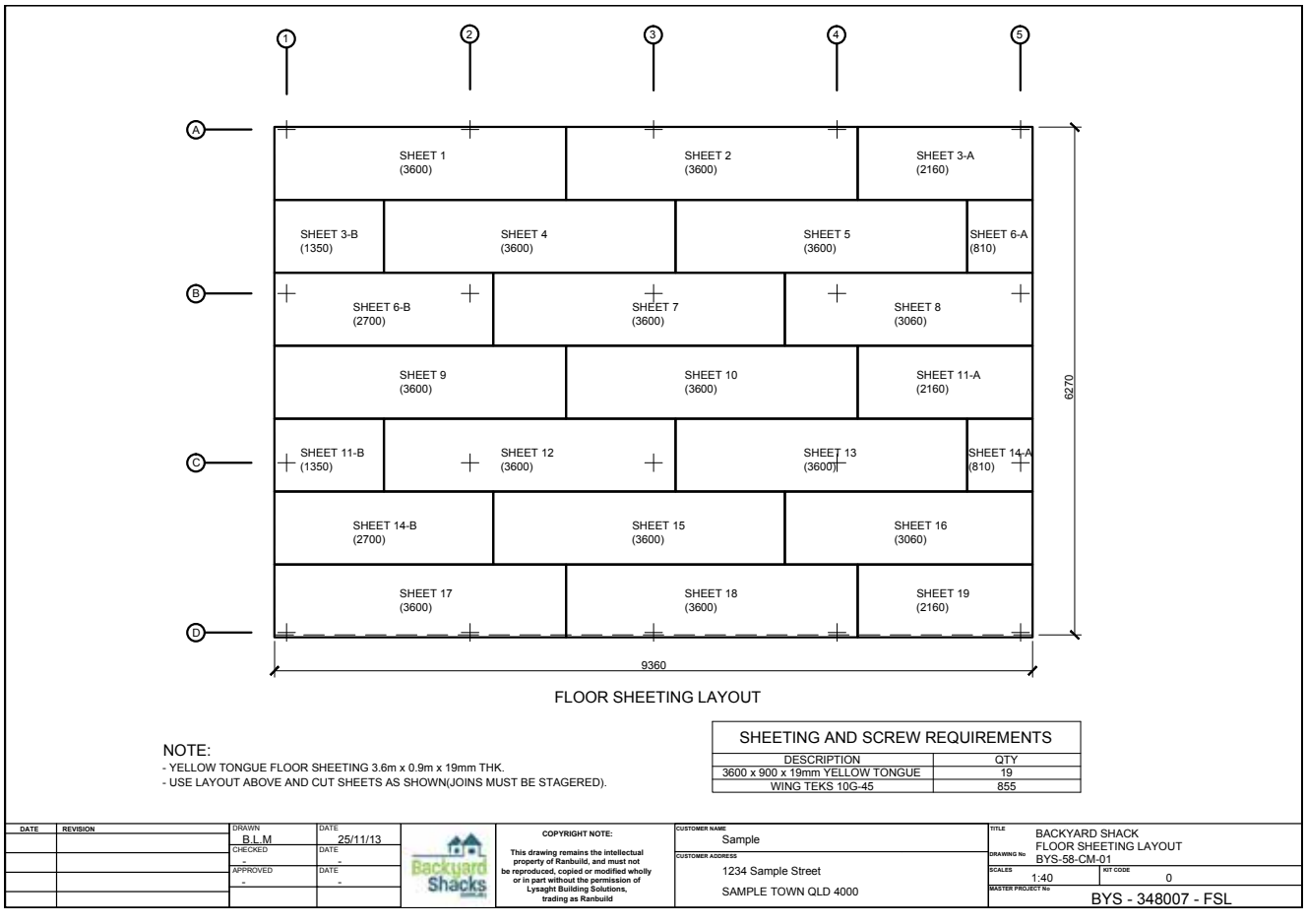


Figure 6.7 A typical floor sheeting layout showing location and laying sequence for floor boards.

6.3 Backyard Shacks™ assembly procedure

Backyard Shacks™ is generally factory assembled or assembly by a third party from completely knocked down (CKD) packs. The following illustrations show the typical steps for site assembly of a wall frame.

6.3.1 Preliminary work

It is important that you check all components delivered on-site against your 'Delivery Packing List' to ensure complete delivery.

Step 1 Part Identification

Unpack the frames and sort them into frame lots using the branding as a manual. Identify the studs from the branding information on the parts.

Figure 6.8 Wall frames are individually strapped & stacked in "stud" bundles, labelled with bundle numbers

Figure 6.9 Matching frames in "nogging, top & bottom plate" bundles, labelled with bundle numbers

Figure 6.10 Accessories bundles to be checked upon delivery.

Figure 6.11 Sort & stack all accessories, cross check packing list. (helps to mark on box's, where accessories are to be used)

6.3.2 Frame Layout & Assembly (Step 2)

Identify the studs and lay toes down on a level surface and align as per assembly drawing. The heads, sills and noggings should be pre-notched allowing parts to overlap as shown. Pre-punched holes are provided for trilobular M6 x 1P x 15mm smooth top fastener screws to connect the frames.

Figure 6.12 Locate & open matching stud & nogging / plate bundles before separating into individual frame packs.

Figure 6.13 Separate and move stud & nogging / plate frame packs next to designated assembly zone.

Figure 6.14 Lift & separate stud pack onto assembly table (this example has utilised TOPSPAN® 40 sections on concrete block stacks as an assembly table).

Identify and separate ENDUROTIE™ bent tab studs (90mm system only)

The ENDUROTIE™ bent tab studs can be identified by the extension of the stud web section and double15mm hole punch for insertion of a frame anchor bolt (or similar).

Prepare bent tab studs

- Place the stud with the web down.
- With a small cold chisel and a hammer, flatten the ribs in line with the stud flange.
- With a pair of duck bill pliers, bend the tab in the appropriate direction to line up with the holes in the bottom plate. (Refer to layout plan provided with job outputs.)

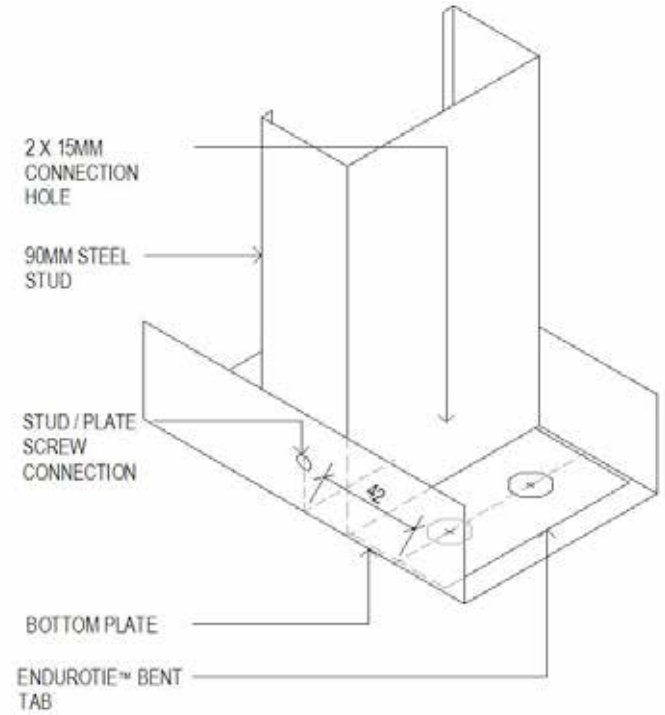


Figure 6.15

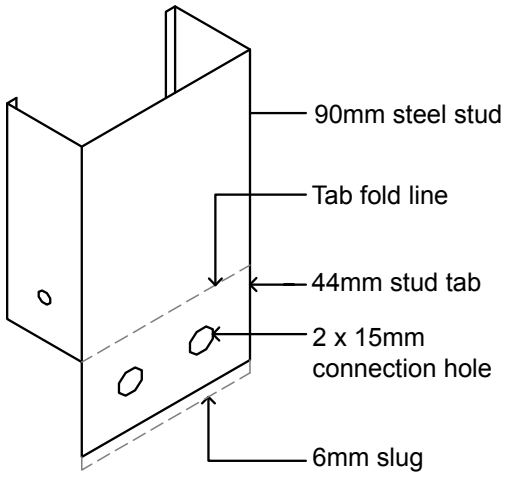
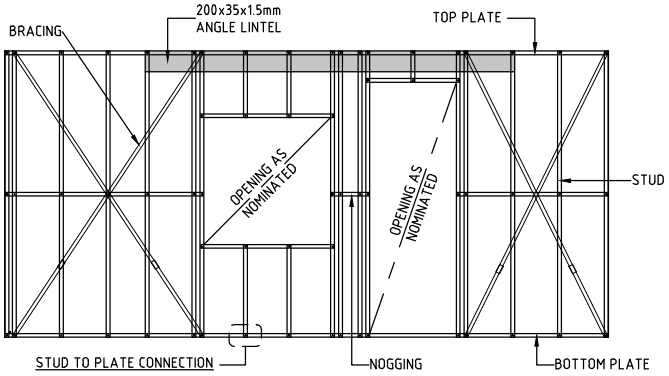


Figure 6.16



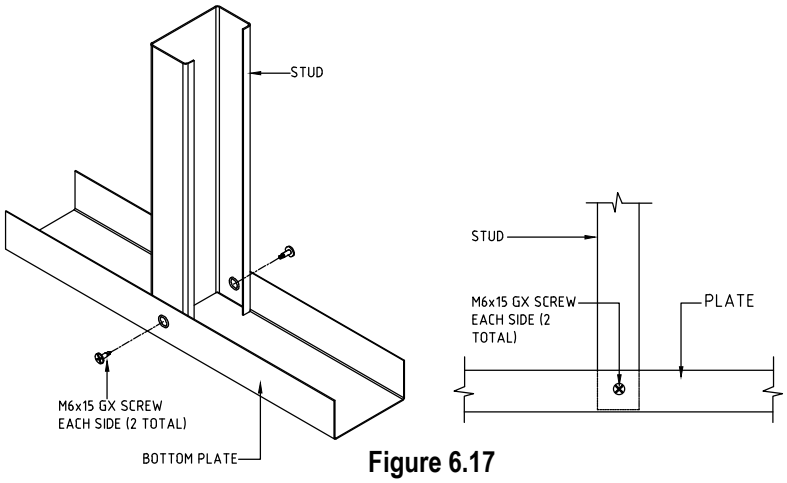


Figure 6.17

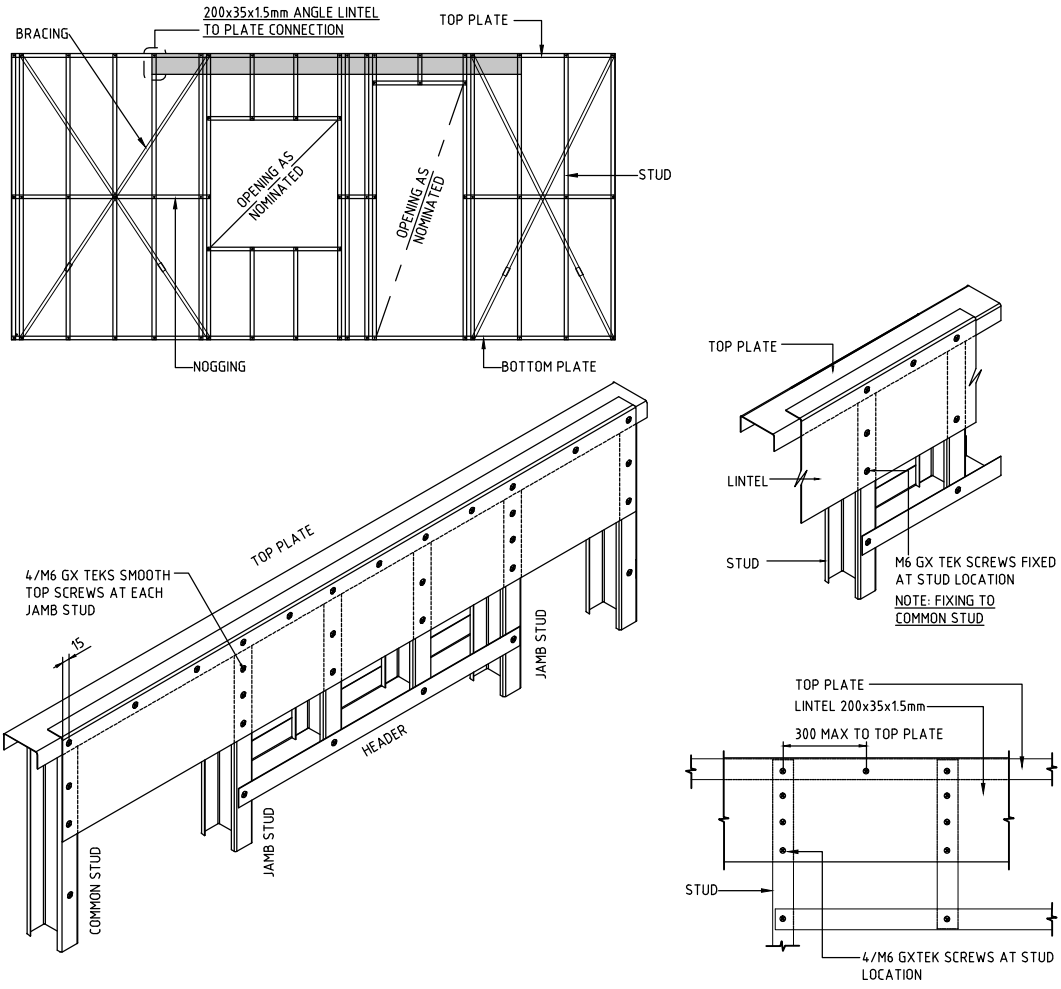


Figure 6.18

WALL FRAME DETAILS - LINTEL TO PLATE CONNECTION

Step 3 Fix at Studs

When carrying out the primary assembly of the frame align notch holes as shown and install M6x1Px15mm smooth top fastener in holes.

Figure 6.19 Layout all studs in sequential order, space out & orientate frame as per assembly sheet.

Figure 6.20 Prepare tabs and align with top of studs & screw fix top plate at both ends. (Where utilised, ensure Endurotie™ bent tab studs are placed in the correct location and orientation.)

Figure 6.21 Bend tab over and fix all studs by inserting into bottom plate on approx. 45º (degree) angle.

Figure 6.22 Twist stud into position & align fixing holes – repeat for all studs along bottom plate.

Figure 6.23 Align holes, fix at studs and install M6x1Px15mm smooth top fastener.

Figure 6.24 Align notch holes as shown and install M6x1Px15mm smooth top fastener in holes.

Step 4 -Fix at corner and install a M6x1Px15mm smooth top fastener

Figure 6.25 Slide noggings onto the studs from base of frame & align fixing holes. May require 2 people to slide up studs evenly.

Figure 6.26 Nogging installation.

Figure 6.27 Fix bottom plate to studs, align holes & screw fix all noggings & bottom plate connections on “Side A”. (Easier to fix bottom plate on an angle, starting at one end & pinching studs into plate, working along the frame). Ensure ENDUROTIE™ bent tab stud alignment is correct.

Figure 6.28 Nogging Installation

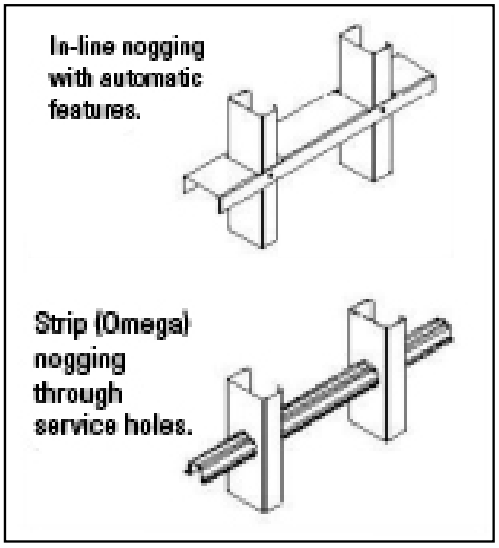


Figure 6.29

Position each one over the frame near their final location. Nogging height is specified in the supplied panel drawings with the reference line to the centre line of the nogging.

Step 5 -Frame assembly - fix both sides

In order to process walls efficiently, two assembly tables situated side-by-side allows walls to be flipped over so both sides can be fixed off.

Figure 6.30 Cross check “Side A” frame layout & connections as per assembly sheet. Utilizing sufficient labour, lift & flip frame for “Side B” screw fixings.

Figure 6.31 Ensure sufficient labour available on both sides of frame to flip safely.

Figure 6.32 By utilizing two adjoining assembly tables, wall fabrication can be optimized by preparing the next frame while screw fixing & checking “Side B”.

Step 6 - Marking wall frames and prepare for openings

Before inserting any bracing or lintels, check the overall dimensions of the frame against the supplied Assembly Sheet. Square the frame before installing any bracing.

Marking frames

Frames should be identified with panel number and the number of any adjoining walls at the appropriate locations. These marks should be applied to the side of the bottom plate.

Figure 6.33 Marking frames

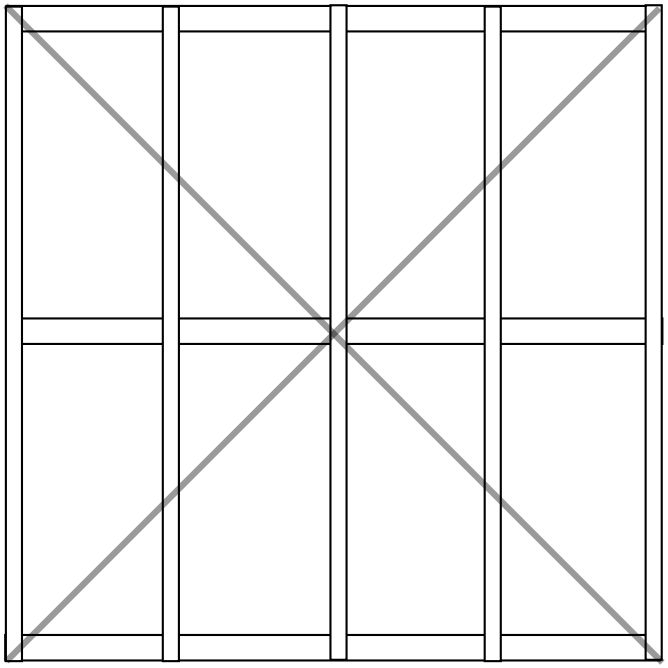
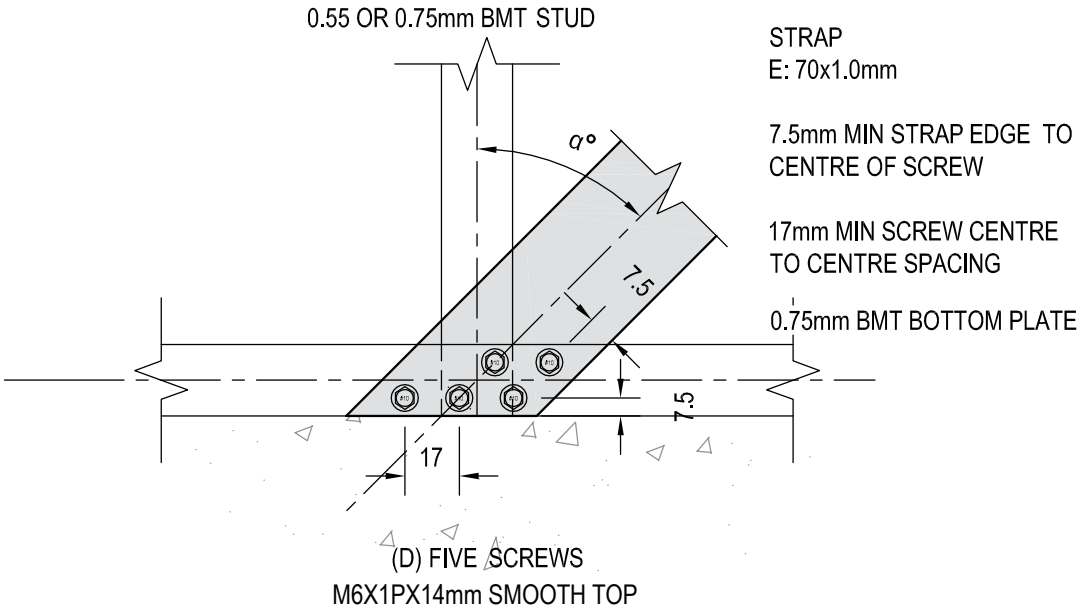


Figure 6.34 Install cross bracing as per wall assembly sheet using the nominated number of screws.

Number each completed wall frame & mark the bracing locations to top & base of frames as per assembly sheet.
Located the pre-cut notch and use tin snips to prepare the tab prior to installation. (This enables easy removal of bottom plate at openings after frame installation). After panel is checked for squareness, screw fix bracing strap to wall plates as per wall frame assembly sheet. Alternate bracing types are fixed in a similar manner.

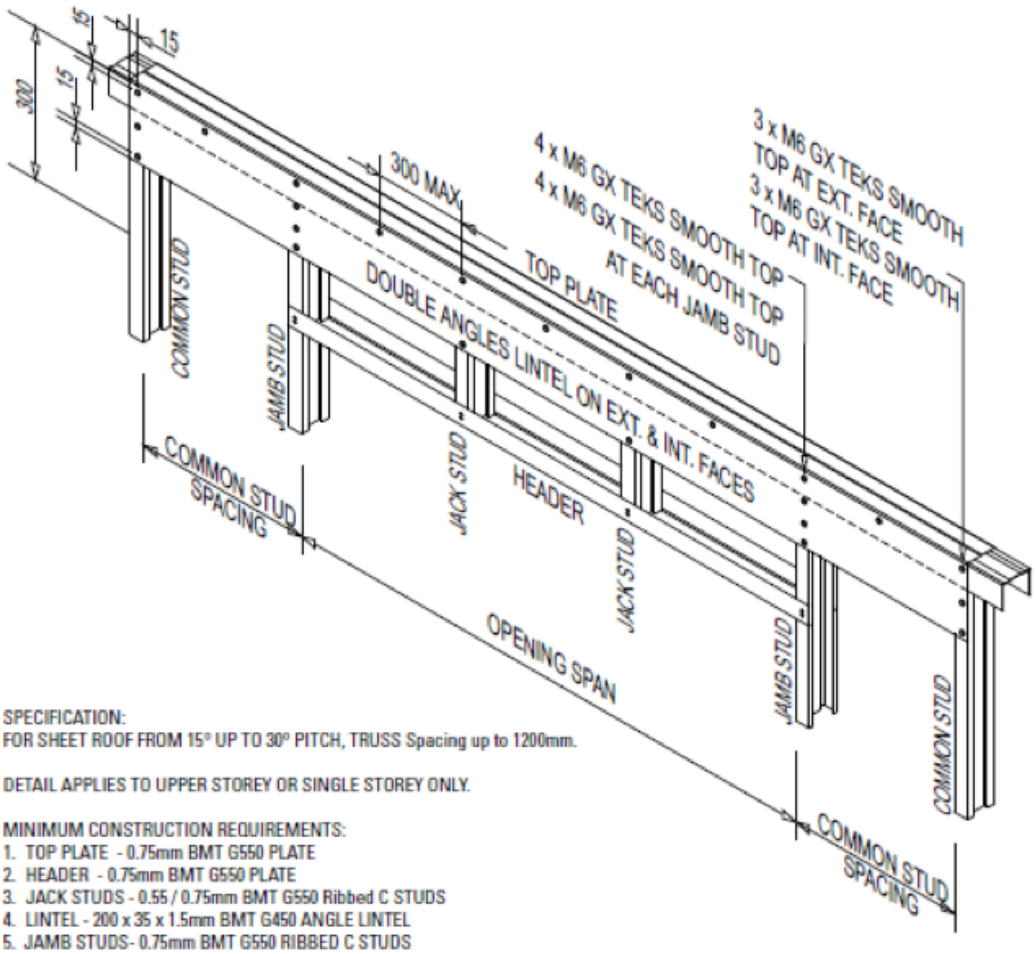


Note: 70mm strap brace requires two tensioners.

Figure 6.35 - Connection detail of diagonal tension strap bracing

Step 7 - Install lintel flashing (where required)

Figure 6.36 Overlay & screw fix lintel flashing to top of frame as per assembly sheet & fixing details given in the Design Manual. (Refer below)



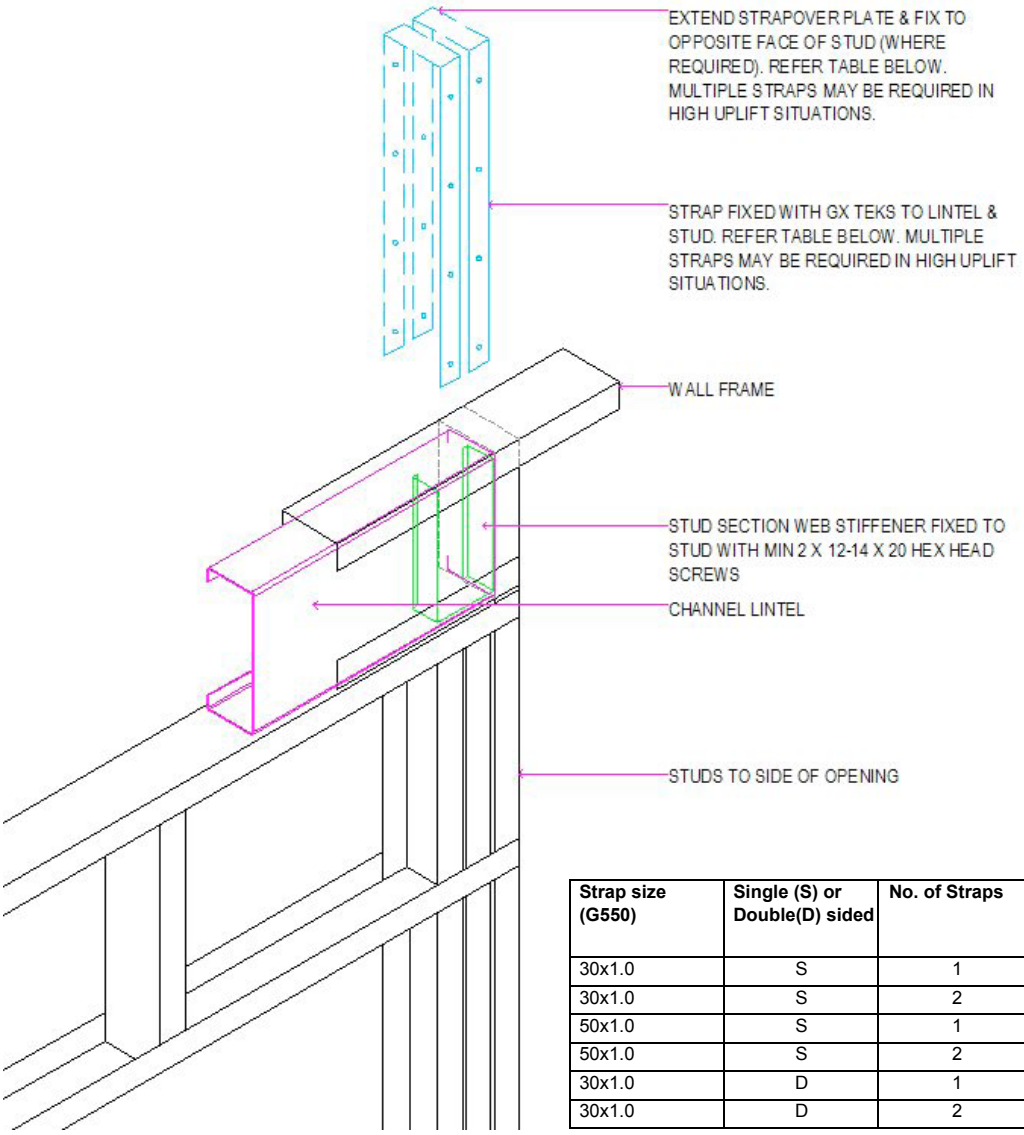
SPECIFICATION:
FOR SHEET ROOF FROM 15° UP TO 30° PITCH, TRUSS Spacing up to 1200mm.

DETAIL APPLIES TO UPPER STOREY OR SINGLE STOREY ONLY.

MINIMUM CONSTRUCTION REQUIREMENTS:
1. TOP PLATE - 0.75mm BMT G550 PLATE
2. HEADER - 0.75mm BMT G550 PLATE
3. JACK STUDS - 0.55 / 0.75mm BMT G550 Ribbed C STUDS
4. LINTEL - 200 x 35 x 1.5mm BMT G450 ANGLE LINTEL
5. JAMB STUDS- 0.75mm BMT G550 RIBBED C STUDS

NOTE:
1. JACK STUD AND JAMB STUD MUST BE SECURED TO THE HEADER WITH 1x M6 FRAME SCREW AT EACH CONNECTION, AT EACH SIDE.
2. JACK STUDS MUST BE SECURED TO THE TOP PLATE WITH 1x M6 FRAME SCREW AT EACH CONNECTION ON INTERNAL FACE.
3. SECURE LINTEL TO FRAME AT EXTERNAL FACE WITH M6 GX TEKS SCREW IN POSITION AS SHOWN ON DIAGRAM.
4. SECURE LINTEL TO FRAME AT INTERNAL FACE WITH M6 GX TEKS SCREW IN POSITION AS SHOWN ON DIAGRAM.

FIGURE 6.37 - Angle lintel fixing details



Strap size (G550)	Single (S) or Double(D) sided	No. of Straps	M6 Teks into Header/each strap	M6 Teks into Jamb Stud/ each strap
30x1.0	S	1	2	3
30x1.0	S	2	2	3
50x1.0	S	1	4	6
50x1.0	S	2	4	6
30x1.0	D	1	2	6
30x1.0	D	2	2	6

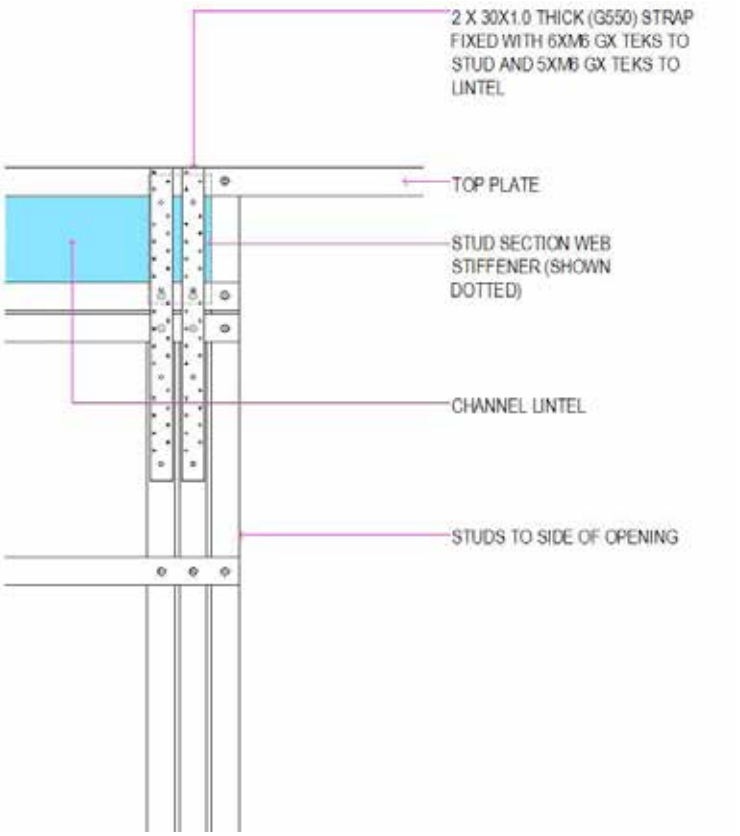


FIGURE 6.38 - Beam Header Fixing Details

Figure 6.39 Relocate completed frames to a designated stacking area.

Step 8 Stack completed wall frames before installation

Figure 6.40 Completed wall frames to be stacked in a flat area ready for installation.

Figure 6.41 Stack wall frames in bundles close to the final installation position.

Step Nine: Plan erection sequence before starting

Figure 6.42
Ensure all wall frame locations have been set out on floor substrate before installation commences. Large wall frames may require additional stiffening to assist stability during installation process.

Figure 6.43
Always have a “plan of attack” when stacking wall frames. Consideration to be taken in the stacking of frames in relation to the order of installation on site. This will then assist in minimizing multiple handling of the frames and simplify installation. Locate frames in a central location, eliminating unnecessary man-handling & ease of installation.

7.0 Backyard Shacks™ Wall construction

7.1 General and Design

Backyard Shacks™ wall frames have been designed to engineering standards and it is essential that to perform as designed, they are handled, erected and braced correctly. The following recommendations apply to wall frames on standard domestic and light commercial buildings.

Components are selected from the Backyard Shacks™ Design Manual to suit the specific roof and floor loads appropriate to the site and architecture. Additional loading such as Air Conditioning, etc. require special consideration at the time of design and the placing of these additional loads should be referred back to the designer.

Wind load is an important factor in the design and performance of wall frames. Ensure that the correct design wind loads have been used and that the tie-down of frames to the floor structure is carried out in accordance with this manual or as specified by the design engineer.

7.1.1 Prior to construction

Before commencing wall construction: Check the support structure in particular the plan dimensions, the plumb and level of the support structure, the straightness of the supporting walls or beams and that the structure is adequately braced, stable and tied down. Rectify the support structure if found deficient prior to proceeding.

Wall frames must be inspected and any damaged parts must be reported immediately to ensure correct rectification. Approval for site rectification should be obtained from the manufacturer.

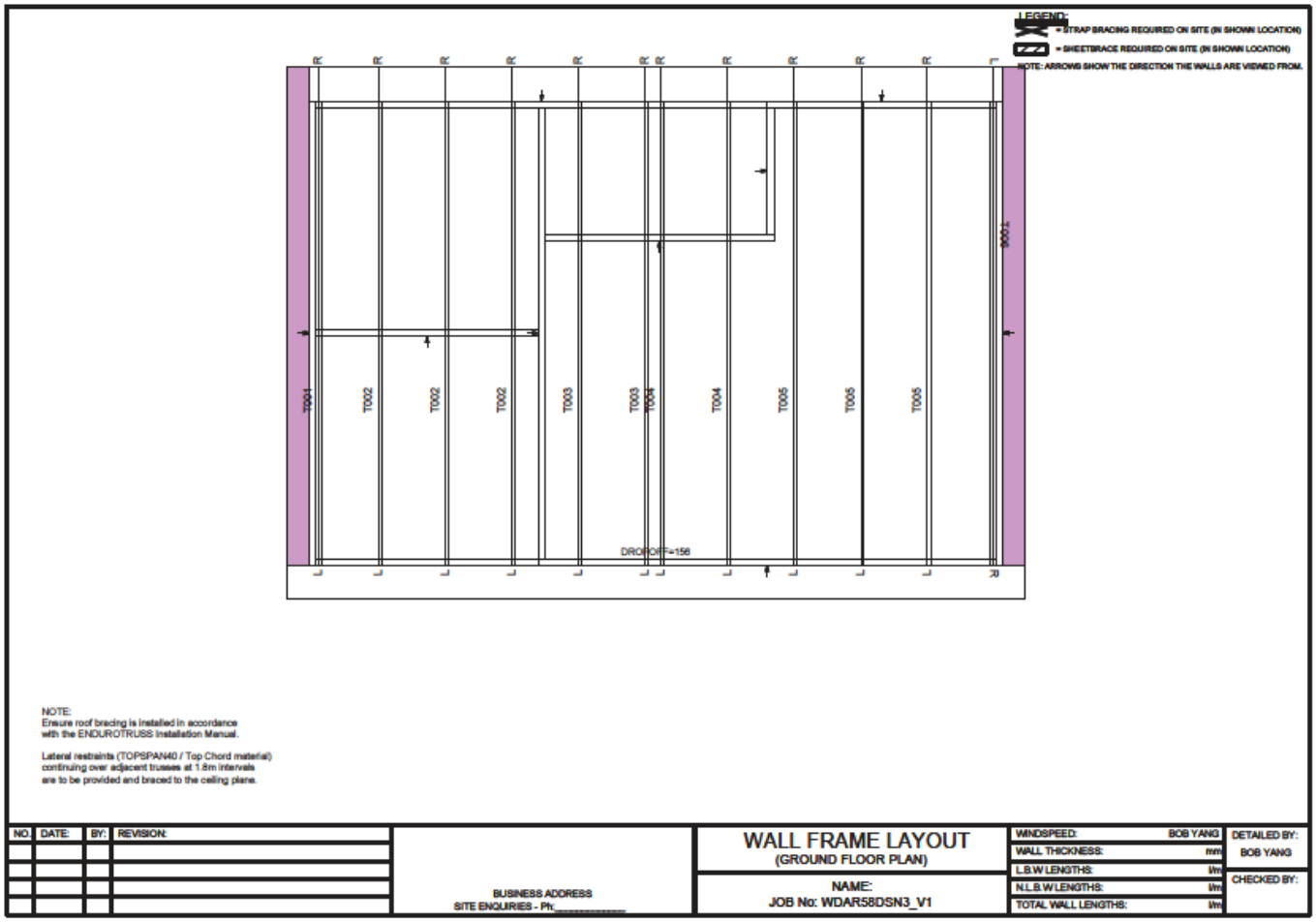


Figure 7.1 Wall frame layout drawing as generated by the ENDUROCADD® software

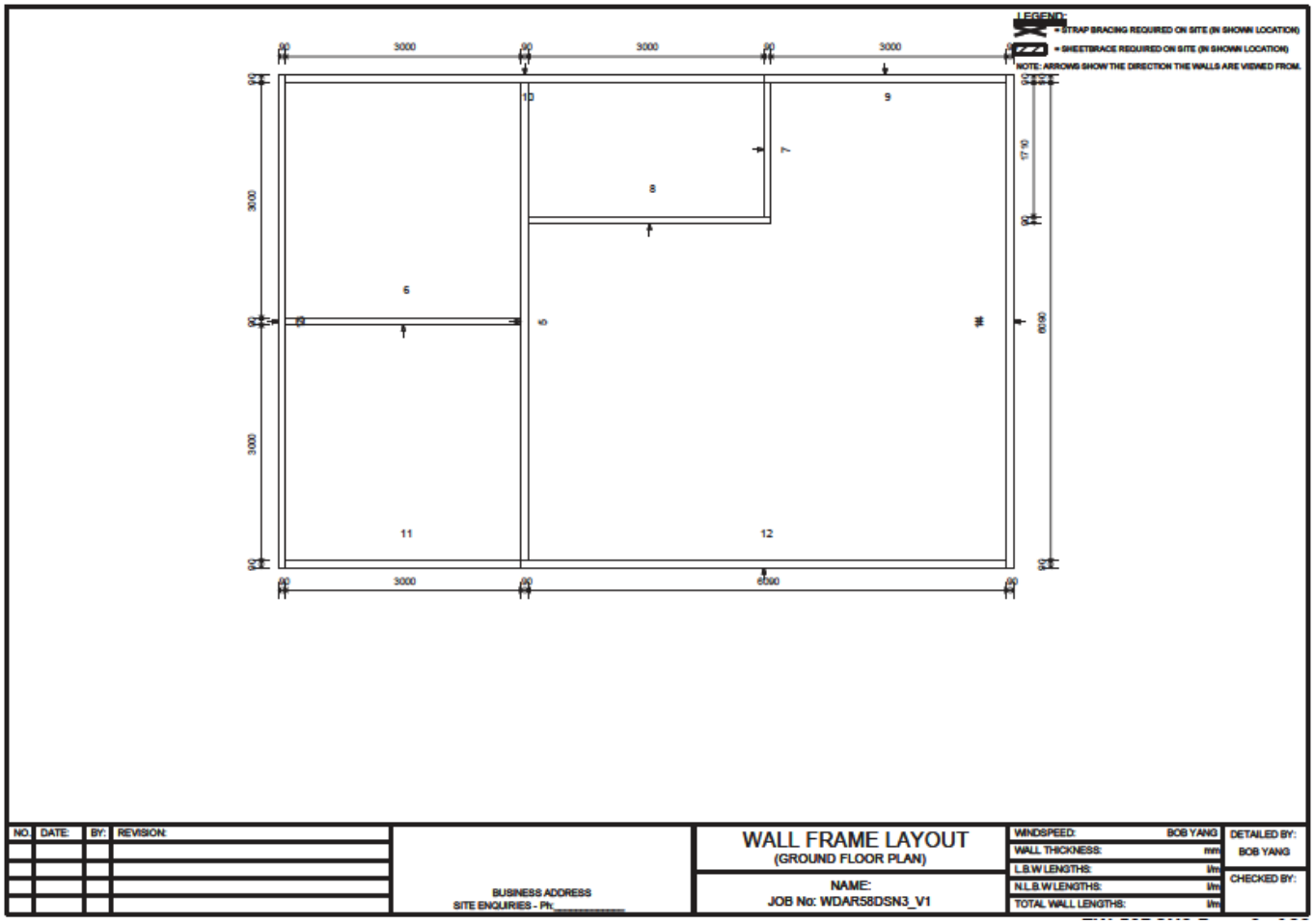


Figure 7.1.1 Wall frame layout drawing as generated by the ENDUROCADD® software

Refer to steel marking plan issued by your local Backyard Shack Dealer

NOTES:

Frame orientation

The layout drawing specifies the correct frame orientation. Ensure frames are orientated as shown on the wall layout. The branding on the plates and nogging are on the side indicated by the arrows.(Figure 7.1)

Wall Frame Numbering

During the detailing / fabrication process the wall frames are numbered to accurately identify them. These numbers are shown on the wall frame layout and form part of the frame branding (refer Section 6). Frames may have identical shape but may differ in the configuration or internal connections. Ensure that the correct frame is used in its specified location on the wall.

7.1.2 Safety

Ensure that all barriers or scaffolding used in order to comply with safe work practices are installed so as to not damage or overload wall components.

7.1.3 Load bearing wall

The builder should ensure that all loads from both internal and external walls are accommodated in the foundation sub-flooring.

7.1.4 Fasteners

Generally, in non-cylonic wall construction, #10-16x16mm wafer or hex head or #12-14x20mm hex head self-drilling Class 3 Tek® screws are used for all structural connections.
Use the recommended number shown on the drawings.

In connections, maintain a minimum fastener spacing of 17mm and minimum distance of 17mm to the edge of sections. Review dimensions to comply with AS/NZS standards.

7.2 Wall frame set out

Prior to lifting any frames into place, mark out the frame locations on the floor, using the supplied Wall Framing Layout as a reference. Check by measuring diagonals that the marked wall positions are square.

7.3 Damp proof course

An impermeable membrane should be installed under all perimeter bottom plates fixed to concrete slabs on the ground. The membrane should also extend up the weather side flange of the bottom plate, and may be pre-applied to the bottom plates at the time of rollforming.This is consistent with good building practice and is a condition of BlueScope Steel's warranty on house framing made from TRUECORE® steel. Refer to BlueScope Steel Technical Bulletin-34.

When a frame is fixed to a suspended floor, an impervious membrane is not required if adequate ventilation is supplied and a minimum distance of 400mm is allowed between the underside of the floor framing and existing ground level. (The protection of internal bottom plates is not considered necessary. For wet areas refer to Australian Standard AS 3470).

The type of membrane used should be "impermeable to moisture"

Suitable impervious membranes include:

- Bitusik by Grace construction products
- Polyethylene and other products specified in BCA Section: Volume 2, 3.3.4.4
- Brushable Hydroseal from Tremco
- Kordon Termite Barrier (see manufacturer's specification for detail)

The protection of weather side flange is necessary because this part of the frame is subject to moist air movement from the lower parts of the cavity as it tries to evaporate and move past the masonry damp proof course.

Whilst erecting wall frames ensure that each frame is erected in the correct position, correctly orientated: aligned with the wall slopes and plumb (using a spirit level).

Best practice is to use the membrane on all underside surfaces (interior and exterior bottom plates) regardless of conditions.

This ensures moisture control no matter what material the underside of the bottom plates come in contact with.

Figure 7.2 Mark set out of wall panels using chalk line

Figure 7.3 Consult plan layout before starting.

7.4 Wall frame Installation

Step 1: Identify each panel location using the Panel Layout supplied. Unpack the panels and lay them near their required positions to avoid unnecessary handling. (Figure 7.2)

Walls are generally constructed by working across the whole building, not around the perimeter. Doing this avoids trying to fit interior walls after the perimeter is finished. Wall numbers help to identify location.

Step 2: Starting from one corner of the building, mark the position of walls on the slab or platform floor using the chalk line. Ensure all lines are square before proceeding. Generally external walls are detailed to maintain 150mm from the outside face of the brick and cavity. However, you should check the architectural drawings as this can vary. (Figure 7.3)

Step 3: Stand the first wall frame on the location points. (Figure 7.4)

Figure 7.4 Place first wall on marked line and hold in position.

Figure 7.5 Place second wall in position using chalk line as a manual and flush against first wall.

Figure 7.6 Fix with a butt joint at corner midway up the wall.

Figure 7.7 Fix using a butt joint at base of wall.

Step 4: Stand the next wall section in position and fix it to the first section using #10-16x16 or #12-14x 20 hex. head screws. Complete each junction before proceeding to next panel.

Butt joints are made by screwing the adjacent studs at the bottom and mid points, using #10-16x16 or #12-14x 20 hex. head screws. Butt joints are normally only used to connect two walls where there is no junction. (Figures 7.6 & 7.7)

Temporary bracing should be used to secure the end of the wall which is not fixed to the second (or subsequent) walls. Use a piece of channel and secure to the wall frame. (Figures 7.8 & 7.9)

Figure 7.8 Affix temporary bracing as required.

Figure 7.9 Structure with temporary bracing.

Figure 7.10 Place interior walls using chalk lines as manual.

Step 5: Ensure all interior wall panels are erected before completing the perimeter. (Figure 7.10 & 7.11) After all wall panels are erected, move the frames in to the positions indicated by the chalk lines. Ensure rooms are square by measuring and comparing diagonals and fix down using recommended fixings shown in the plan drawings. (Fig.7.12)

- The fixings are installed next to opening jamb studs, at points where tension bracing attaches to the bottom plate
- For trusses with sheet roofs, install next to the studs carrying roof loads each end of a frame, load bearing studs and up to 1200mm for remaining circumstances.

Figure 7.11 Interior walls are fixed into position.

Figure 7.13 End and interior walls are fixed into position.

Figure 7.12 Use clamp to hold temporarily in position.

Figure 7.14 End wall placed into position and temporarily braced using clamps and/or TOPSPAN battens.

Step 6: Position the final assembled wall frame on the chalk line and remove temporary bracing.

Join walls at the corner at bottom and mid-height using the extended drill bit.

Step 7: The walls should now be moved into their exact positions using the chalk lines which were drawn on the floor from the layout drawings. Once in position, the walls can be fixed to the floor through the bottom plate of the frame using the hold downs at the spacings specified by the Detailer.

Figure 7.15 Position final wall.

Figure 7.16 Remove last of the temporary bracing.

Figure 7.17 Join walls at corner using extension bit.

Figure 7.18 Position and fix final wall using extension bit.

Figure 7.19 Align walls with chalk marks and put into final position before fixing.

Figure 7.20 Screw bottom plate into final position on floor.

Figure 7.21 Check walls for plumb.

Figure 7.22 Measure lengths at bottom and top of wall to check frame is square.

Step 8: Measure diagonals and ensure structure is square.

Step 9: Use a spirit level and straight edge to check if the frame is true. Suitable temporary braces should be used to align and plumb long walls until the roof is completed. Plumb the frame by adjusting the bracing tensioners. Tighten one strap and loosen the other to rack the wall until the studs are plumb.

Step 10: Fasten the bracing straps at each stud to provide nogging bracing and to prevent rattle within the walls after lining. Ensure #10-16x16 wafer head screws are used where walls are to be lined or clad. On external walls use #10-16x16 hex. head screws in brick veneer construction.

Step 11: Where specified on the Panel Layout, additional permanent bracing may require site fitting.

Figure 7.23 use tensioner on strap bracing to bring the wall into square.

Figure 7.24 Check plumb and square and adjust as required.

7.5 Wall Bracing

The original means of bracing uses diagonal straps of G250/300 material screwed to the frame using M6x1Px22mm Smooth Top GX Teks screw to each end. The bracing is detailed with a tensioner set that enables the site erection crew to tension the strap brace pair on site which can rack the wall enabling the walls to be made plumb (studs vertical in both directions).

Temporary bracing, using TOPSPAN® battens can be used to hold the frame in position while permanent strap bracing is used to adjust the frame for plumb and square.

When the wall is true, the temporary bracing is removed.

Step 12: The stud, plate connection requires screw fixing as specified/ designed for specific site conditions.

Figure 7.26 Use a length of TOPSPAN batten to hold the frame square until bracing can be tensioned.

Figure 7.25 Once the frame is plumb and square, fix at the top of the wall.

Figure 7.27 Use strap bracing and tensioner to set frame square and plumb. Note vice grips at mid-span.

Figure 7.28 Wall up, plumbed, squared and fixed - ready to fit roof trusses

7.6 Typical hold down connections

The designer should specify the tie-down system to be used for each job. A layout plan will be provided to show the location, type of hold down and design uplift value, including both the tie down connector and the fastener or bolt to connect to the underlying material. The pullout capacities of the fastener or bolt should have the same capacity as the bracket it is attached to.

Typical wall to floor connections are illustrated below in Figures 7.29 - 7.31.

In addition to tie downs shown on the layout plan, a suitable nominal tie down should be placed at every stud to meet resistance requested by the designer.

Wall frames (both Lower and Upper Storey) Bottom Plate Hold-down are required at:

-each end of a wall panel

-each side of an opening

-load bearing studs

-each side of a brace panel

-else where not exceeding 1200mm

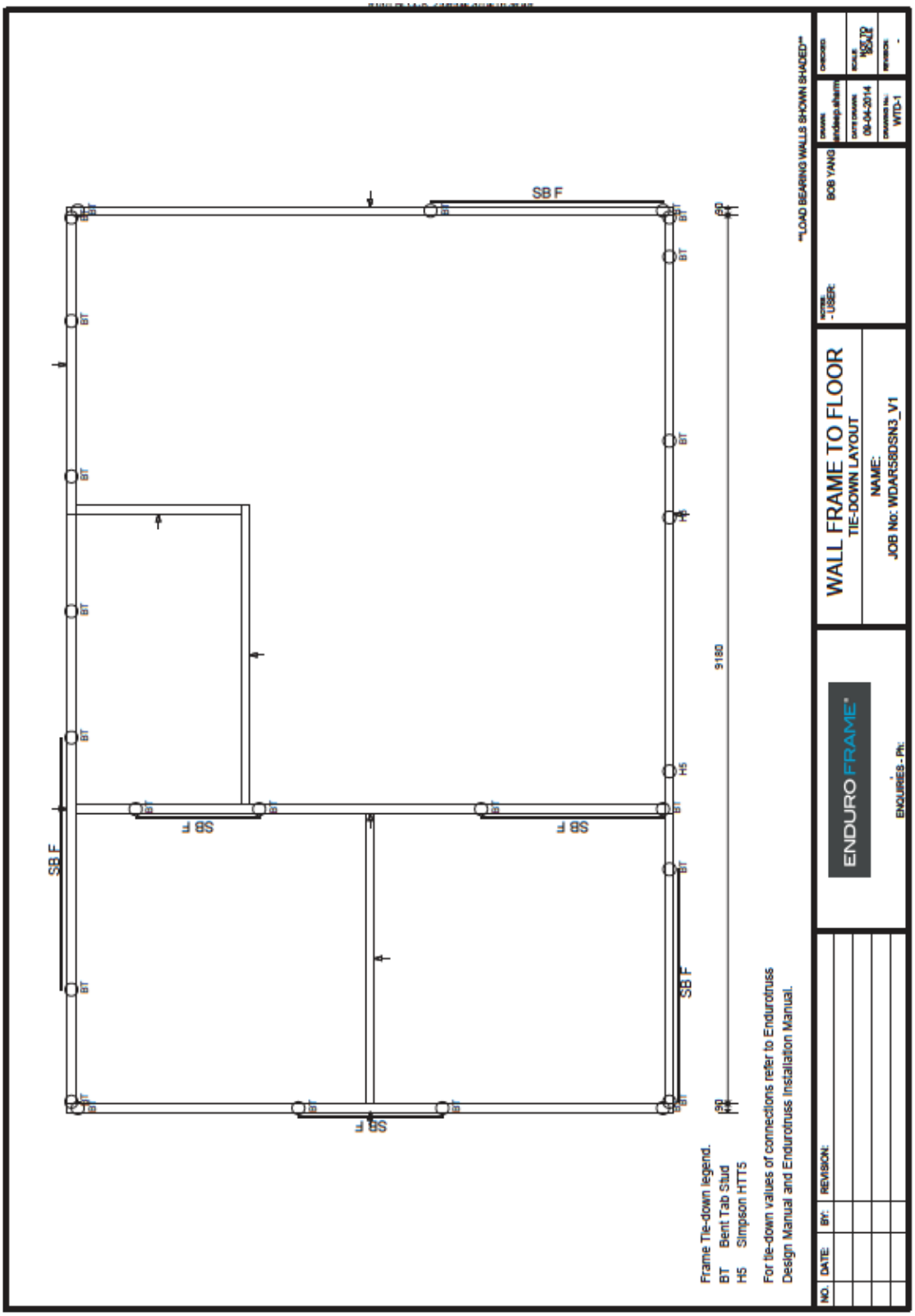


Figure7.29 Hold down locations

All hold downs should be located with 50mm of face of stud or as close as practical.
The hold downs values for various products and manufacturers varies and hence always refer to manufacturers specifications.
Anchors can vary from pin and washer systems to Ankascrews®,Tek® screws through to Dynabolts® and Chemsets®.

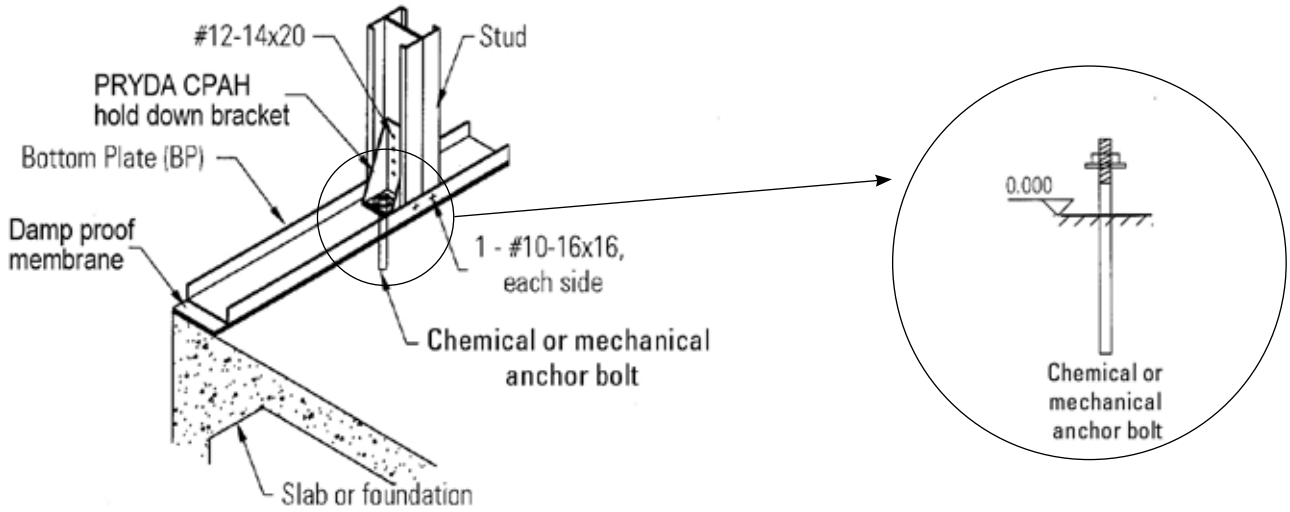


Figure 7.30 Hold down connection Option 4

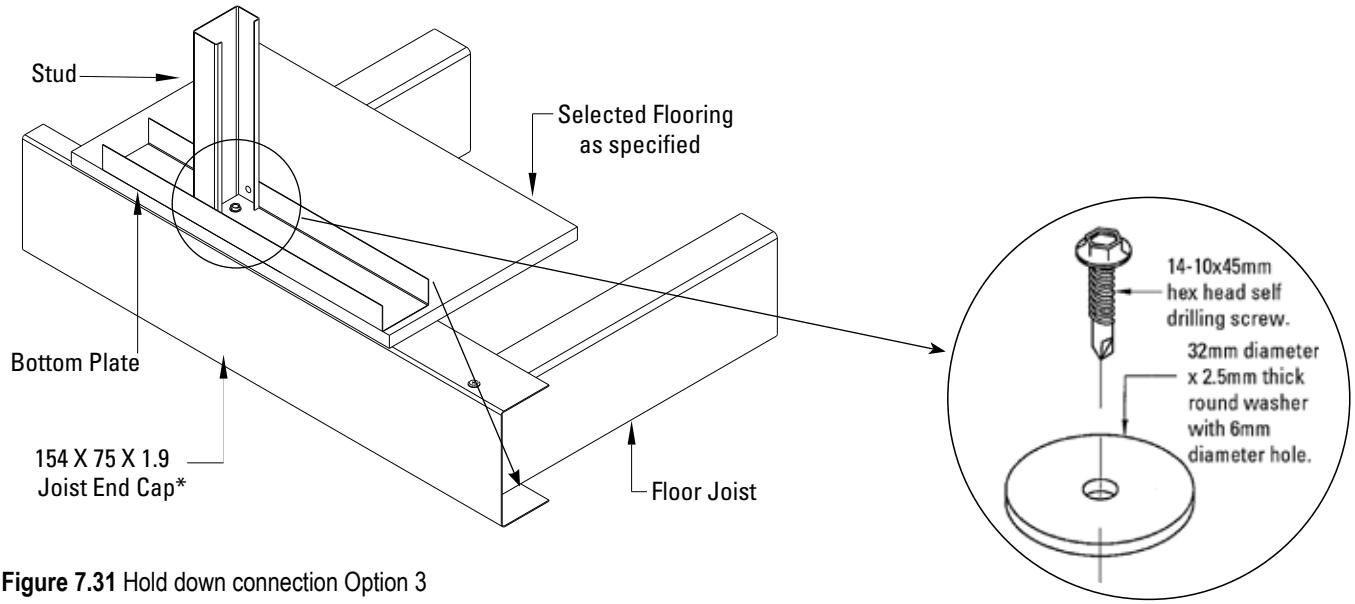


Figure 7.31 Hold down connection Option 3

Step 6a - Connection details

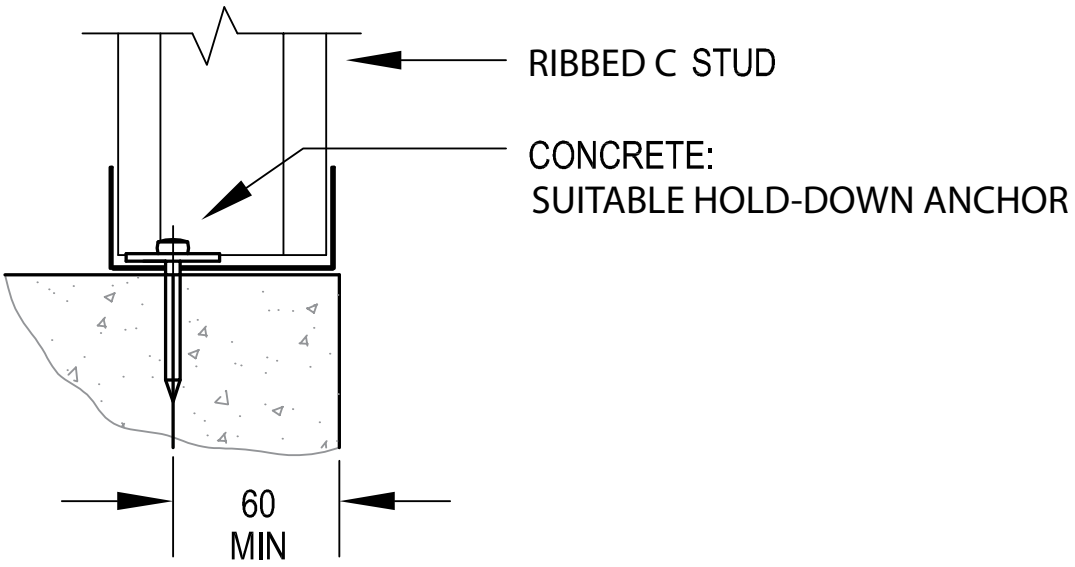


Figure 7.32 Nominal Stud Tie-down

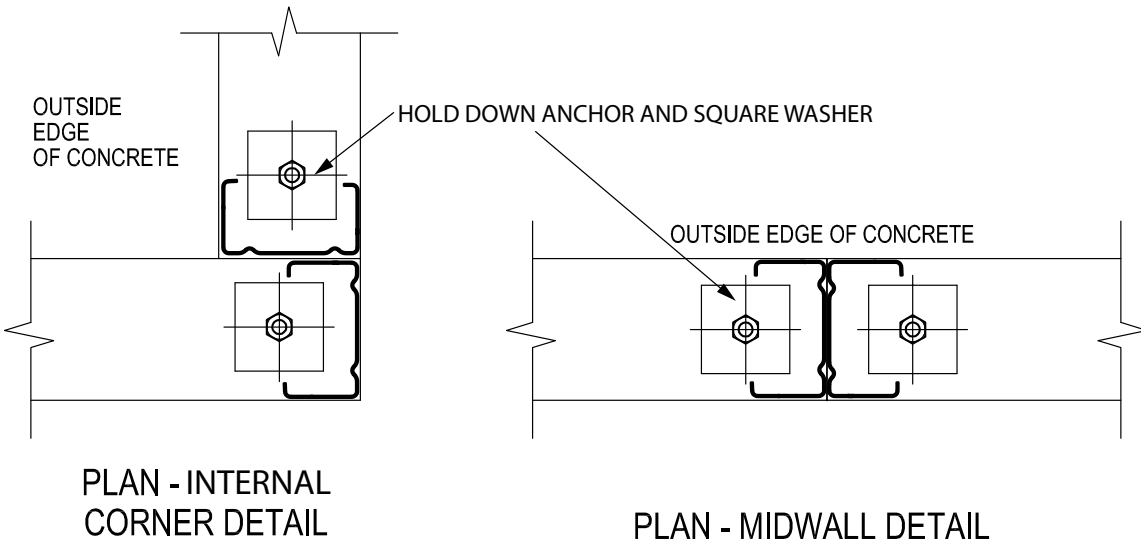


Figure 7.33 - Corner/Mid-wall Detail (Hold-down anchor and square washer)

For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the uplift forces.

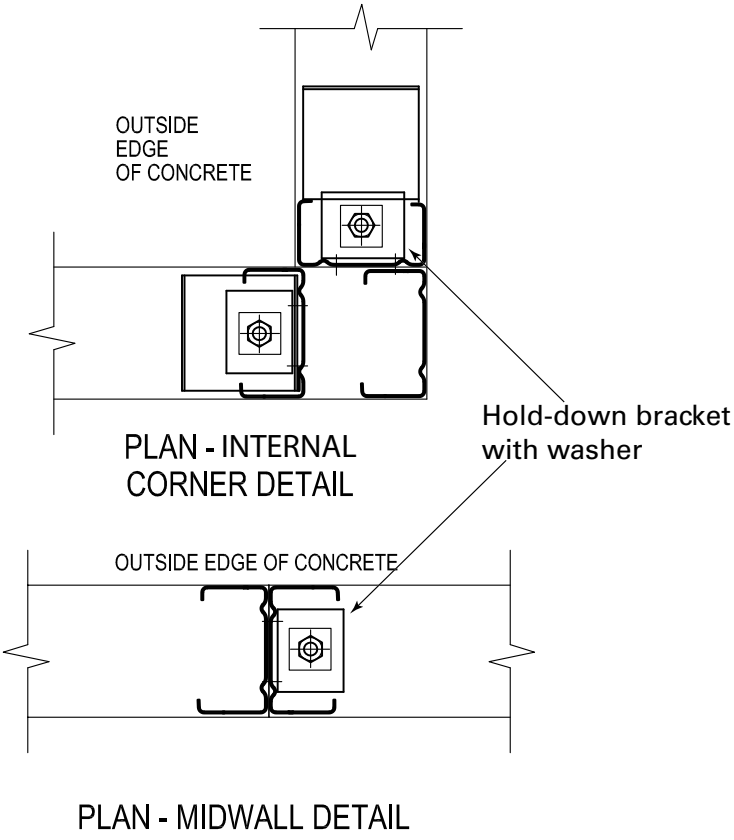


Figure 7.34 - Corner/Mid-wall Detail (Hold-down anchor, bracket and washer)
For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the uplift forces.

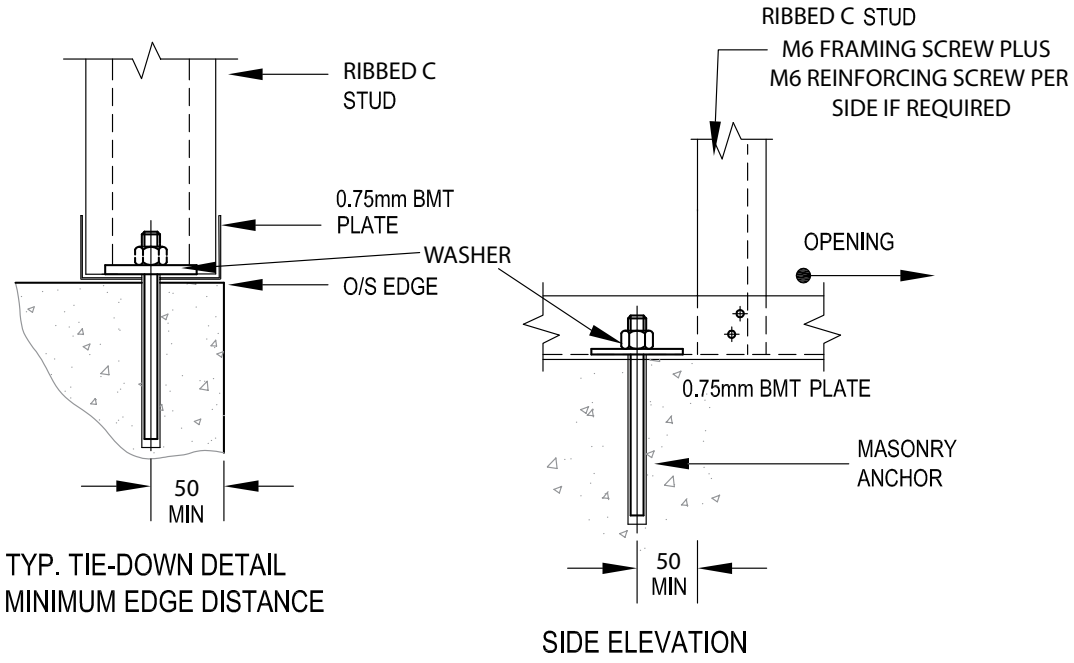


Figure 7.35 Tie-down details - Masonry anchors with washers
(medium uplift capacity - 7.5kN Limit State)
For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the calculated uplift forces.

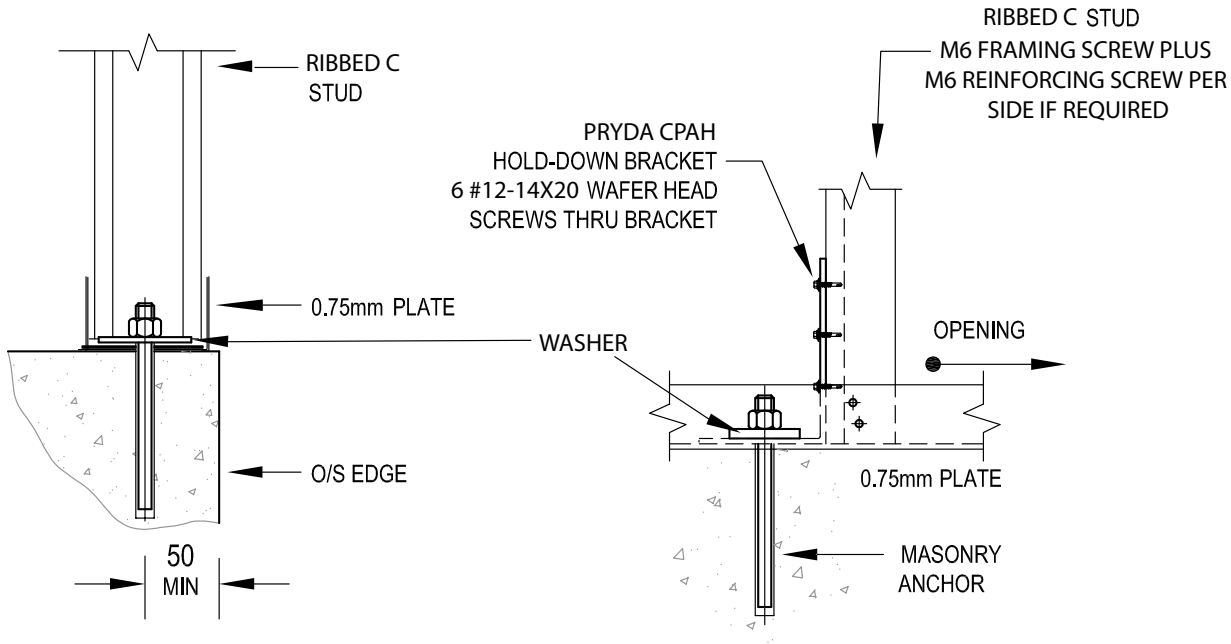


Figure 7.36 Tie-down details - Masonry anchors with bracket and washer (high uplift capacity - 12.5kN Limit State)
For hold down anchor capacity, refer to manufacturer's information.

Value 15kN

For hold down anchor capacity, refer to manufacturer's information. '

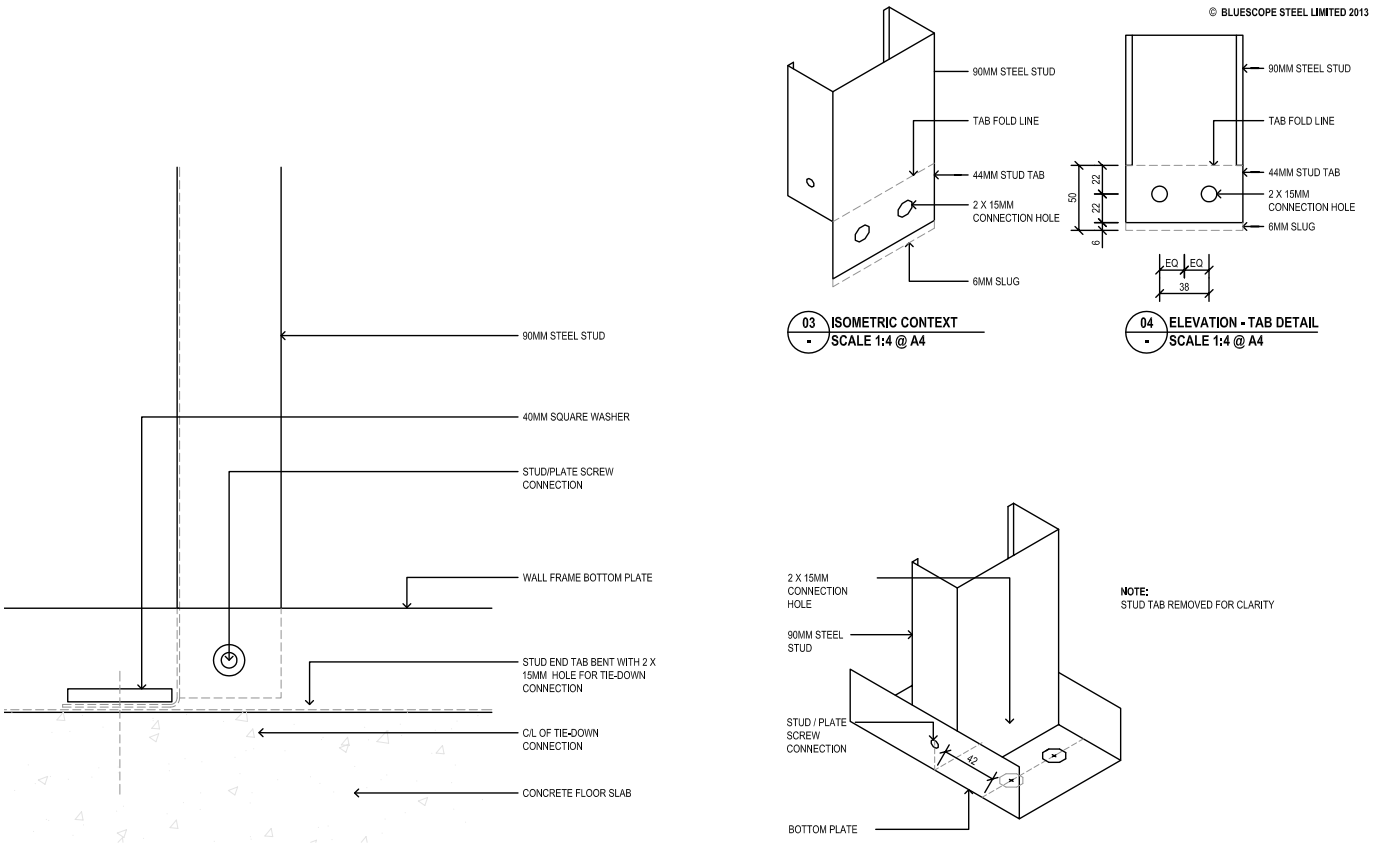


Figure 7.37 ENDUROTIE™ bent tab stud tie-down.

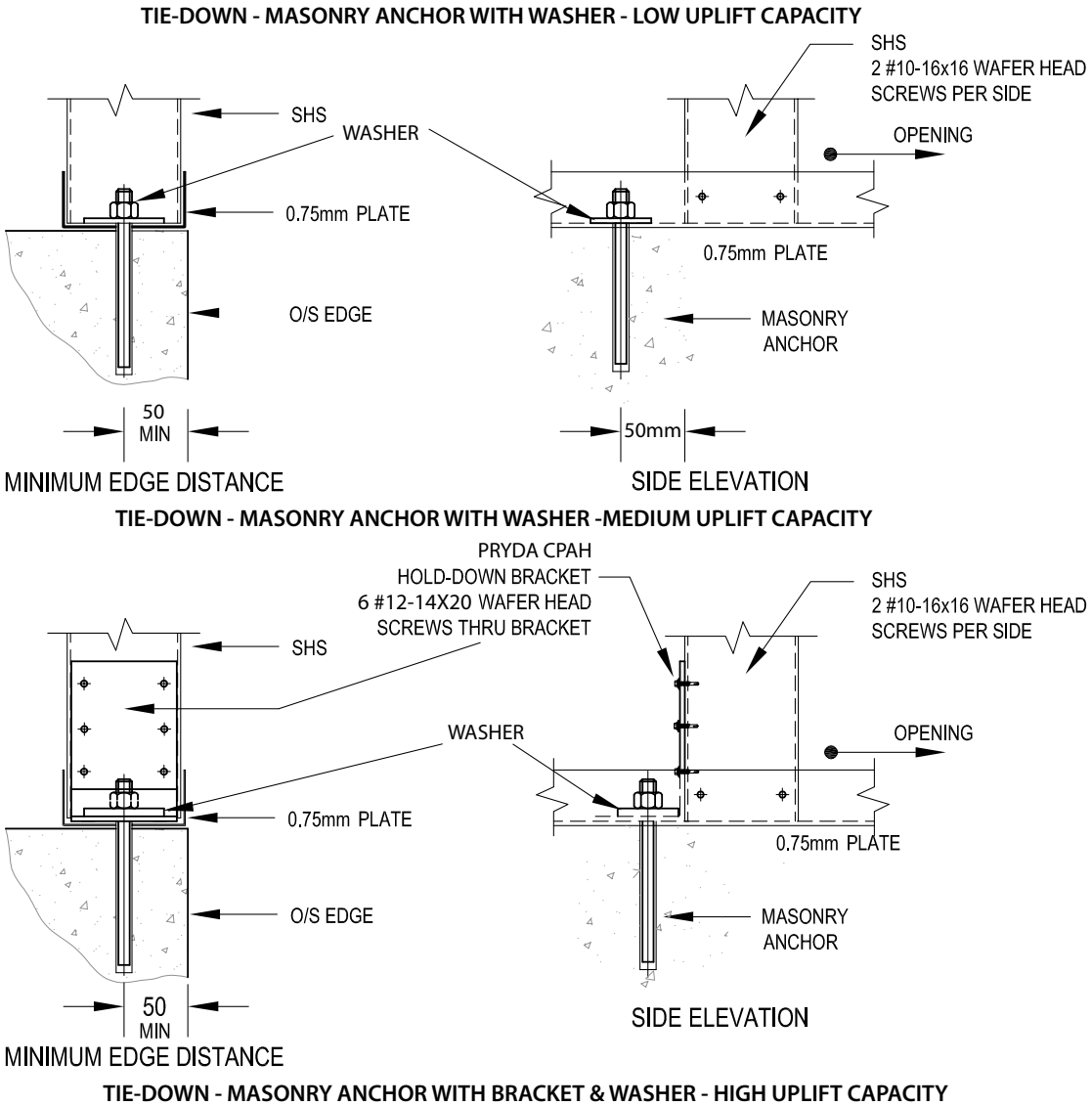


Figure 7.38 Tie-down Details - Square Hollow Section (SHS)
For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the uplift forces defined in in Tables 2-5 of Section 3.3.1 of the Backyard Shacks™® Building System Design Manual.

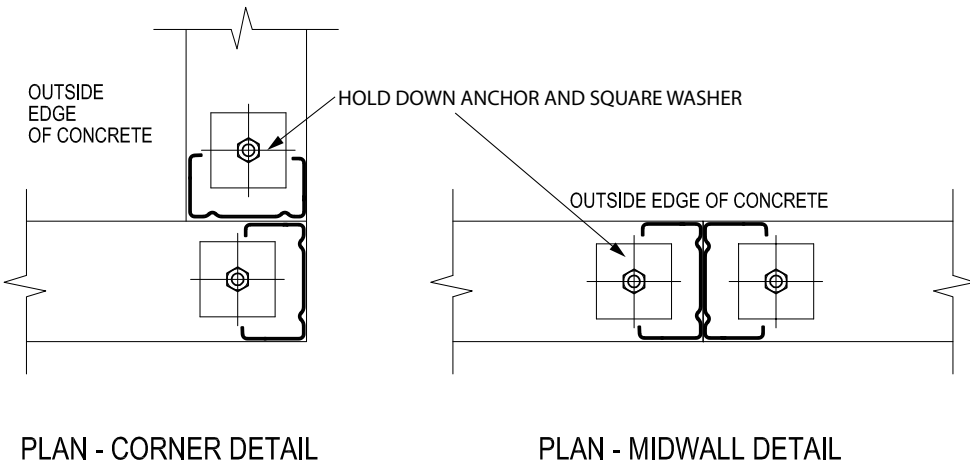


Figure 7.39 - Corner/Mid-wall Detail (Medium Uplift Capacity, kN)
For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the uplift forces defined in Tables 2-5 of Section 3.3.1 of the Backyard Shacks™® Building System Design Manual.

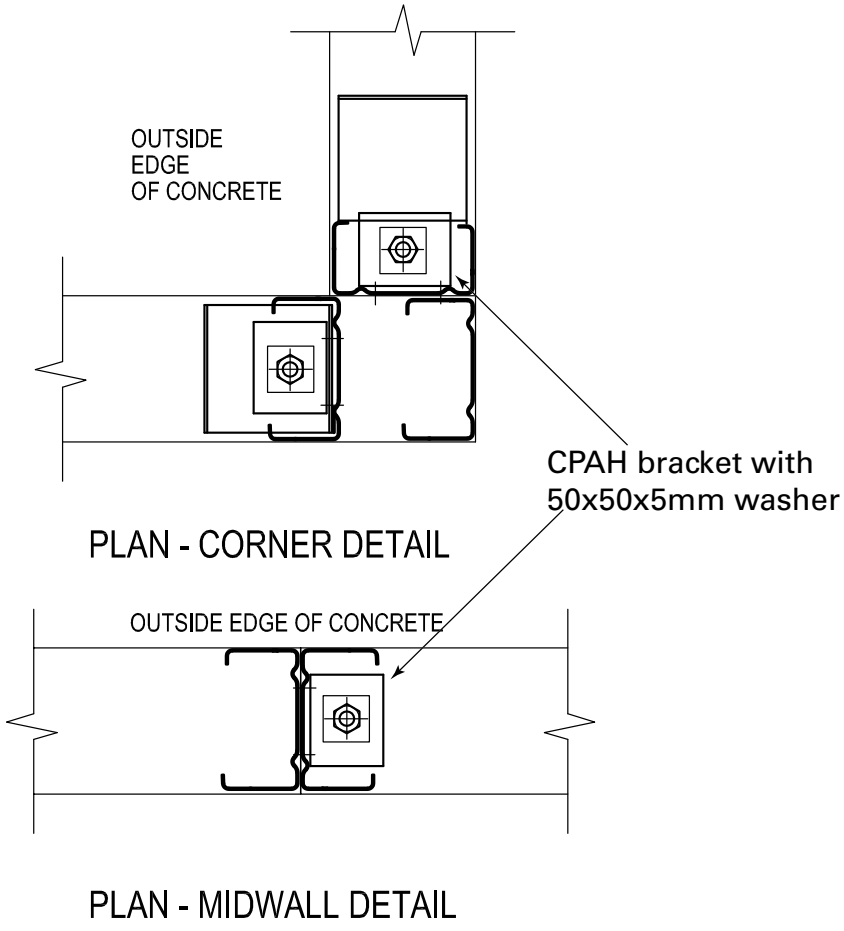


Figure 7.40 - Corner/Mid-wall Detail (High Uplift Capacity, kN)
For hold down anchor capacity, refer to manufacturer's information.
Suitable hold down anchors are to be provided to resist the uplift forces defined in in Tables 2-5 of the Backyard Shacks™® Building System Design Manual.

7.7 Types of flashings

For the BackYard Shack flashings, there are two flashings types of flashings for the corners, windows and around the doors. The preliminary flashing must be installed prior to the wall sheeting or insulation being installed.

For the corners, the preliminary flashing/corner flashing must be installed and held into place using a TEK15 button head screw to fasten. Only 2 TEK15s are required to hold the flashing in place prior to the wall sheets being fitted.

Before fitting wall sheeting, install the insulation and hold in place with supplied tape. Then as you fit wall sheeting remember to install the foam infill strip behind the corners, and around the window and door openings to seal and prevent water from entering.

Once sheeting has been installed, the sheet trim flashing can be installed at the corner locations and around all windows and doors to cover the edges of the sheeting and provide a neat finish.

Figure 7.42 Preliminary flashing around window and door openings flashing details

Figure 7.43 Preliminary flashing for the corners of the building

Figure 7.44 Sheet trim flashing at corner locations

Figure 7.45 Sheet trim flashing around window and doors

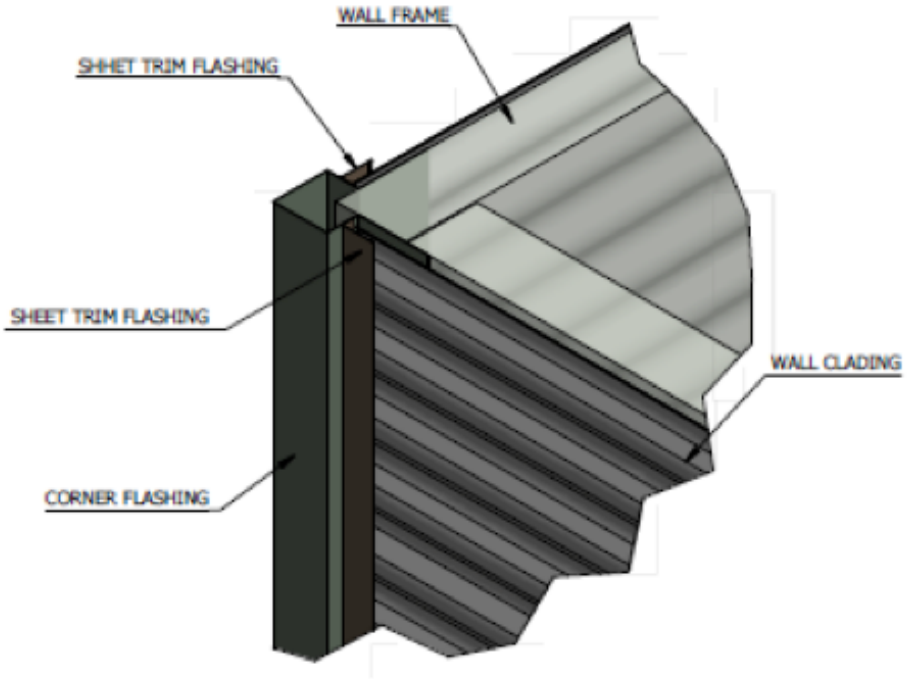
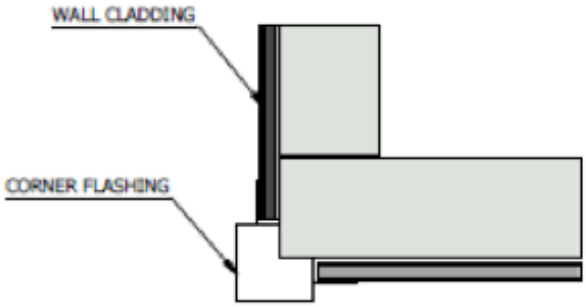


Figure 7.46a External corner



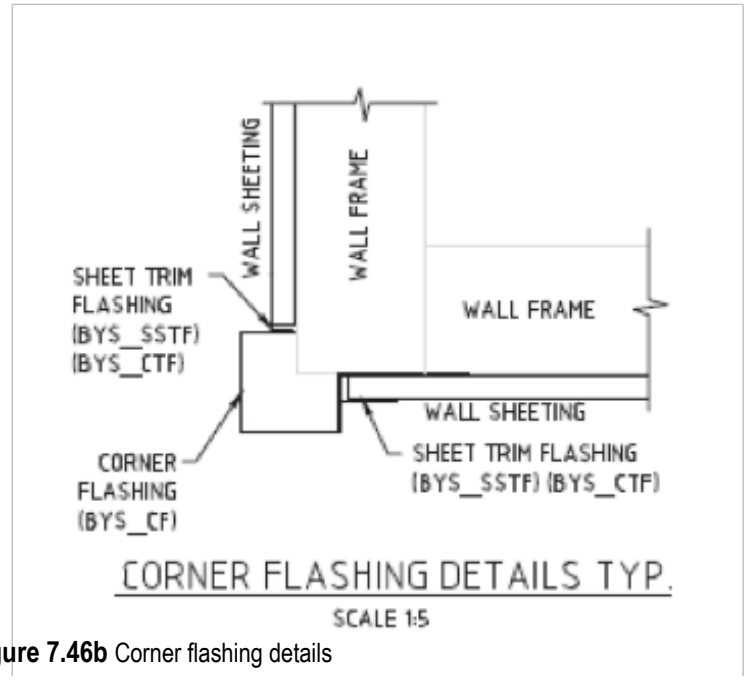


Figure 7.46b Corner flashing details

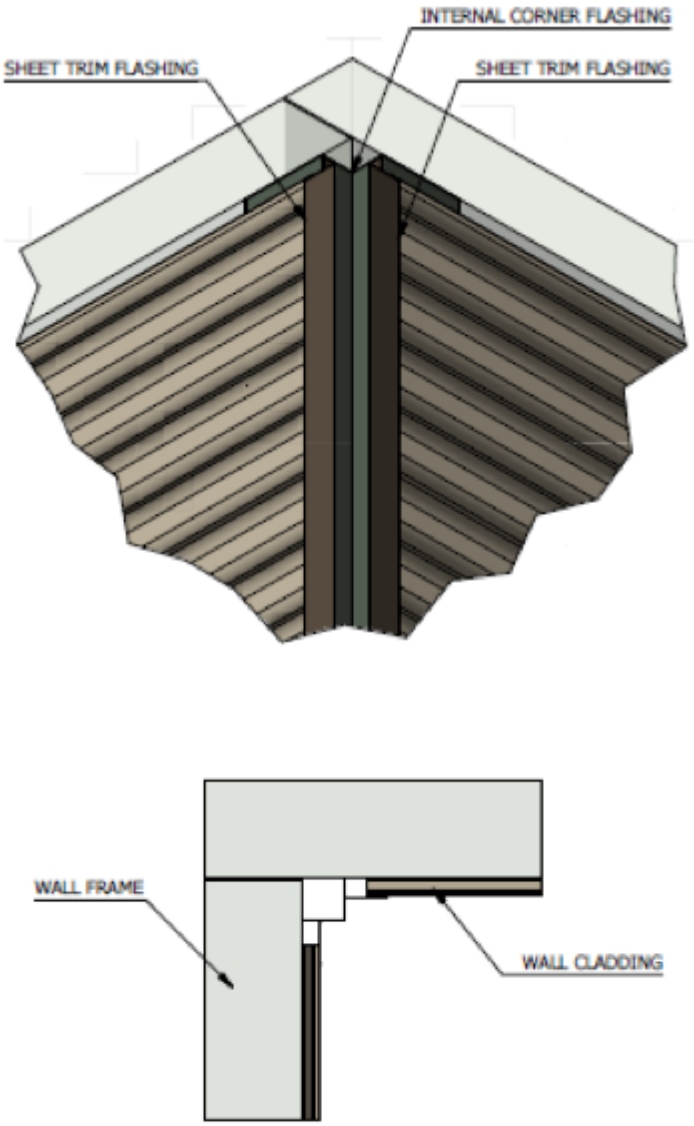


Figure 7.47 Internal corner flashing details

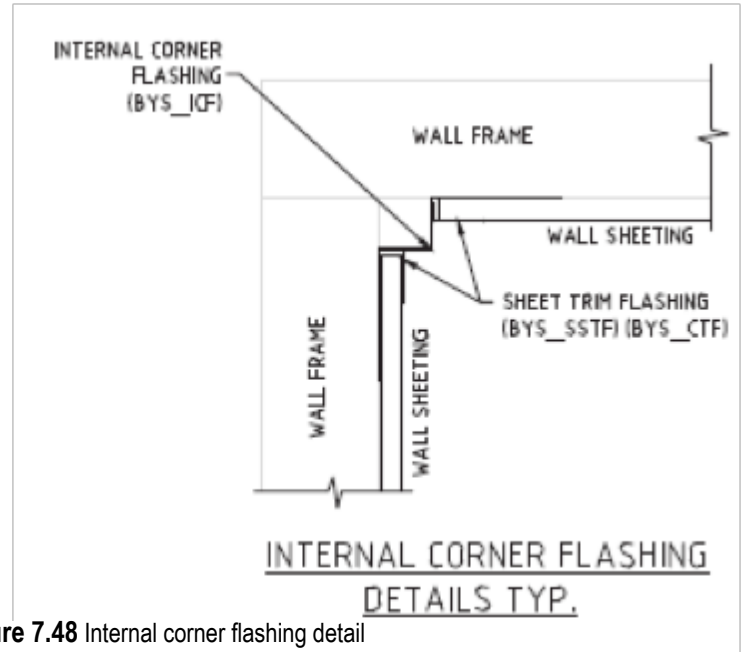
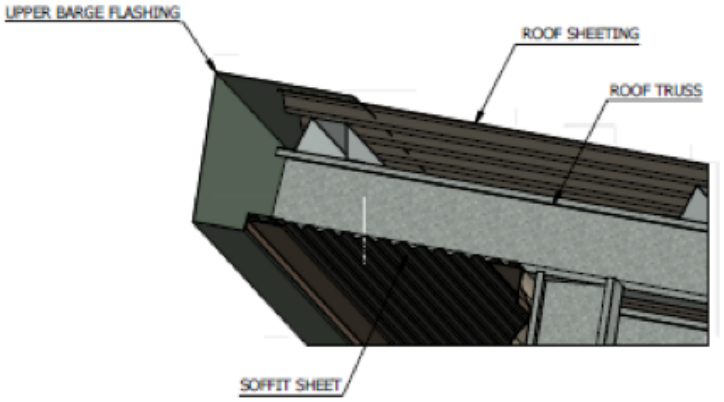


Figure 7.48 Internal corner flashing detail



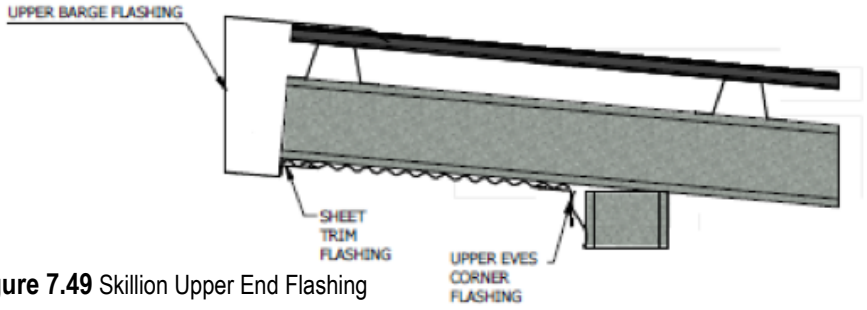
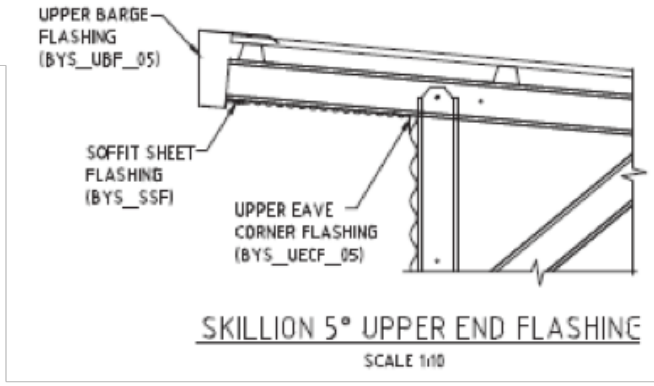


Figure 7.49 Skillion Upper End Flashing



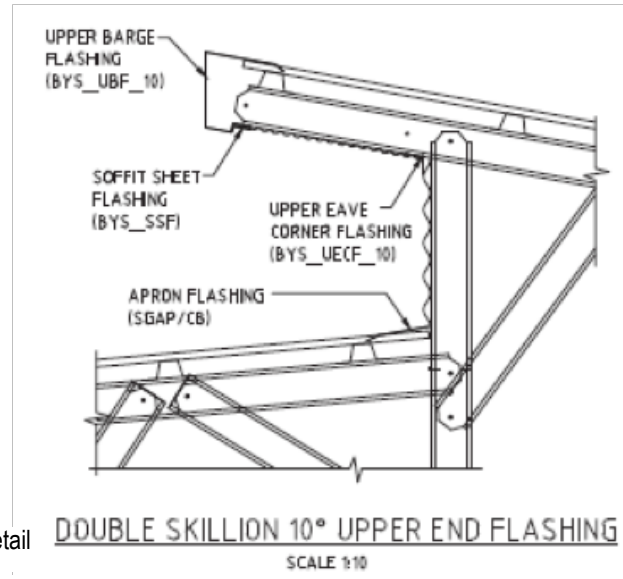
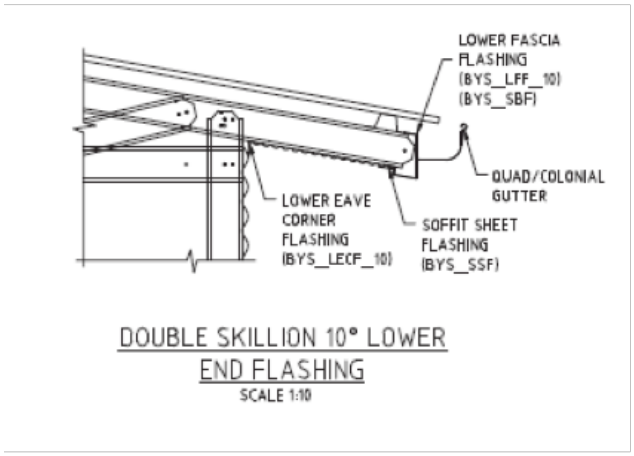
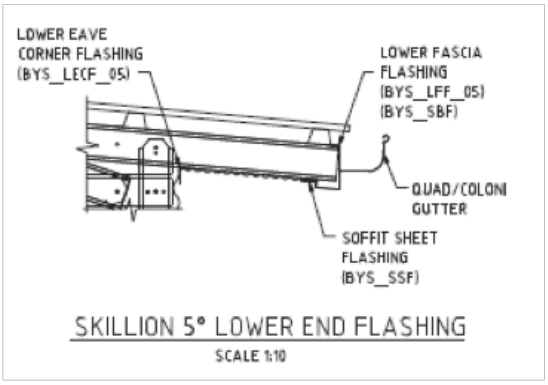
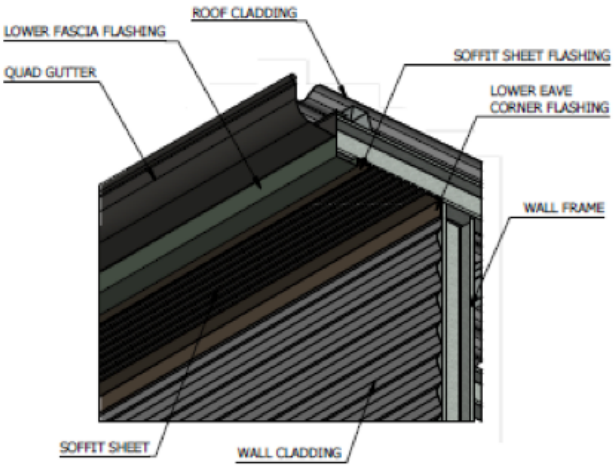


Figure 7.50 Skillion Upper End Flashing detail







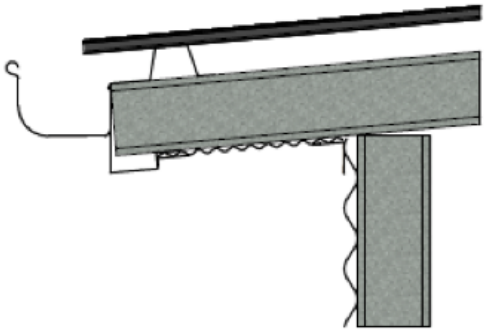


Figure 7.51 Skillion Lower End Flashing

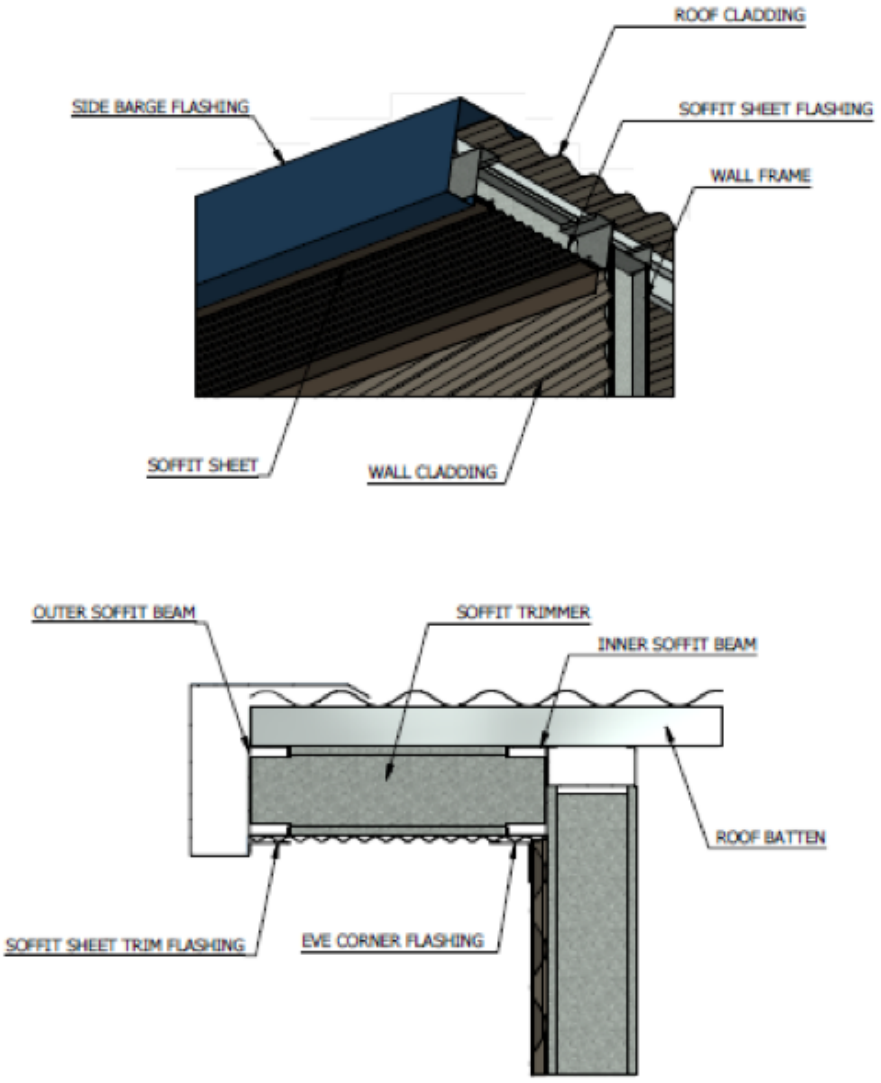
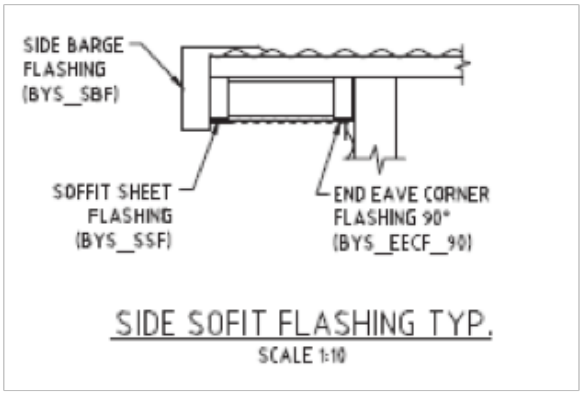


Figure 752 Side Soffit Flashing



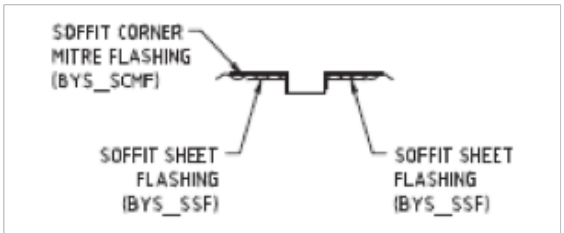
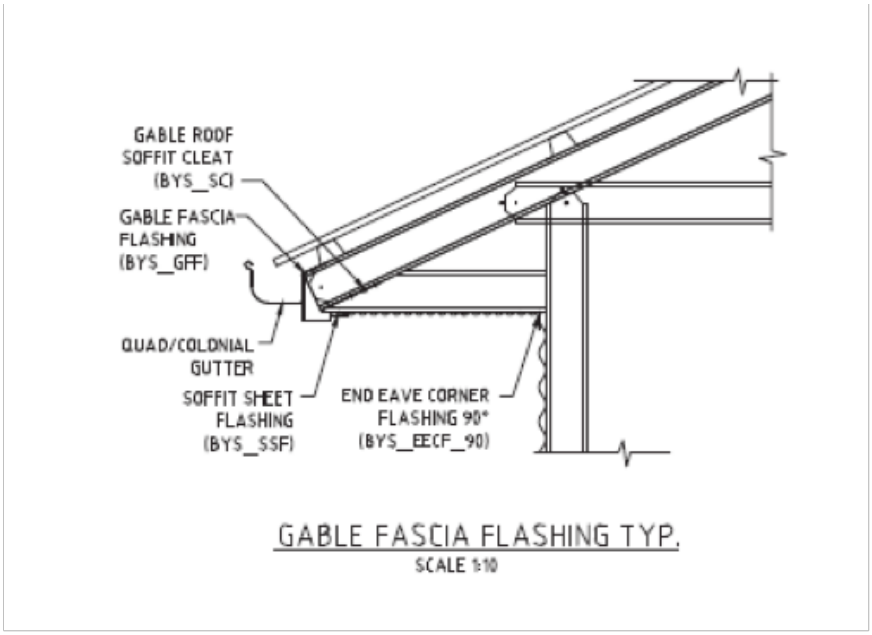


Figure 7.53 Soffit Corner Mitre Flashing Typ.



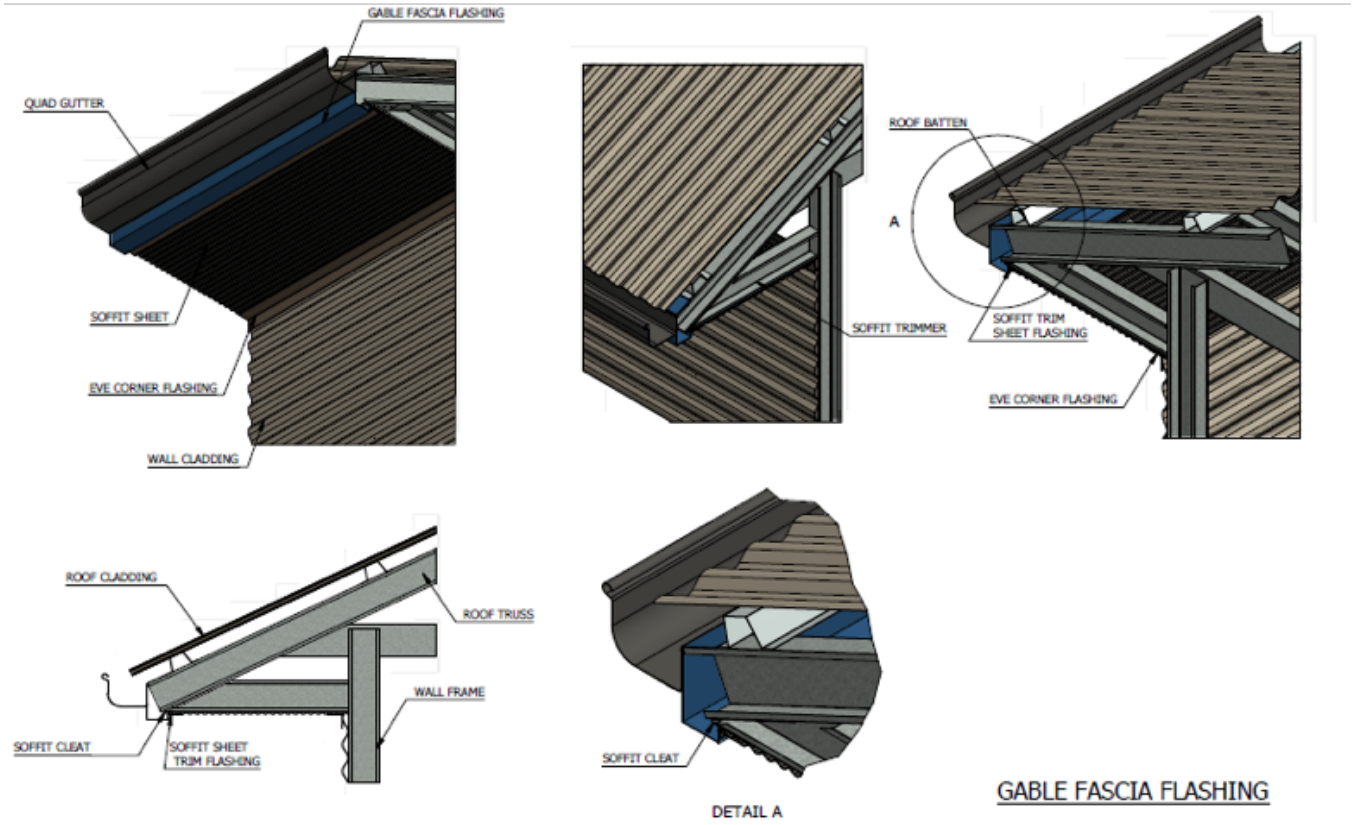


Figure 7.54 Gable Fascia Flashing Typ.

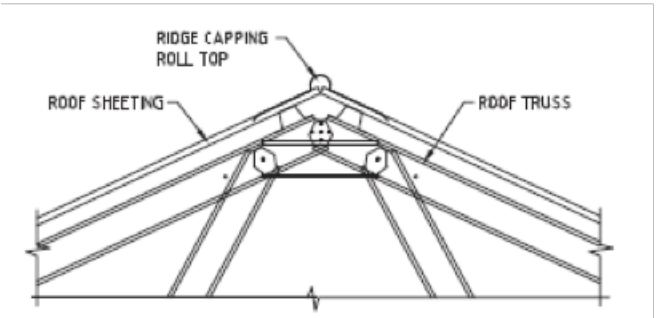
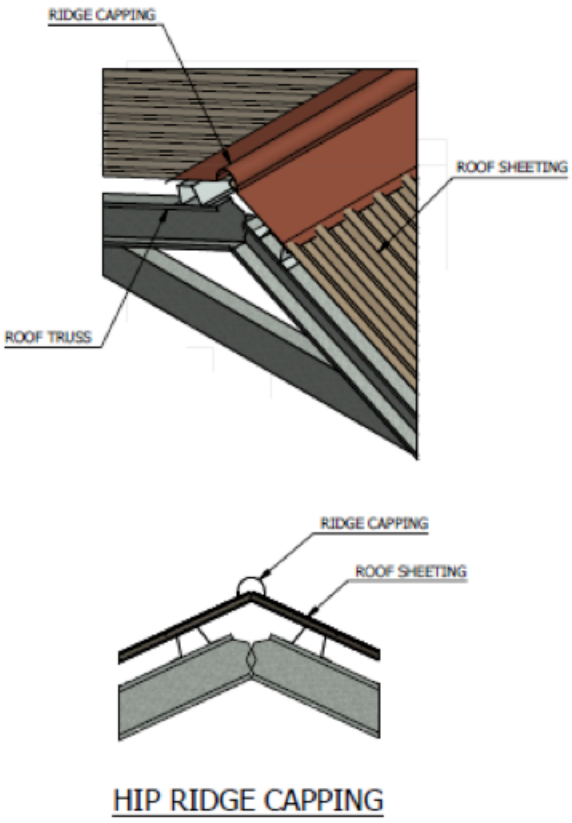


Figure 7.55 Hip Ridge Capping (Typ.)



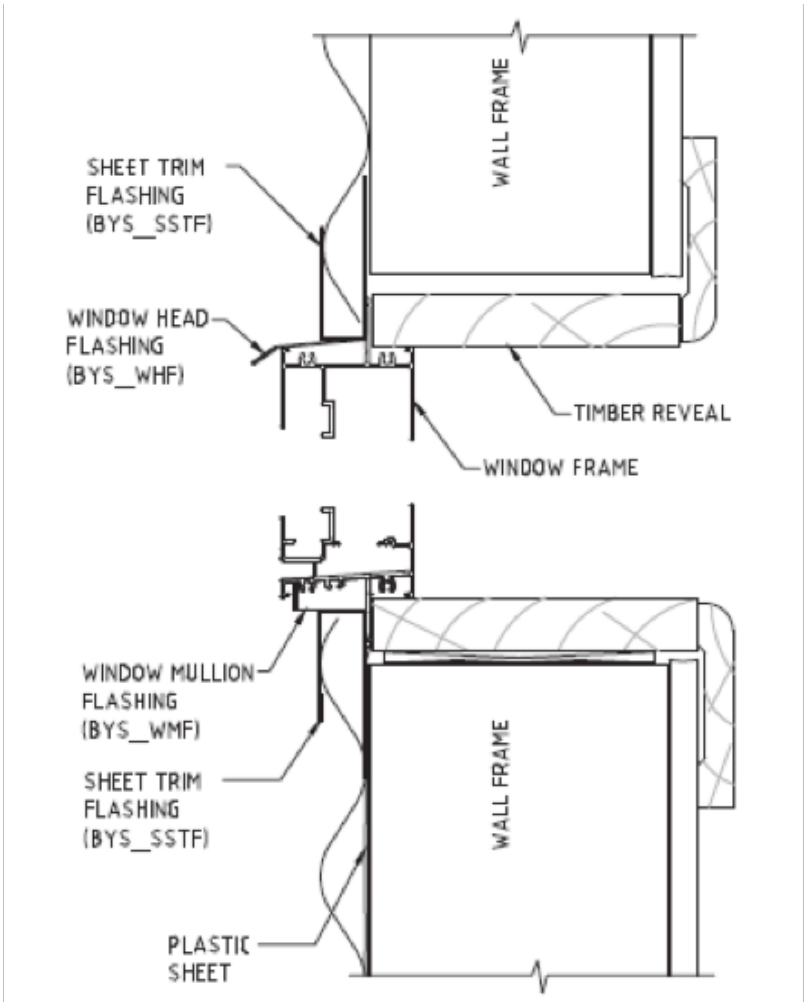


Figure 7.56 Window Head Flashing

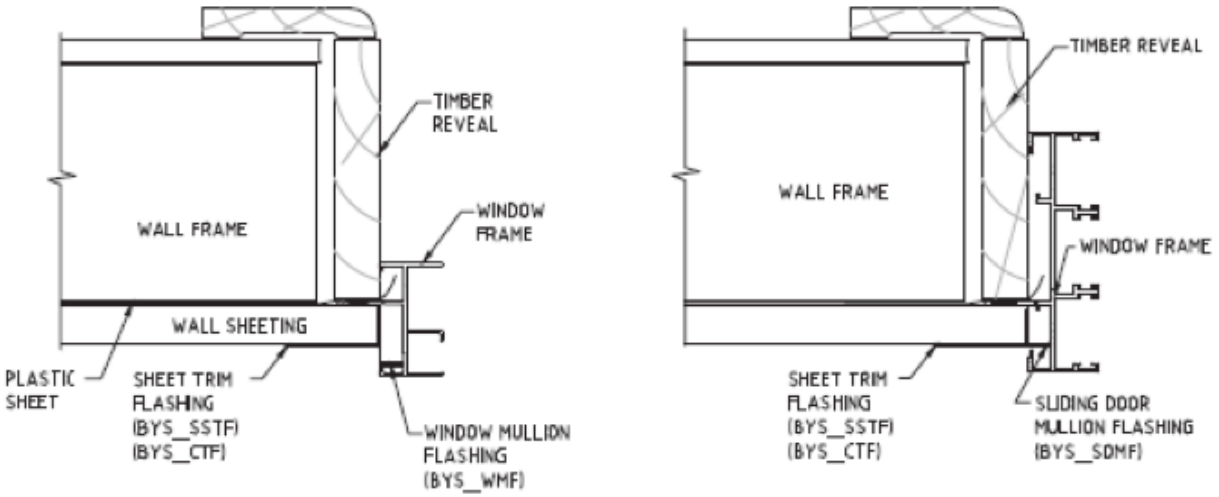


Figure 7.57 Window Mullion Flashing

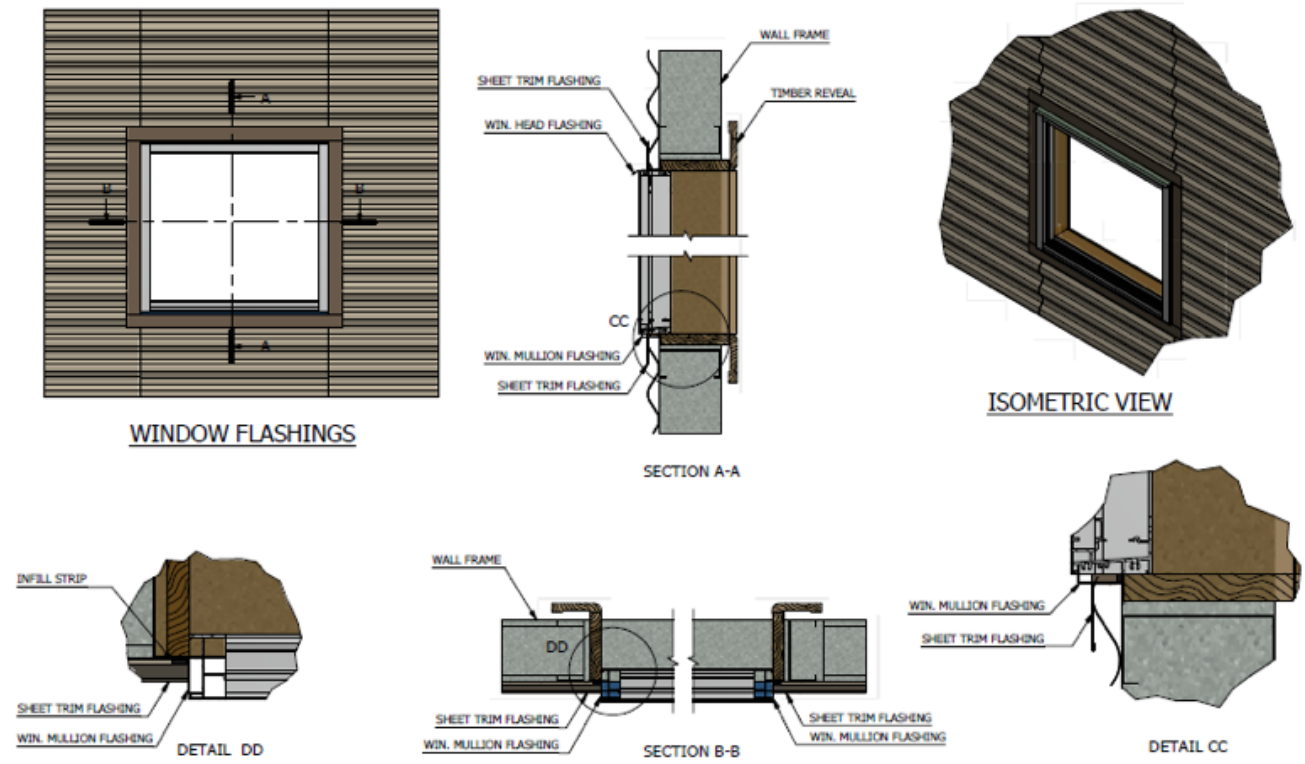


Figure 7.58 Window Flashings

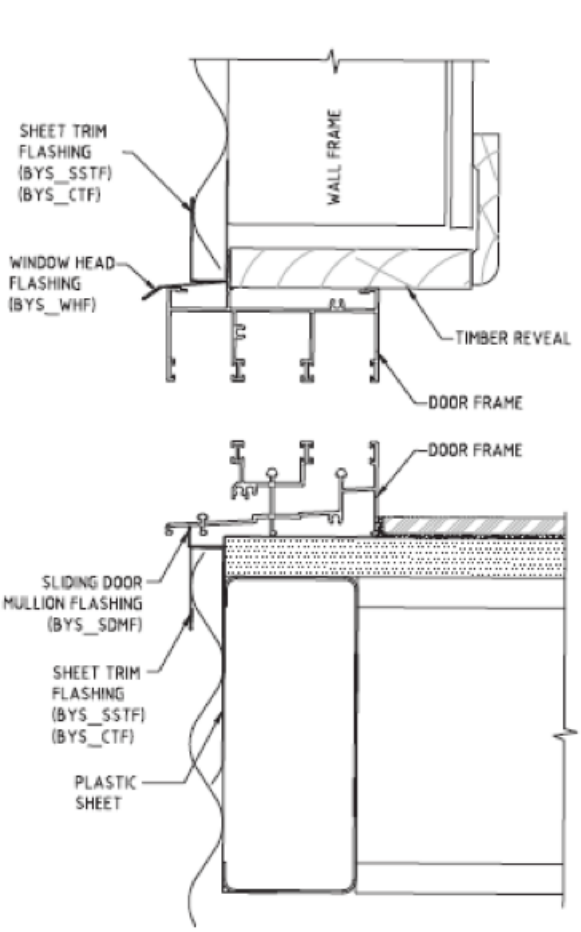
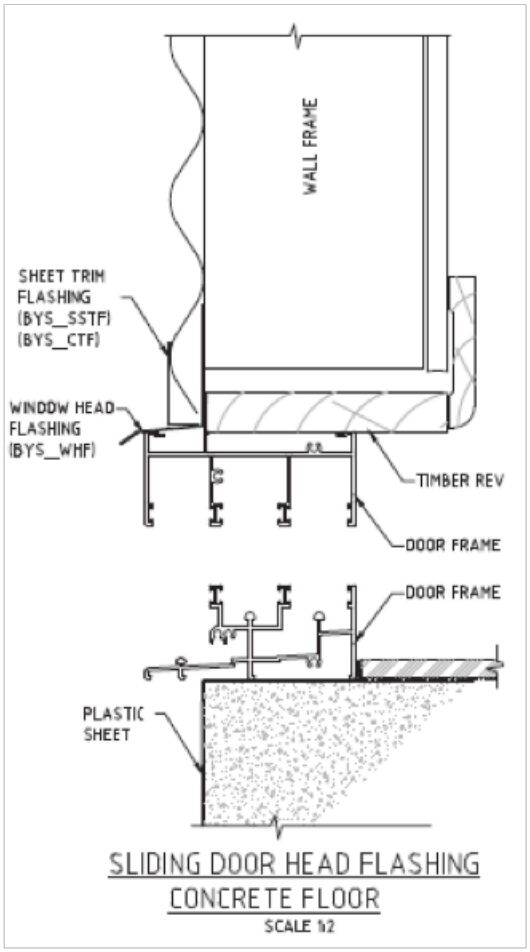


Figure 7.59 Sliding Door Head Flashing



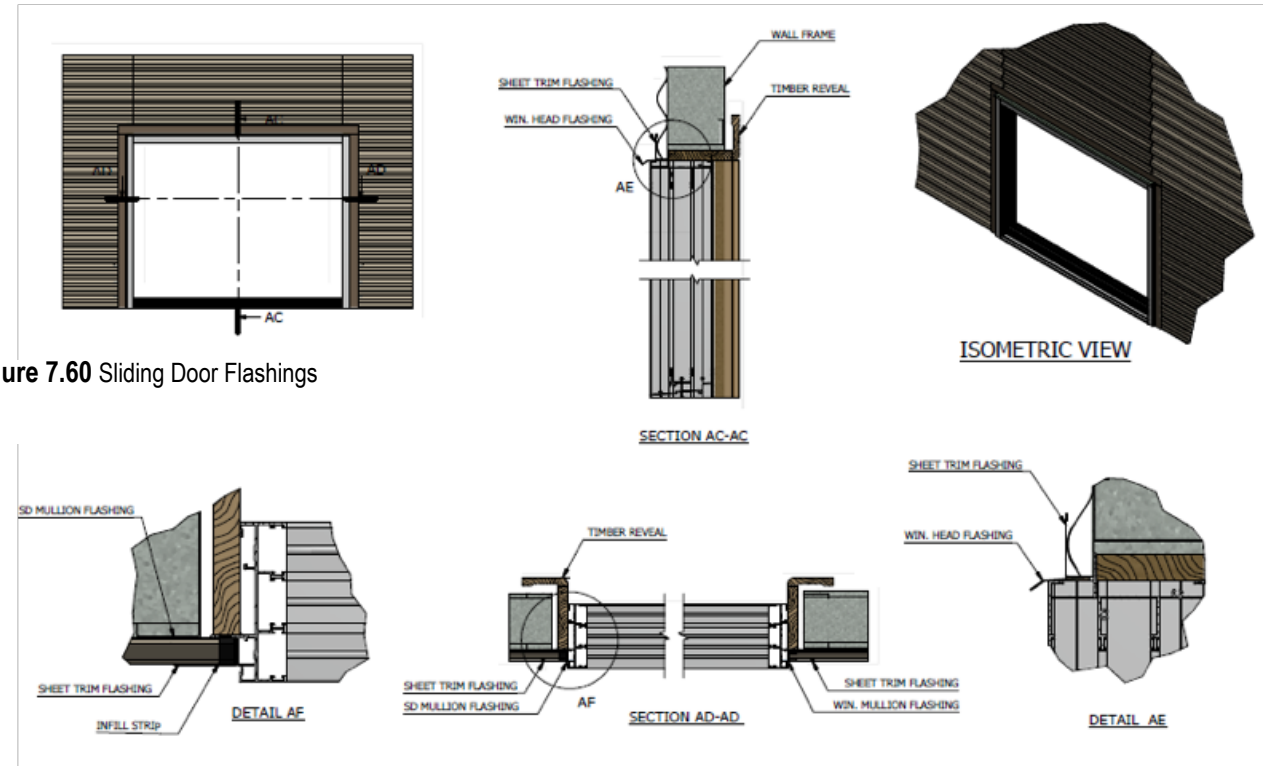


Figure 7.60 Sliding Door Flashings

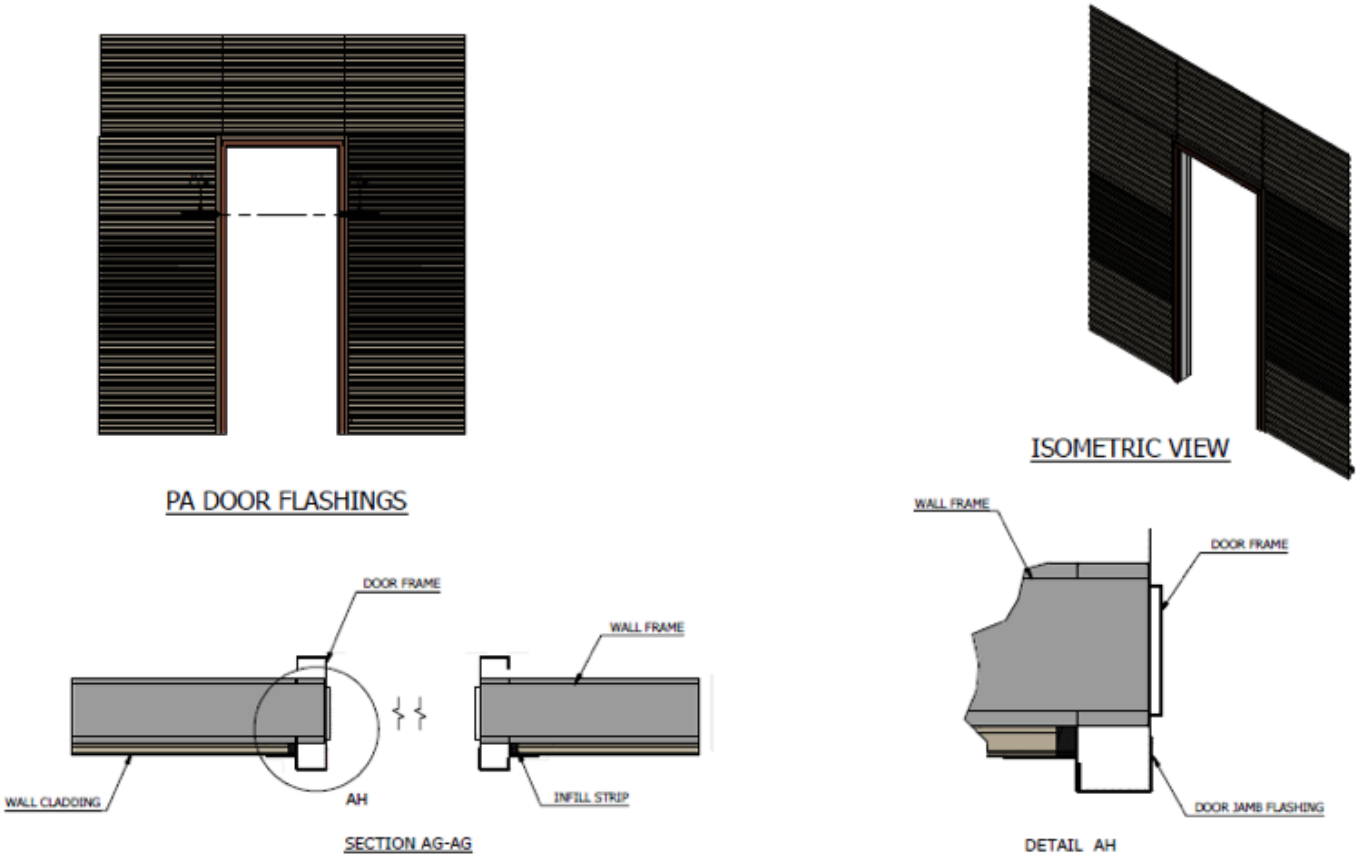


Figure 7.61 Door Flashings

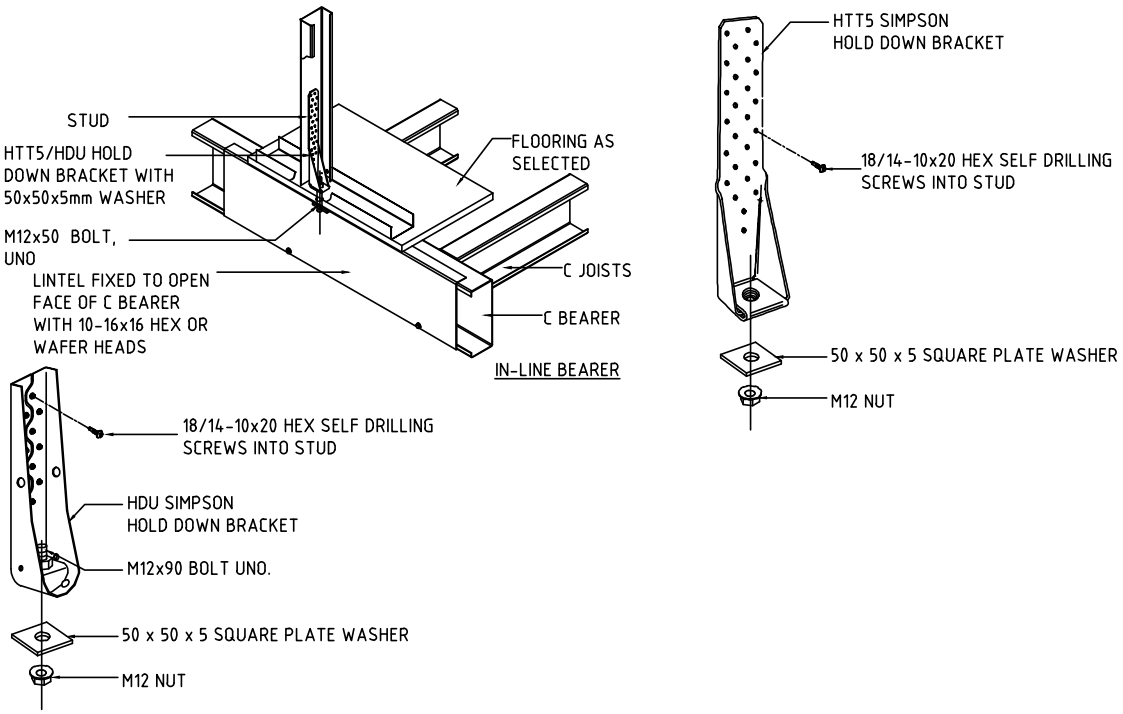
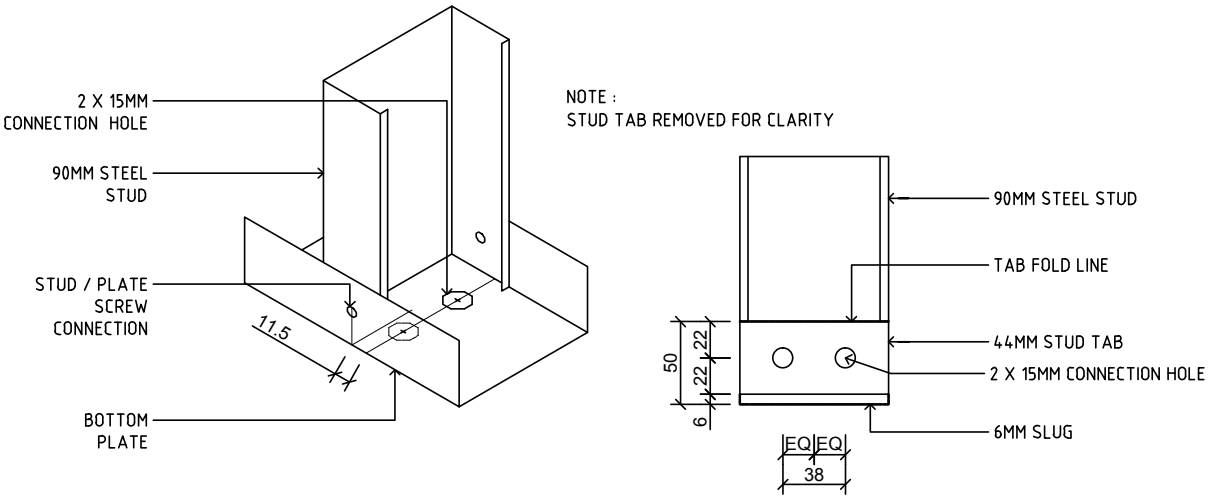
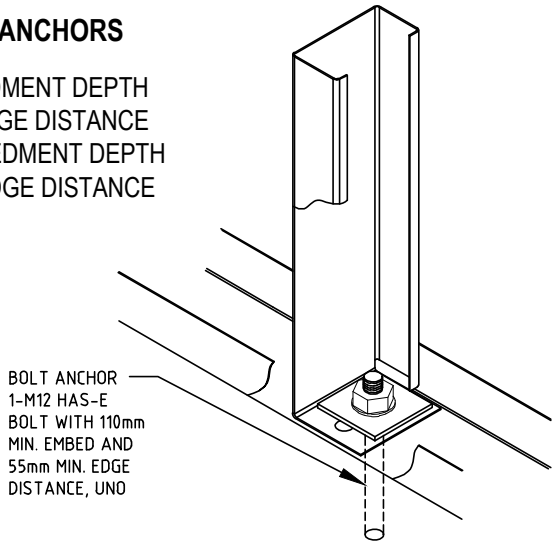


Figure 7.62 Wall frame tie-down details



HILTI HVU CHEMICAL ANCHORS

2- M8 HAS-E 80 EMBEDMENT DEPTH
6.5 kN FOR 80 mm EDGE DISTANCE
1- M12 HAS-E 110 EMBEDMENT DEPTH
12.7 kN FOR 55 mm EDGE DISTANCE



WALL FRAME DETAILS - BENT TAB STUD, ANCHOR & WASHER DETAILS

Figure 7.63 Bent tab, anchor and washer details

Section 2: Truss Installation

Table of contents

8.0 Scope of manual

This part of the BackYard Shacks manual has been prepared for the construction of a trussed roof within the following parameters:

- Only ENDUROTRUSS® Framing System components made from TRUECORE® steel and made with the ENDURO® rollformer can be used
- Erection details cover construction for cyclonic and non-cyclonic buildings. (See Table below.)
- Other spacings may require additional engineering
- Trusses suitable for both sheet roof cladding and tiled construction

Table 1 - Wind categories covered by this installation manual

Wind Classification			
Sheet roof	Truss Spacing	N3	C2
	600mm	✓	✓
	900mm	✓	✓

ENDUROTRUSS® Product performance

The ENDUROTRUSS® Framing System has been designed in accordance with relevant Australian Standards and the requirements of the Building Code of Australia 2013.

The roof framing system will perform as specified by the ENDUROCADD® 2013 software output documentation if installed in accordance with the recommendations and details set down in this manual and related references.

This manual contains vital information. PLEASE READ IT CAREFULLY.

For more information and technical support,contact: info@enduroframe.com.au

Table 2: Maximum Design Gust Wind Speed (Vh) at Height (h)

Wind Classification	Maximum design gust wind speed (Vh)	
	Serviceability limit state (m/s) (Vh,s)	Ultimate limit state (m/s) (Vh,u)
N3	32	50
C2	39	61

9.0 On-site handling

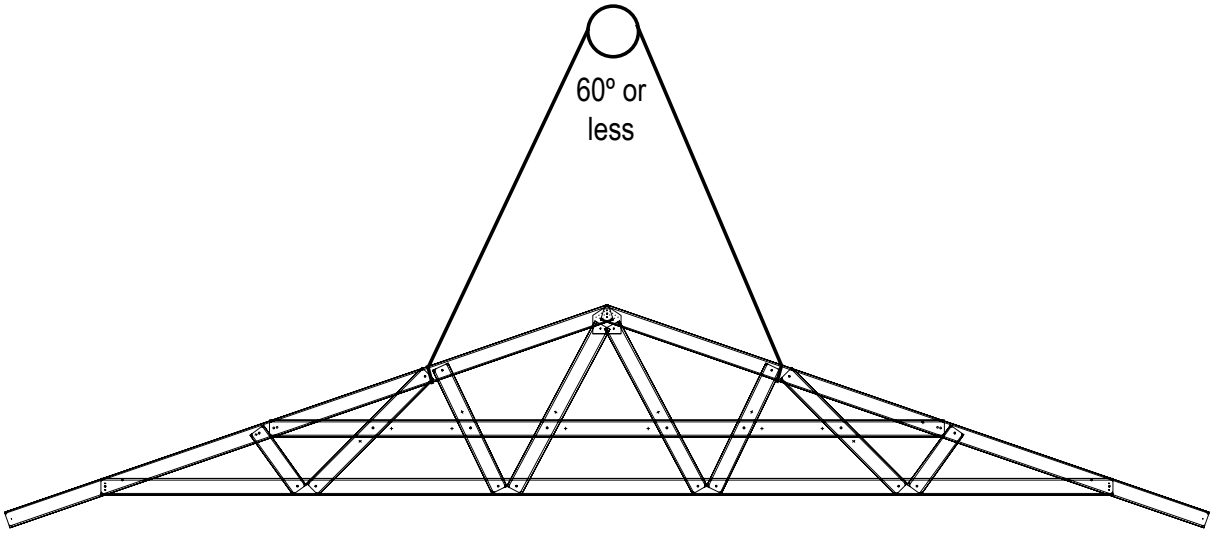
9.1 Slings

Trusses must be fully supported in either horizontal or vertical planes when being transported. Care must be taken when tying down and lifting trusses not to put an excessive pressure on chords, webs or joints. For transporting trusses in horizontal planes where a solitary Trusstite screw is used in a chord to web connection, an additional screw may be inserted to provide additional stiffness, especially for “flush” trusses.

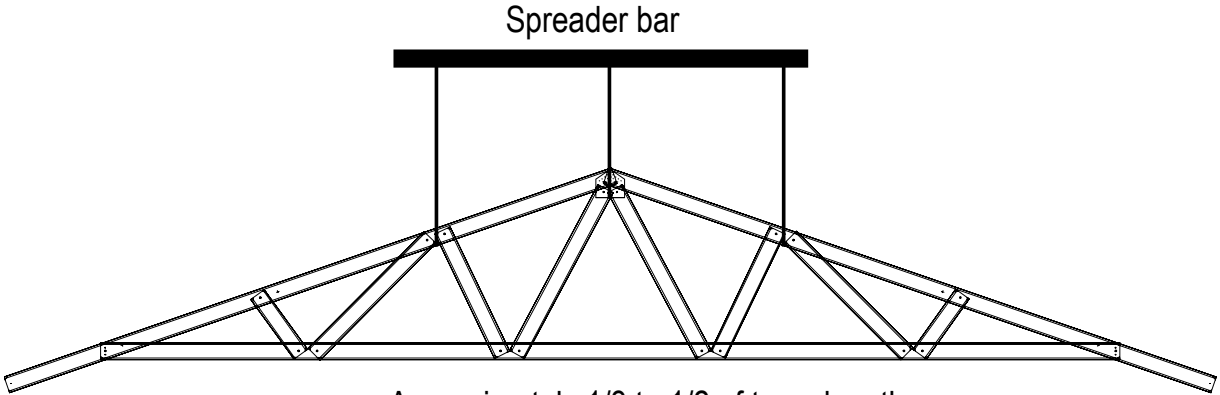
Most trusses for single storey work may be lifted by hand, however where cranage is required, sling trusses or truss pieces from top chord panel points as shown in Figure 2.1. Slings should be located at equal distances from truss centrelines and be approximately one-third to one-half the truss length apart.

The angle between the sling legs should be 60 degrees or less and where truss spans are greater than 9000 mm, spreader bar should be used. Where a truss span exceeds 9000 mm, a spreader bars with attachment to web-chord should be used. Never lift trusses by the apex joint alone.

Note: When manoeuvring any materials by hand, take care not to damage components. Components should be inspected on arrival to site. Damaged components may affect structural integrity.



Approximately 1/3 to 1/2 of truss length
Vertical lifting of trusses - Truss span less than 9.0m



Approximately 1/3 to 1/2 of truss length
Vertical lifting of trusses - Truss span greater than 9.0m

Figure 9.1 Handling

9.2 Roof trusses exposure and storage

Where trusses are stored on site, they should be blocked above firm ground so that they do not come into contact with the soil and to protect them from ground water:

(a) If the trusses are stored horizontally, as shown in Fig. 2.2, the blocking should be at 2.0m to 2.5m centres or as required at joints, to prevent bending of the trusses. Avoid using copper, chemically treated timber or EPDM based materials as blocking.

(b) If the trusses are stored vertically as shown in Fig. 2.3, they should be supported at the designed support locations or bottom chord panel points, and in a manner that will be prevented from tipping or toppling.

(c) The truss chords should be sloped such that water drains off.

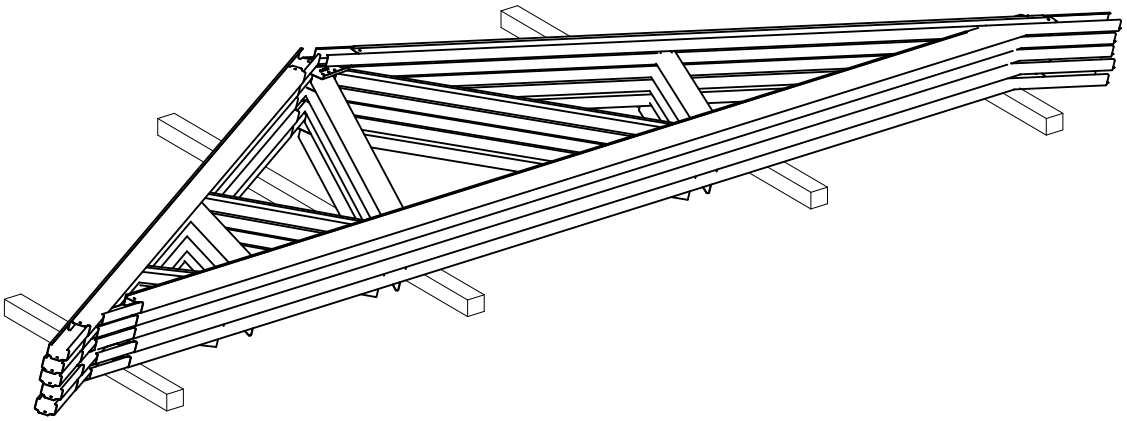


Figure 9.2 Trusses rafters stacked horizontally

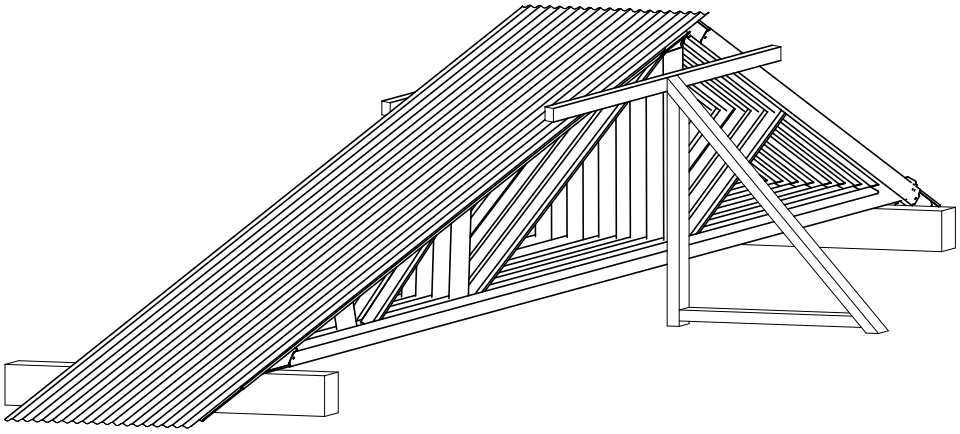
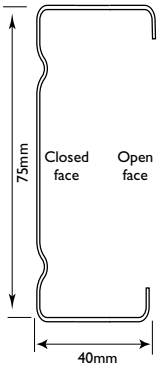
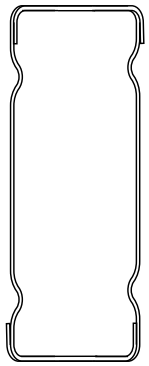


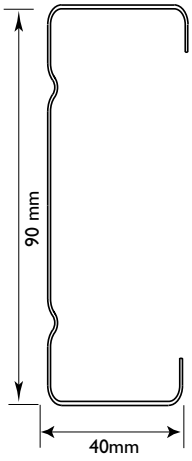
Figure 9.3 Trusses rafters stacked vertically



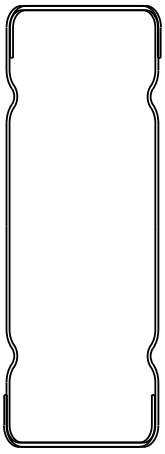
S75 Section



S75 Boxed Section



S90 Section



S90 Boxed Section

Figure 10.1 Section types

10.0 Points for construction

Trusses must be installed plumb and straight

While erecting the roof, trusses must be fixed plumb and straight. After fixing, if a bow or tilt is evident, the trusses have not been installed correctly. In this case, the problem must be rectified before proceeding further. THE TRUSSES MUST NOT BE MODIFIED ON SITE WITHOUT FIRST SEEKING ADVICE FROM A TRAINED SOFTWARE USER OR ENGINEER.

Correct direction of Backyard Shacks™ chord profile

The direction of the channel section used for the chord should be as depicted on Truss Assembly diagrams in Figure 10.11.
Trusses should be oriented as shown on the truss layout drawing provided and ensure load bearing points shown on the assembly drawings align with load bearing walls.

Material specification

ENDUROTRUSS® sections are roll-formed from TRUECORE® steel complying with AS1397:2011. The standard ENDUROTRUSS® sections are shown in Fig. 11.1. In the grade shown, the number prefixed with G indicates minimum yield stress in MPa; and the number prefixed with Z or AM indicates minimum coating mass in g/m^2.

- 0.55mm BMT, TRUECORE® G550 AM150 steel
- 0.75mm BMT, TRUECORE® G550 AM150 steel
- 1.00mm BMT, TRUECORE® G550 AM150 steel
- 1.20mm BMT, TRUECORE® G500 AM150 steel

Straightness

Trusses and rafters must be installed with an overall straightness not greater than L/500 where L is the length of the member as shown in Figure 10.2.
Differential in vertical bows between adjacent members must not exceed 1/150 of their spacing or 6mm whichever is less.

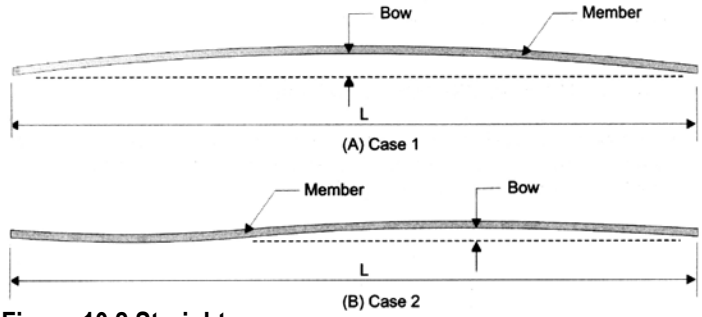


Figure 10.2 Straightness

Plumb

Out of plumb at any point along the length of the truss from top to bottom, must not exceed the minimum of h/100 or 20mm unless the trusses are specifically designed to be installed out of plumb. (See Figure 10.3 below)

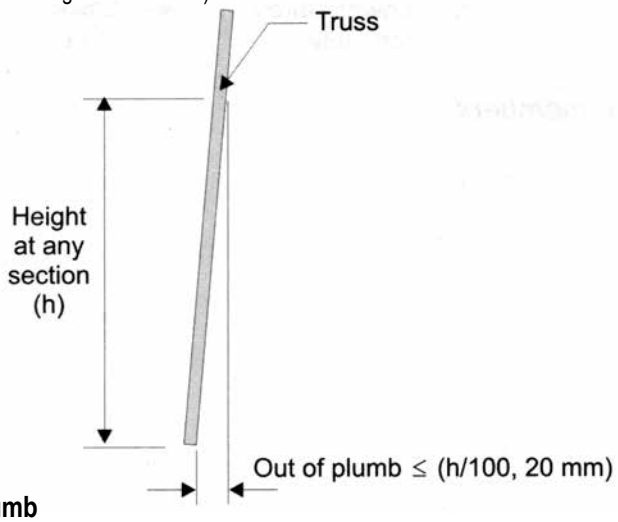
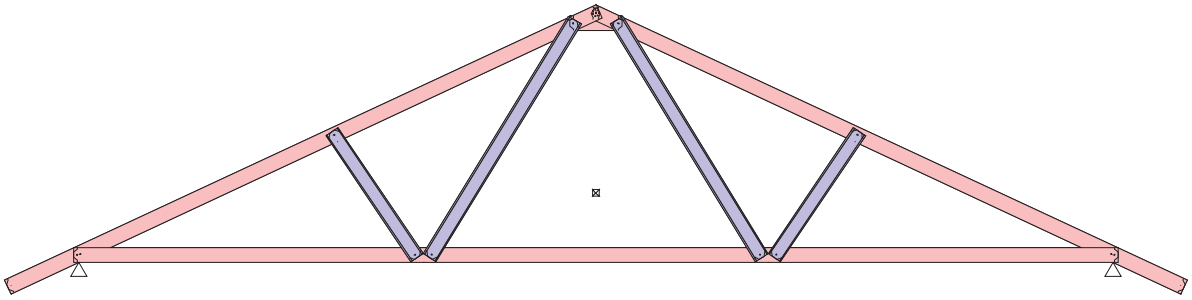


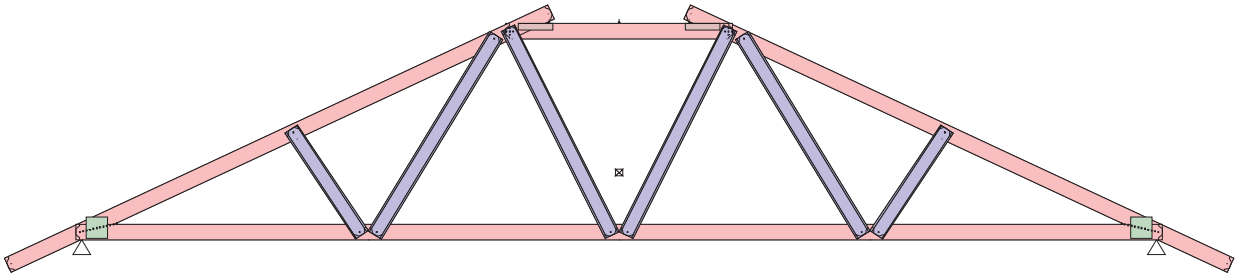
Figure 10.3 Plumb

11.0 Sample Gable Truss Layout

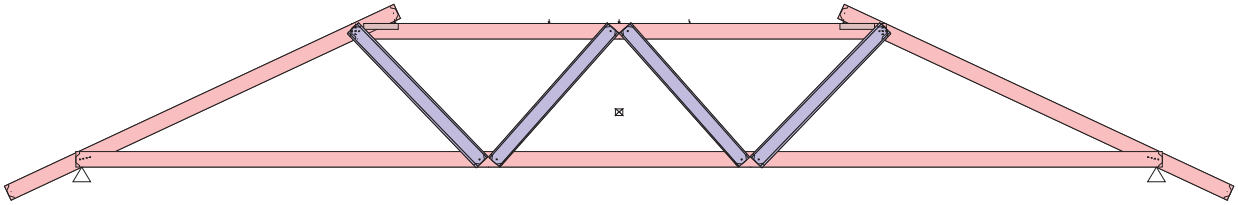
DIAGRAMATIC ONLY - NOT TO SCALE



TRUSS:T005, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:37:29



TRUSS:T006, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:37:30
CPAH, 25x3mm Hold down strap or 50x50x3 Angle to be fitted to strengthen truss Heel E/F.



TRUSS:T007, SPAN=6270
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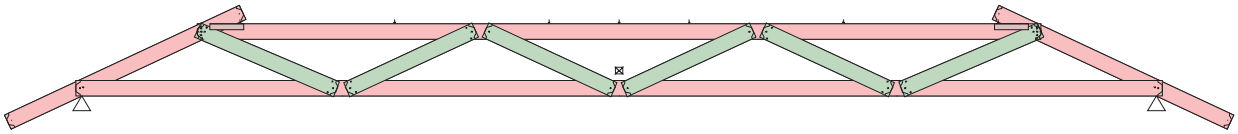
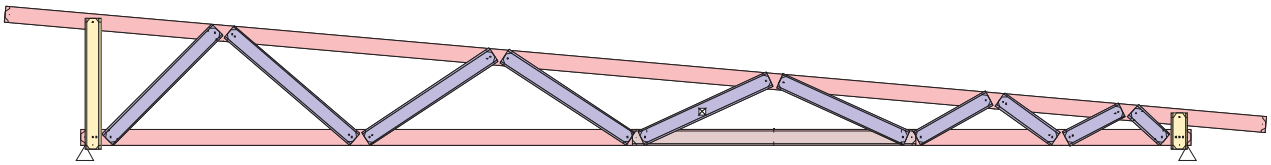


TRUSS:T008, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:37:30

11.1 Sample Skillion Truss Layout

DIAGRAMATIC ONLY - NOT TO SCALE



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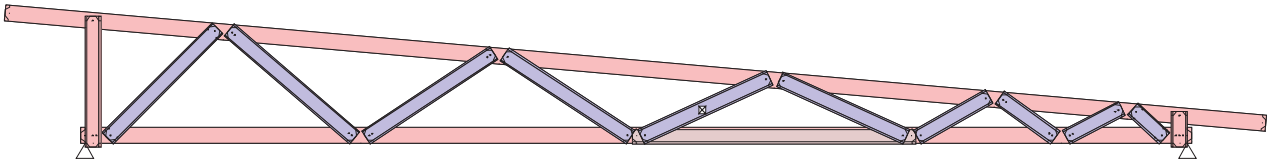
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:50:58



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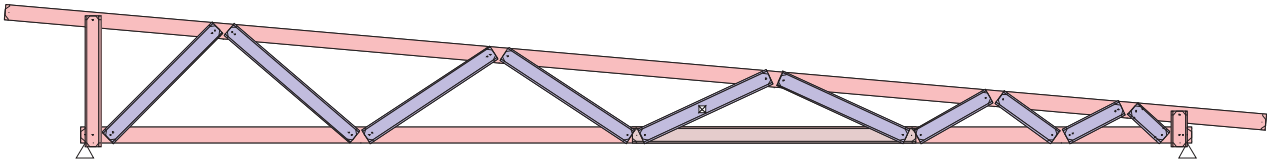
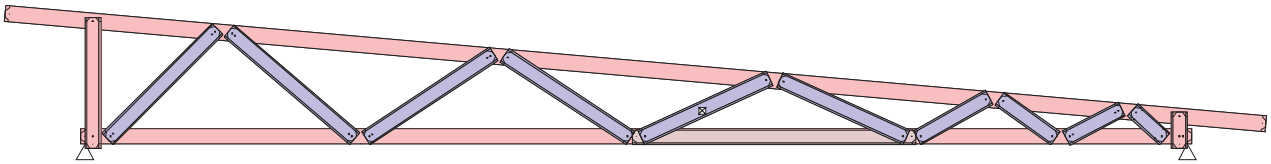
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:50:58



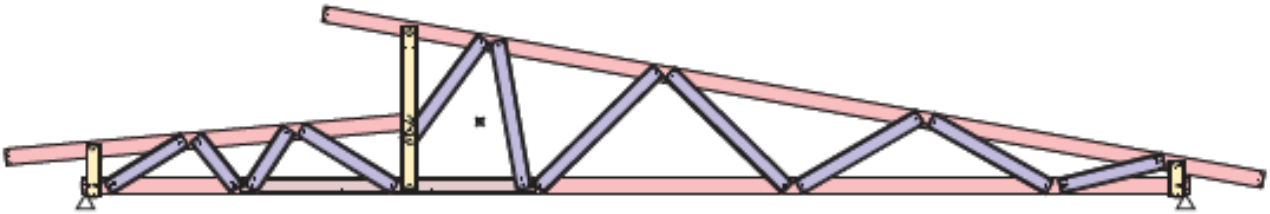
TRUSS:T003, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:50:59



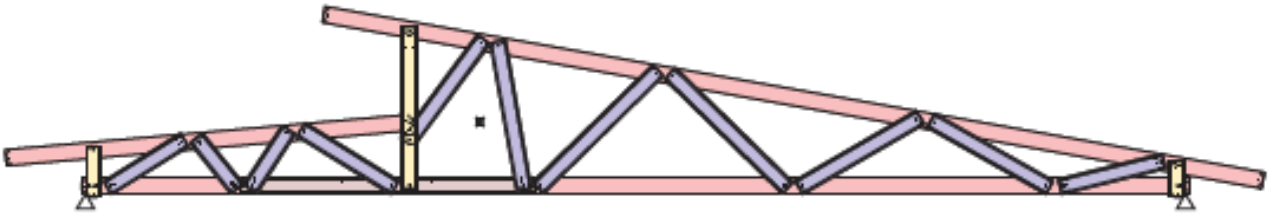
TRUSS:T004, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:50:59

11.2 Sample Double Skillion Truss Layout

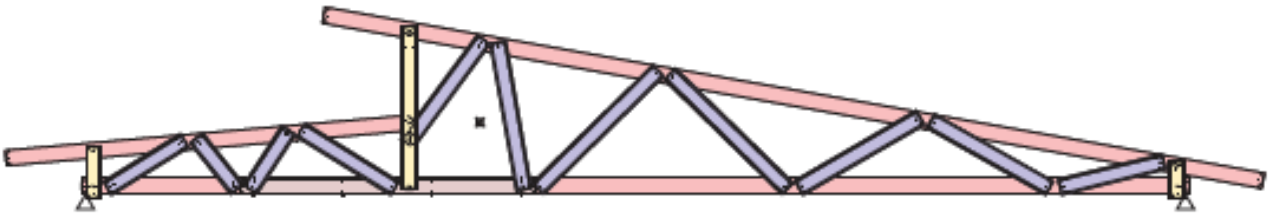
DIAGRAMATIC ONLY - NOT TO SCALE



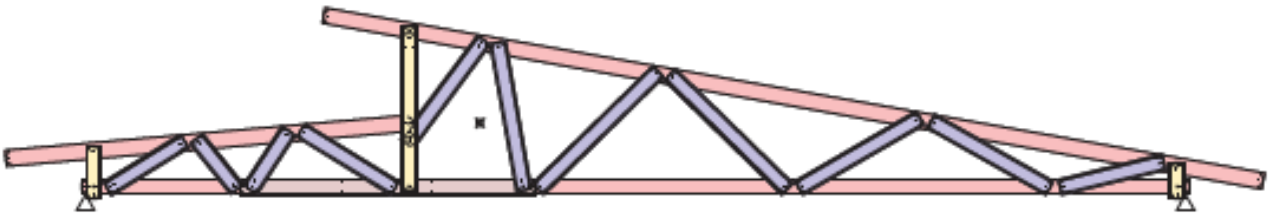
TRUSS:T001, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:21:51



TRUSS:T002, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:21:51



TRUSS:T003, SPAN=6270
Endurocadd 9.001-26 ENDUROTRUSS 02-05-2014 14:21:51



TRUSS:T004, SPAN=6270
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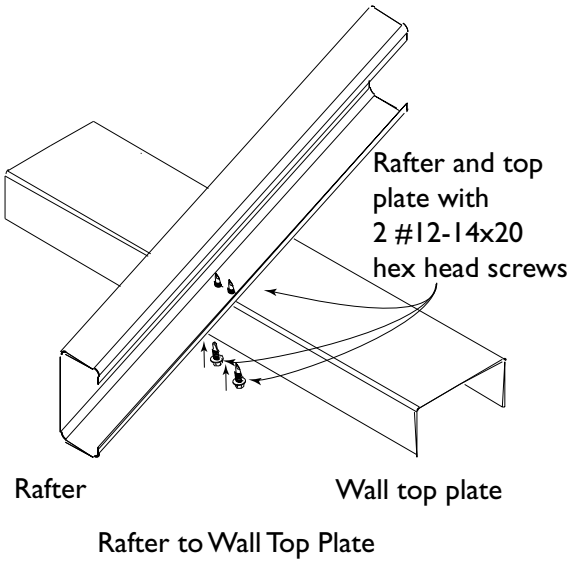


Figure 11.3 Common Rafter/creeper rafter to wall top plate using screws

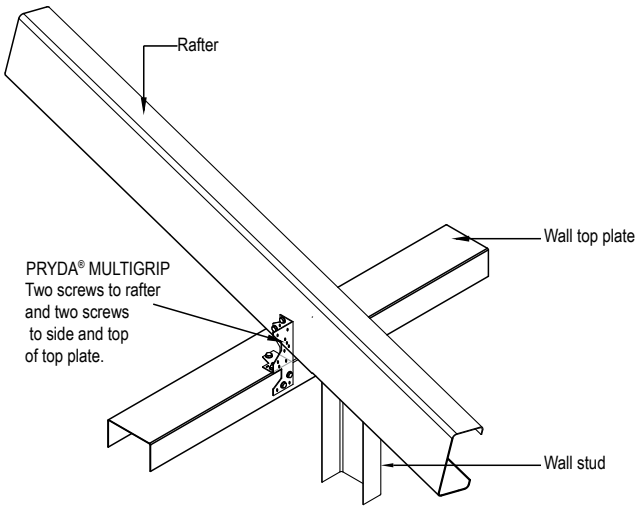


Figure 11.4 Rafter to wall top plate using Pryda®
Multi-Grip Plate transition bracket may also be used as shown in Fig. 7.2.2b

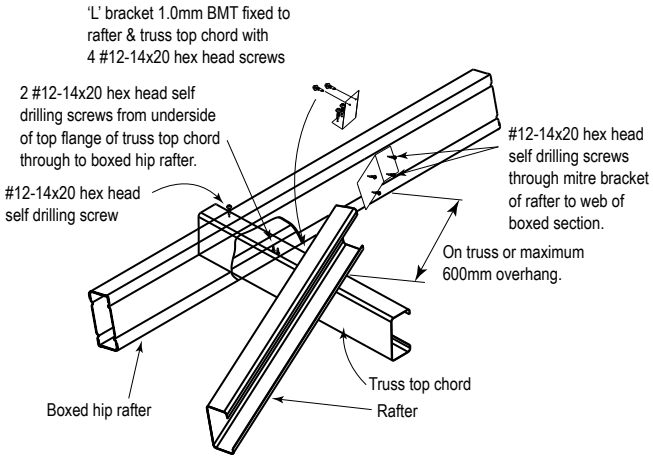


Figure11.5 Hip/creeper rafter connection

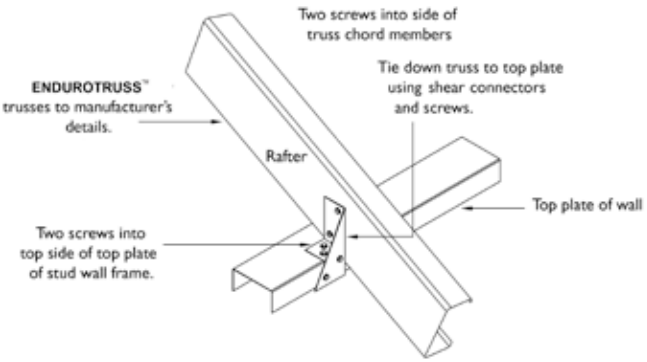


Figure 11.6a Rafter to wall top plate using Pryda® Triple-Grip shear connector

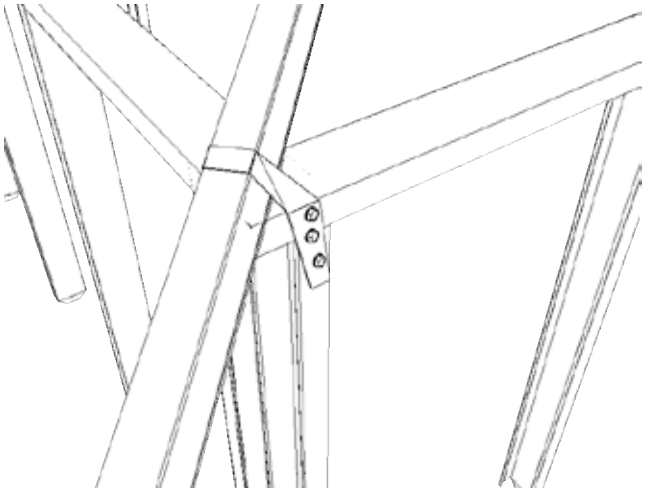


Figure 11.6b Hip rafter tie down using 1.2 x 30mm strap over hip rafter attached with 3x12-14x20 hex head fasteners

7.5 Type 1 Hip construction

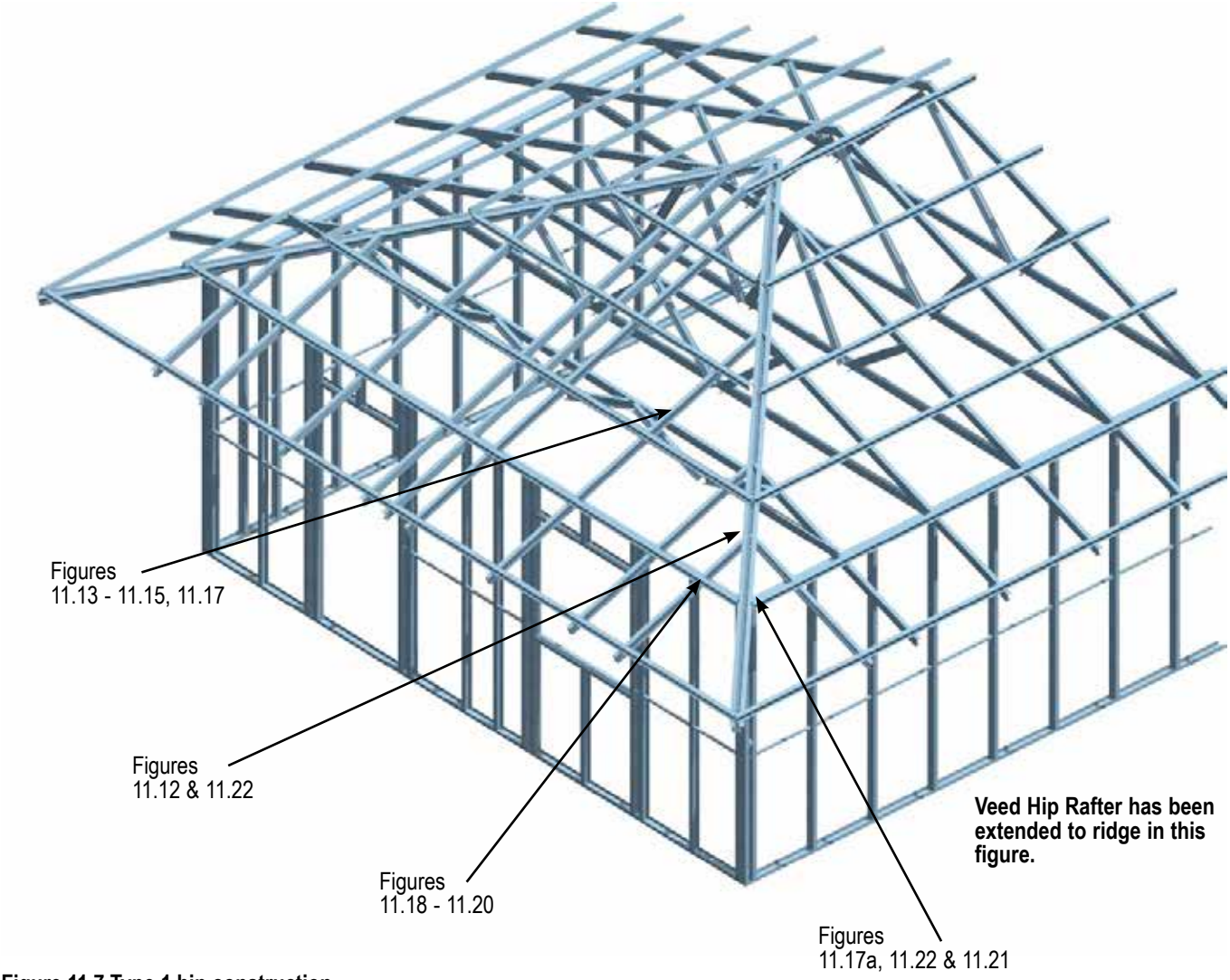


Figure 11.7 Type 1 hip construction

Standard ENDUROTRUSS® Framing System hip end trusses (Type 1 Hips) are generally placed parallel to and at the same spacing as the main roof trusses. The following procedures apply to Type 1 Hip Roof construction.

STEP 1: Study the entire set of architectural and fabrication drawings.

STEP 2: Set out and mark truss positions.

STEP 3: Install fixing brackets to support structure in marked positions.

STEP 4: Lift trusses into position, ensuring the webs of the trusses face the hip end wall.

STEP 5: Stand the first station truncated truss in its set-out position and, fix two #12-14x20mm hex head self drilling screws through the fixing bracket at each heel connection into the truss Chord. If erection screw positions clash with truss manufacture fasteners remove these screws and replace with the erection screws through the bracket and into the chords in the same location.

STEP 6: Temporarily brace the truss and ensure it is plumb and straight. This can be done using batten or roof bracing material fixed to the end wall and to the horizontal top chord of the truss.

STEP 7: Repeat Steps 3 and 4 when installing the second, third and subsequent station truncated trusses until all truncated trusses are positioned in accordance with the roof layout.

STEP 8: Hip rafters are provided at hip ends to support roof battens and creeper rafters. There are 3 types of hip rafter options available in the ENDUROTRUSS® system. Note that the trusses will align with the top chords of the truncated trusses via dimple holes that are punched in both the rafters and truncated trusses.

A Boxed Hip Rafter extends from the fascia corner at the eaves to the end of the hip line. It may be fixed to another hip rafter as shown in Fig. 7.12. Depending on the cladding material and wind loads the fixings of the hip rafter may vary. For tile roofs, 2 screws are placed through the truncated top chord into the hip rafter as shown in Fig. 7.14 & 7.15. For bottom of hip rafter, a shear connector is used as shown in Fig. 7.19 and Fig. 7.20.

A Veed Plate Hip Rafter do not continue to the ridge line. The inner channel of the Vee extends from the fascia line to just past first structural truss. The outer channel of the Vee stops short of the first structural truss so that it does not clash with any members of this truss such as the horn, and can be supplied as a standard part. The hip rafters are fixed with 2 #12-14x20 hex head screws from underside of wall top plate through the hip rafter flange.

STEP 9: Creeper rafters are generally designed to extend from the top chord of the truncated truss adjacent to the knee connection, to the fascia line running perpendicular to the truss. Mark the overhang length on the jack rafters using the truss overhang as a reference. Position the rafter with the correct overhang and in the location shown on the layout. Ensure the common truss spacing is not exceeded in setting the rafter positions. Fix to the truss top chords 11.13 to 11.15 and the external wall top plate in accordance with Figs. 11.18 to 11.21. Continue to install all creeper rafters until the hip end is complete.

STEP 10: Creeper rafters are supported by the hip rafter and the external wall. They are generally short rafters near the corner of the building. Ensure sufficient back span is provided to give the installed rafter sufficient strength. Mark the overhang length on the creeper rafters as per the jack rafters. Install the creeper rafters in the locations shown on the layout drawing fixing to the creeper rafter and the wall top plates as shown in Fig. 11.18 to 11.21. Fix creeper rafter to hip rafter as shown in Fig. 11.10 to 11.22.

NOTE: When all trusses are erected, install wind bracing as specified in Section 11.9 Roof Bracing.

Figure 11.8 Installation of a Type 1A hip truss

Figure 11.9 Type 2 Hip Construction

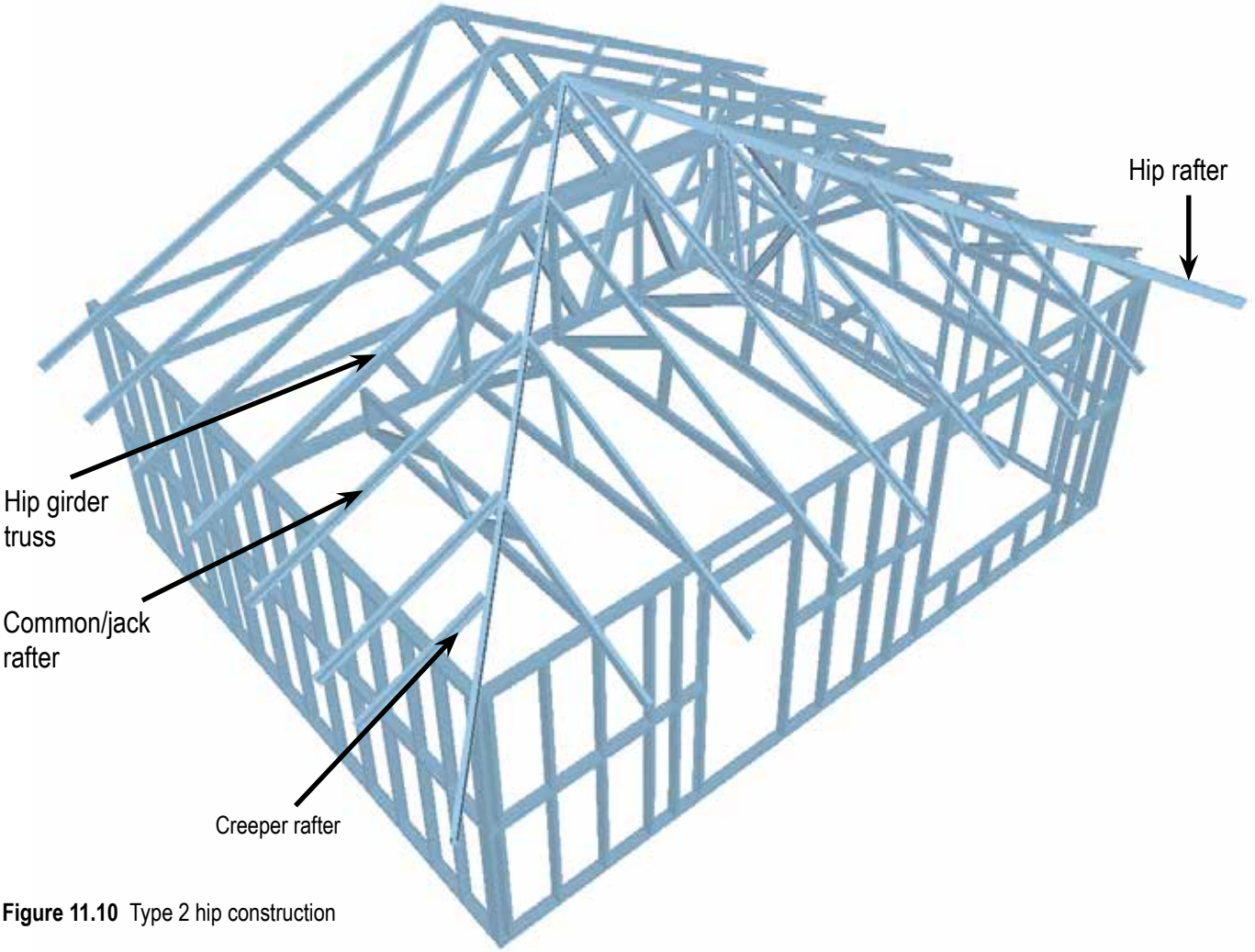


Figure 11.10 Type 2 hip construction

A hip end Girder truss on some large span roofs may be selected. These trusses run parallel to the main roof trusses and pitch half trusses or rafters off this Hip Girder. This is called a Type 2 Hip. The following procedures apply to Type 2 Hip roof construction.

STEP 1: Study the entire set of architectural and fabrication drawings.

STEP 2: Set out and mark truss position as per Section 7.2. Mark Bridge Truss positions on the Hip Girder Truss bottom chord. If the hip girder is a double truss, ensure that the bridge truss location is marked on the correct truss as specified in the girder truss fabrication sheet.

STEP 3: Install fixing brackets to the wall top plates to fix girders, bridge trusses and rafters in marked positions.

STEP 4: Lift girder trusses into position. Note the bottom chord of the Girder trusses is always boxed and that the flat face of the girder faces the hip end wall. If the hip girder is a double truss, install the first ply of the girder truss that is closest to the hip end wall.

STEP 5: Stand the hip girder trusses in its set-out position and fix two #12-14x20mm hex head self drilling screws through the fixing bracket at each heel connection into the truss chord. If erection screw connection clash with truss manufacturer fasteners, remove these screws and replace with the erection screws through the bracket and into the chords in the same location.

STEP 6: Temporarily brace the trusses and ensure that they are plumb and straight. This can be done using batten or roof bracing material fixed to the end wall and to the Horizontal top chord of the truss.

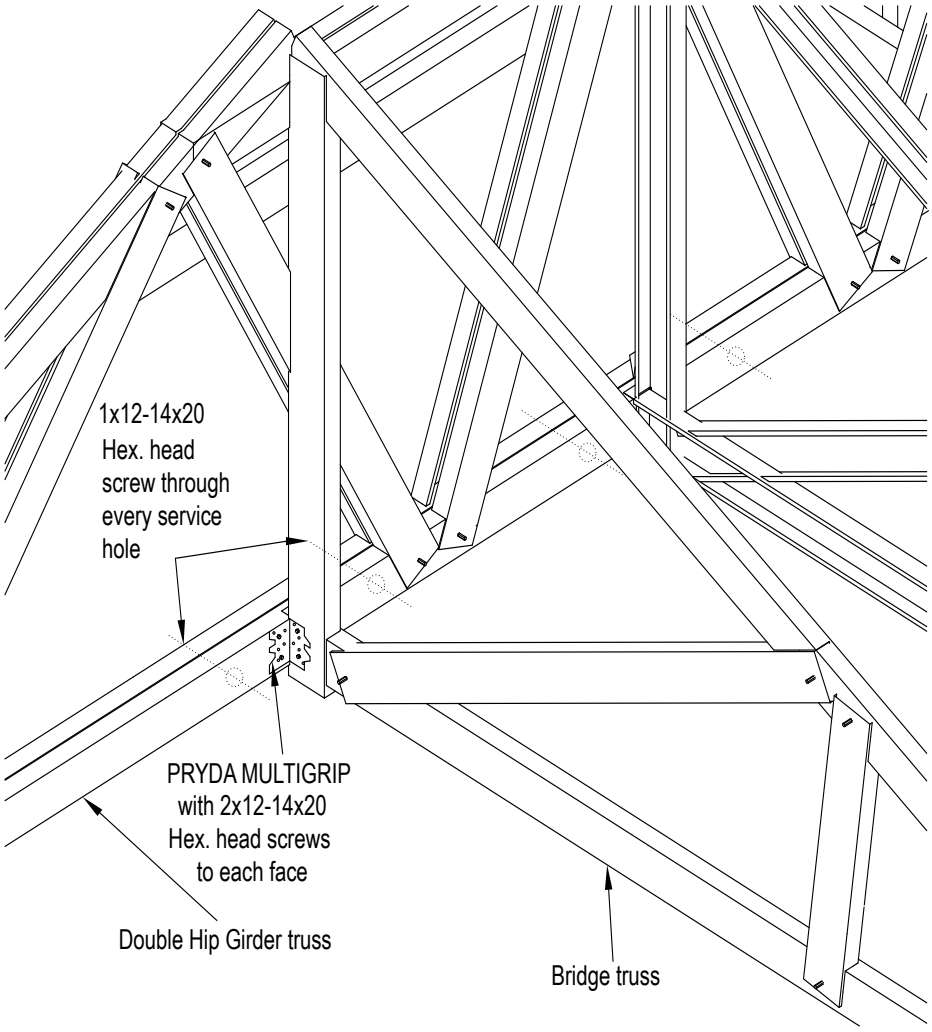


Figure 11.12 Bridge truss to hip girder truss connection

STEP 7: Bridge trusses are designed to span between the hip girder and end wall. Position bridge trusses at the locations marked on hip girder truss bottom chord and wall top plate. Install bridge trusses (half trusses) and fix to the external wall top plate using the tie down specified. Refer to section 7.8 for tie down options. Fix the bridge truss to the top chord of the girder truss with 2/12-14x20 screws through the web of top chord into the end vertical web of the bridge truss.

Fix the bridge truss to hip girder bottom chord as shown in Fig. 11.15. Using a mulitgrip fixed with 2x12-14x20 hex head scews. The tab on the bottom chord may need to be cut or bent for fixing. Ensure bridge truss spacing is not exceeded.

STEP 8: A single girder truss can be installed using either a 25 x 5mm strap tie down or a 50 x 50 x 3mm angle tie down as is shown in Fig 11.13) or 11.14. Install the second ply girder truss (if applicable) with the toes of both trusses facing each other and fix it to the brackets as shown in Fig 11.14 or 11.15. Install 1x12-14x20 Hex Head screws through EVERY service hole provided on the bottom chord to connect the two trusses together as shown in Fig 11.14 & 11.15.

STEP 9: Refer to step 8 of section 7.4.1 for hip rafter installation. In case of Veed Rafters, the difference is that the shorter rafter is located on the inside of hip while the longer rafter (supported by the truncated truss) is on the outside of the hip.

STEP 10: Refer to step 9 of section 7.4.1 for common / jack rafter installation.

STEP 11: Refer to step 10 of section 7.4.1 for creeper rafter installation.

NOTE: When all trusses are erected, install wind bracing as specified in Section 7.9 Roof Bracing.

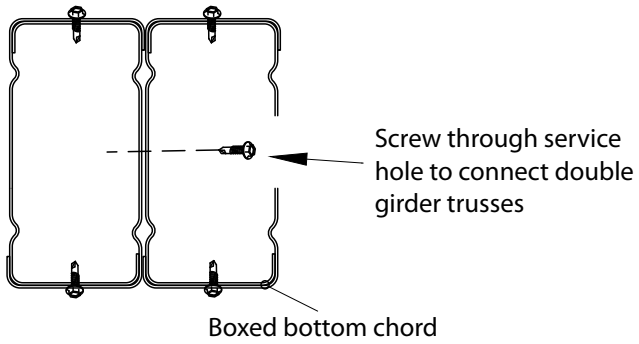


Figure 11.13) Connection between double girder trusses

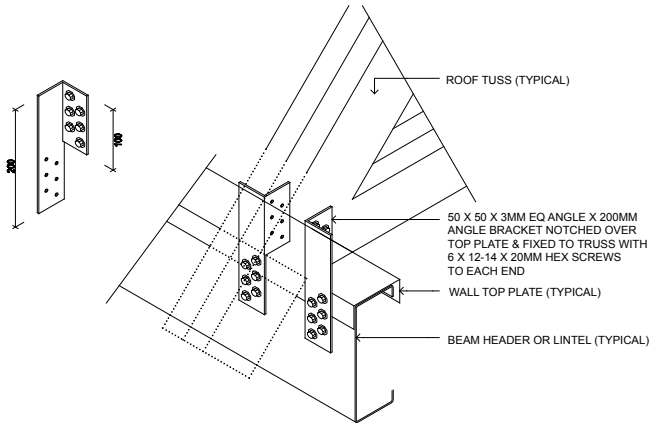


Figure 11.14 Girder truss to wall top plate connection using angle brackets

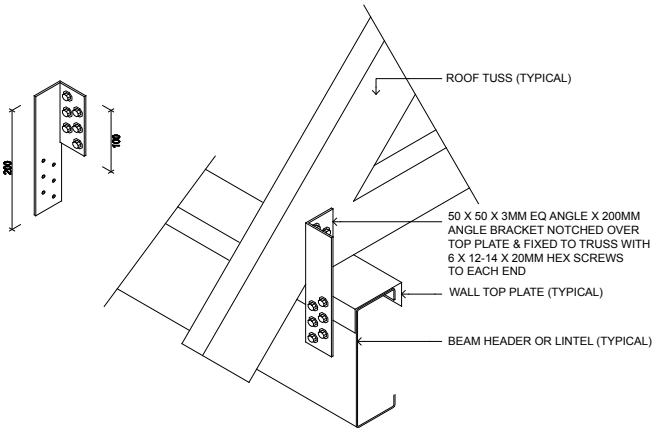


Figure 11.15 Single girder truss to wall top plate connection using angle tie downs

12.0 Truss Assembly

12.1 Backyard Shacks™ structures marking and branding

All Backyard Shacks™ structural parts are coded with information to assist erectors in the assembly process. This matches the part information shown on the assembly drawings.

All Backyard Shacks™ structural parts are coded with the following:

Part Number, Truss Number, Job Name/Number, Part Length, and Part Usage. They also contain the rollformer number and date of manufacturing for traceability purposes

With this information, erectors can identify what the part is and where it is intended to be used in the structure. The illustration below shows how the coding works:

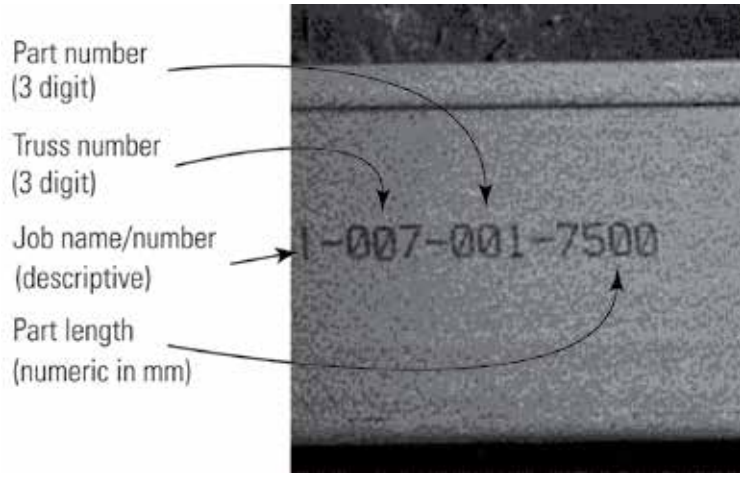


Figure 12.1 Marking and branding

So the above example illustrates that this member is for Job Number 1, it is part of truss number 7 (as numbered by the software in the construction drawings), it is part number 1 and is 7500mm in length.

12.2 Chord to chord connection identification

Connections are identified on the truss assembly sheet by a connection code. The connection detail is displayed on a Backyard Shacks™ connection sheet showing all the connections used in the specific job. The chord to chord connection code is displayed next to the connection on the assembly sheet. (Refer Figure 12.2.)

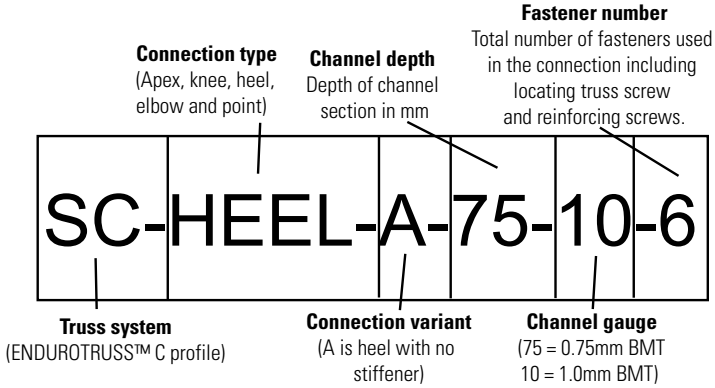


Figure 12.2 Connection identification

The Connection code is explained using the following example

Example	SC-HEEL-E1-90-10-7
Field 1	The truss system- in this case Backyard Shacks™ C profile
Field 2	The connection type - Options: APEX KNEE, HEEL, ELBOW and CHORD POINT
Field 3	The Connection- Type E1 is a heel for a tiled and sheet roof
Field 4	The depth of the channel section
Field 5	The gauge of the channel - 10 is 1.0 BMT and 75 is 0.75 BMT
Field 6	The number of fasteners used in the connection. Includes any purlin bolts, locating truss screw, reinforcing screws or stiffener connection fasteners.

12.3 Fasteners

Truss members are joined together with two types of fasteners.

A locating Trusstite truss screw which is a hex-head fasteners with a trilobular thread for fixing through pre-punched holes and a #12-14x20 hex-head self drilling reinforcing fasteners. Fasteners should always be supplied by the manufacturer of the trusses and be in accordance with the specifications described in the ENDUROFRAME® Design Manual for mechanical and coating properties. All fasteners should have a minimum Class 3 coating. The specifications of the locating Trusstite truss screw may be either a:

- #17-15x15 hex. head or
- 5/16"-12x17 hex. head screw

The use of the correct fasteners in the quantities shown in the truss fabrication drawings are essential to ensure the design capacity of the trusses are achieved.

The following illustrations show the typical steps for assembly of a truss. In this example the webs are linked for ease of locating the parts.

12.4 Backyard Shacks™ framing assembly

The following illustrations show the typical steps for assembly of a truss.

Step 1 - Identify Parts

Step 2 - Layout Chords

Step 2 - Truss Layout & Chord Assembly

Identify the chords and lay toes down on a level surface or assembly table and align as per assembly drawing. The chords should be pre-notched allowing parts to overlap as shown. Pre-punched holes are provided for locating truss screw to connect the chords at the apex, heel and knee.

Note: branding is on the side flange which will be on the inside of the truss chords which can aid in laying out.

Step 3 - Align holes, fix at heels and install a locating truss screw

Step 4 -Fix at apex or knee and install a locating truss screw

Align notch holes as shown and install a locating truss screw in holes.

Step 5 - Web Installation

Separate linked webs by cutting or snapping pieces apart. If webs are joined they will be attached in the order required for assembly (Left to right). Snip or snap the webs apart and position each one over the truss chords near their final location. Where flush truss is being used (as in this example), the branding on the webs will face towards the top of the truss and toes of the channel will face down. For a non-flush or back to back truss the flanges of the webs face up and no notches are provided at the web ends.

Step 6 - Align holes and fix connection with a locating truss screw.

Using part identifier numbers layout the webs in accordance with the Assembly Sheet. Line up the 6mm locating holes on the ends of the webs with the appropriate holes on the truss chords. If a “flush” truss is being installed the flanges of the web are to face downwards in line with the truss chords Install a locating truss screw into the aligned holes ensuring that the screw is driven firmly home and does not strip. Should the locating truss screw strip, reduce the driver torque and place a 12-24x20 self drilling screw 20mm minimum from the locating truss screw.

Finished connection (unreinforced)

Finished knee web connection (unreinforced)

Step 7 - Overall Quality Check

Before inserting any stiffeners or reinforcing screws check the overall dimensions of the truss against the Assembly Sheet. For a complex shape truss, lay it on top of a previously assembled one and check they are the same.

12.5 BackYard Shacks™ splicing

Large span trusses may be too large to economically transport and components may be too long to rollform and handle through the manufacturing workshop. The detailing software allows the Trained Software User to set a maximum component length. Where this length is exceeded the software will create a splice to subdivide the component.

The splice will be located between truss panel points and close to the centre of the panel.

The 2 bottom chord members connect using the standard notched end as shown in Figure 6.3.

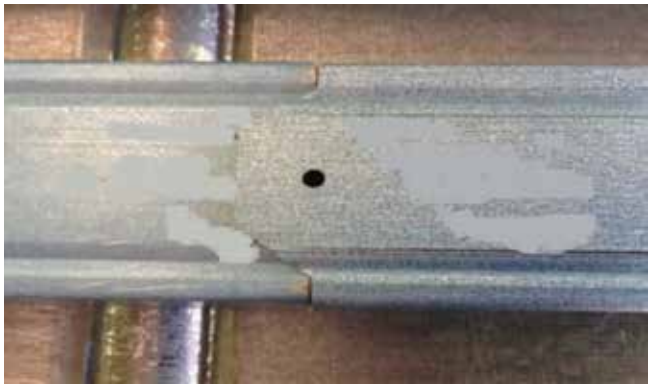
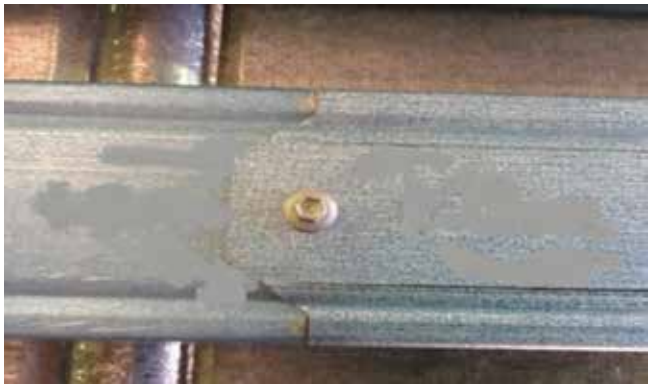


Figure 12.3 Bottom Chord connection at splice



After the chords are connected, a boxing piece is placed over the chords and fixed with 12-14x20 self drilling screws following the connection details in Figure 6.4.

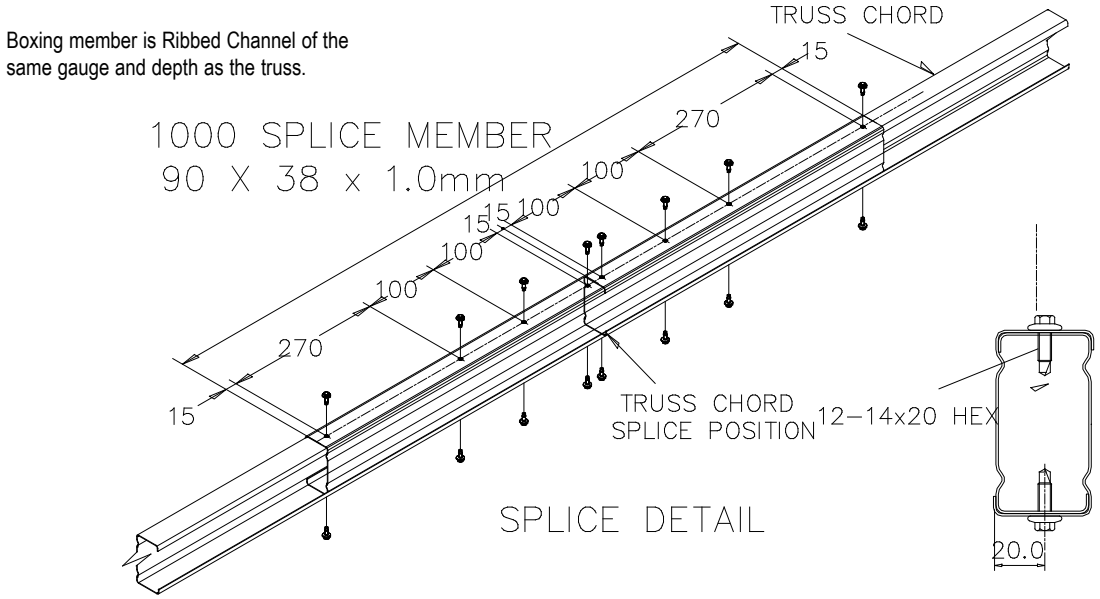


Figure 12.4. ENDUROTRUSS Splice Details

12.6 Backyard Shacks™ frame stiffening and reinforcement

Refer to the connection drawing and the assembly drawings to identify reinforcing screws and stiffeners required to complete truss assembly. Primary fixing screws are self-locating Trusstite screws fastened through pre-punched holes, while reinforcing screws are #12-14x20 hex-head self-drilling fasteners, without washers. Stiffening screws should be installed a minimum of 21mm from each other and the locating screw and a minimum distance of 10mm from the edge and 17mm from the end.

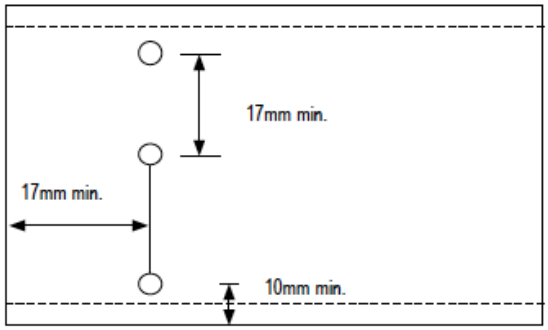


Fig 12.5 Stiffening screw distances

From the appropriate connection drawing, identify the location and type of stiffener and/or the screws required. Install as shown on the drawing.

Different stiffeners are specified for various loading and geometry.

12.6.1 Web stiffening

Identify webs requiring reinforcing screws by referring to the code printed on the part or the truss assembly drawing. For example 030-3 refers to three fasteners required on each end of web 030. For larger trusses and flush, an additional screw may be placed in unreinforced webs to strengthen the trusses in the horizontal plane during handling, although they are not required for structural purposes. The position of the additional screw is as shown in Step 6 of Section 12.3.

12.6.2 Apex stiffening

Identify the number and location of reinforcing screws required for chord to apex plate connection by referring to the connection drawing for the apex type. The range of apex stiffening options are shown in Table 12.1.

For example SC-APEX-E1-75-10-5 means to install one locating truss screw and four number #12-14x20 hex head screws.

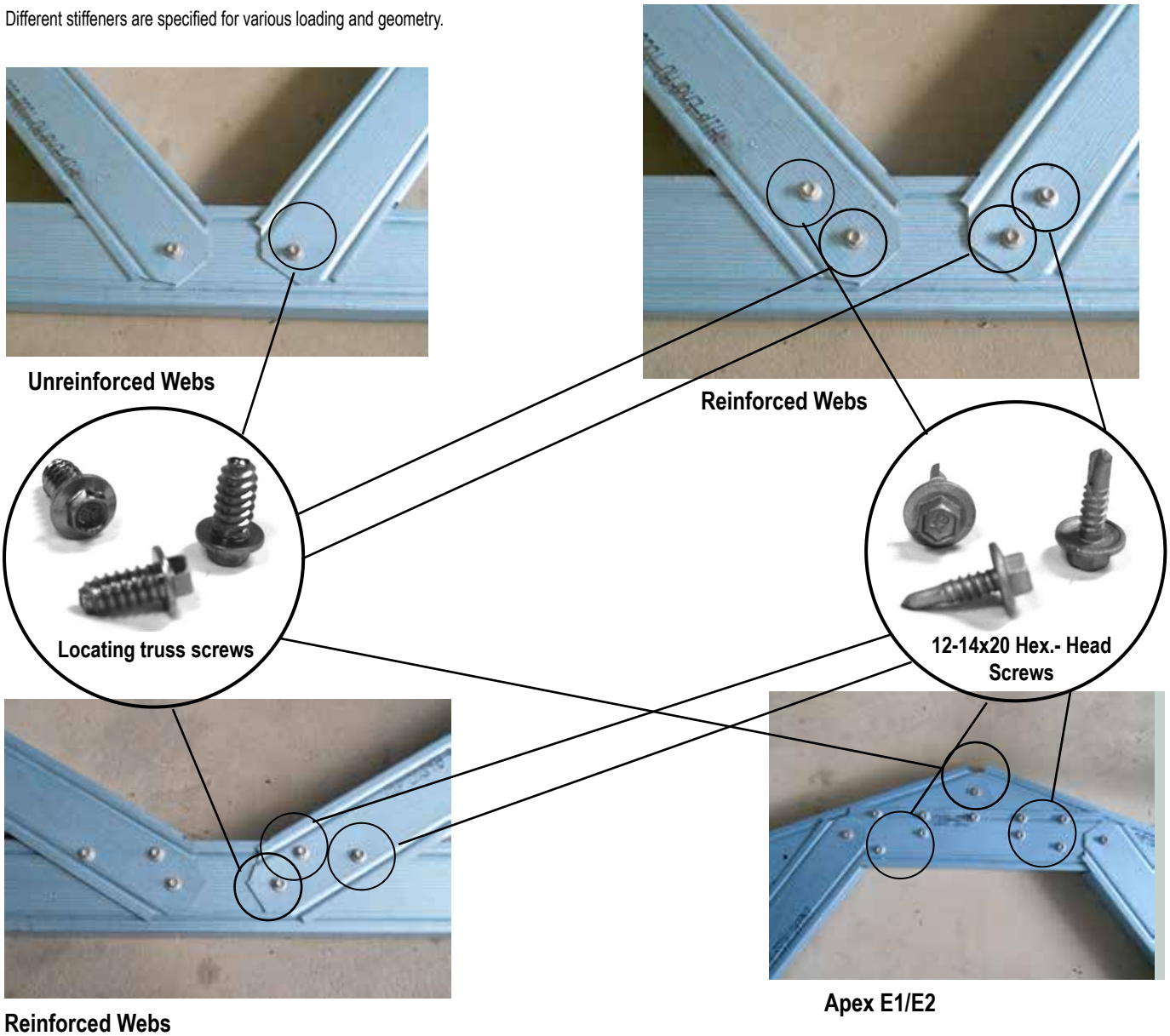
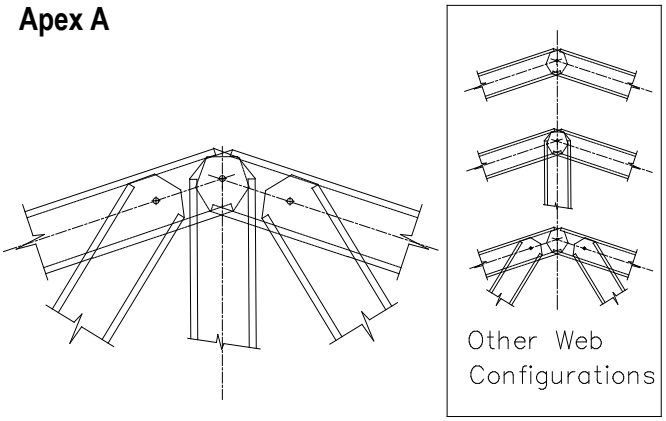


Fig. 12.6 Connection details

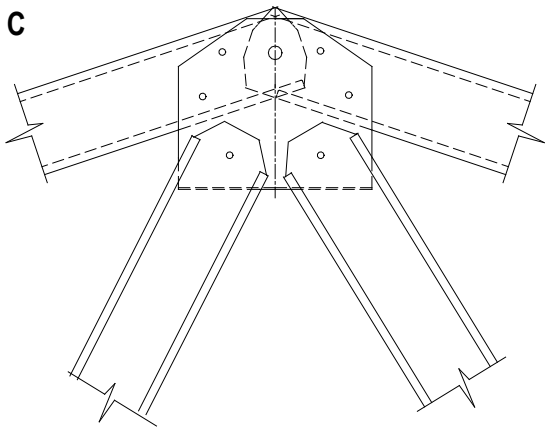
Table 12.1

Apex A



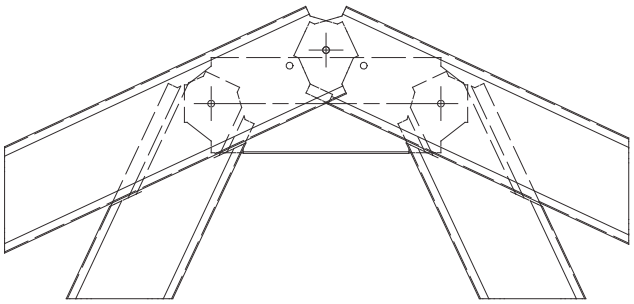
No stiffeners or plates and a single Trusstite connection

Apex C



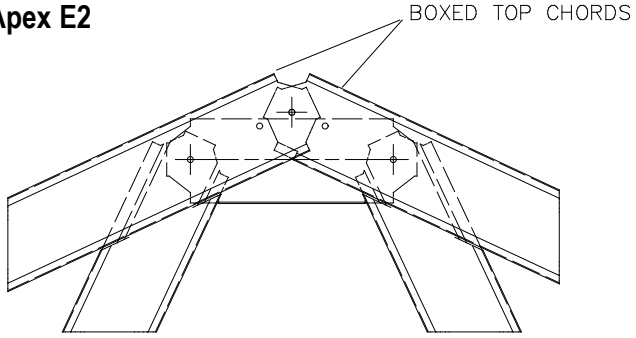
Standard apex plate connection

Apex E1



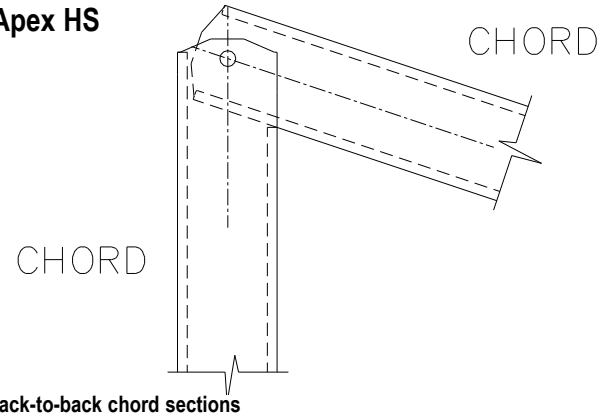
Notched C stiffener plate across apex with webs connected to top chord

Apex E2



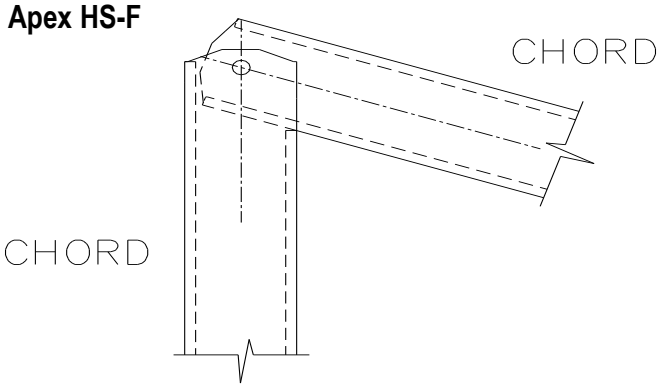
Notched C section with boxed top chords

Apex HS



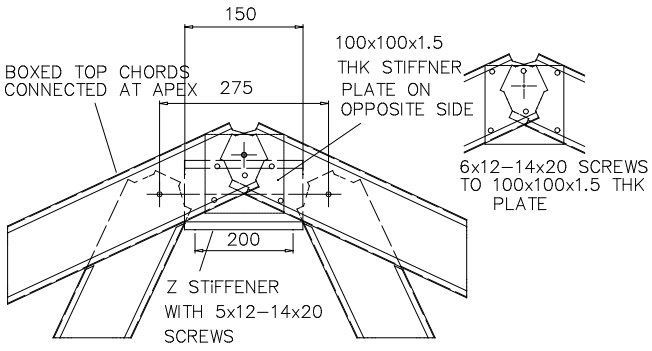
Back-to-back chord sections

Apex HS-F



Flush chord connection

Apex F

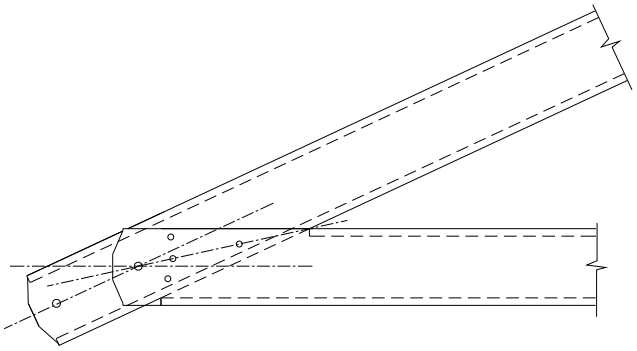


200mm long Z section over 125 x 125mm x 1.5mm stiffener for 90mm section or 100mm x 100mm x 1.5mm stiffener for 75mm section

12.6.3 Heel Stiffening

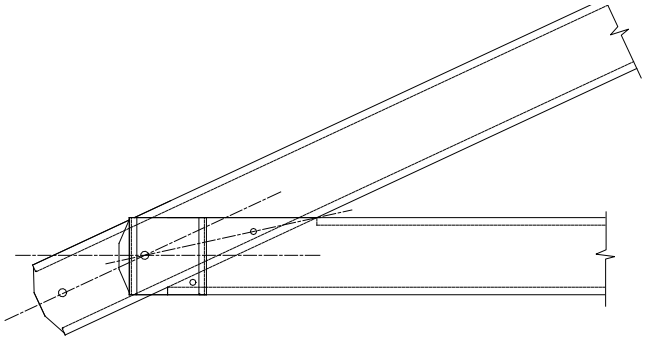
A range of heel stiffeners are available to enhance truss capacities and are changed depending on whether a truss or sheet roof is being used. From the appropriate connection drawing, identify the location and type of stiffener and/or the screws required. Install as shown on the drawing.

Heel A



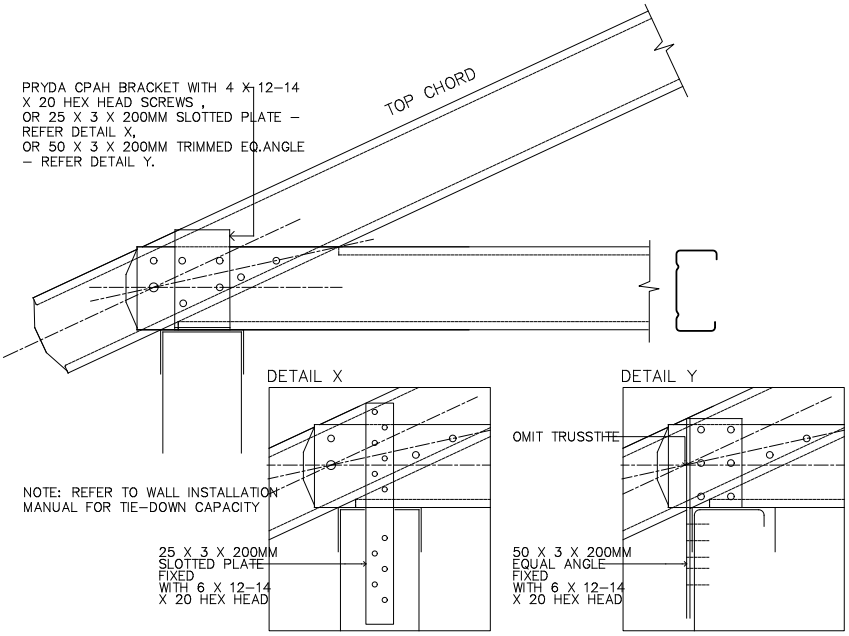
Heel Connection with no stiffener or brackets. Used for lower span tile roof and low wind areas sheet roof

Heel B



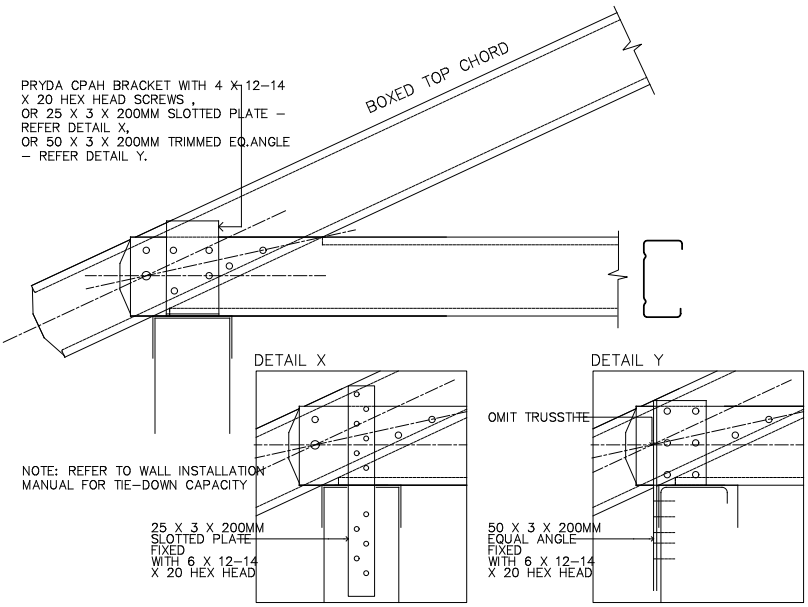
Heel Connection with vertical channel stiffener. Stiffener increases bearing capacity of connection

Heel E1



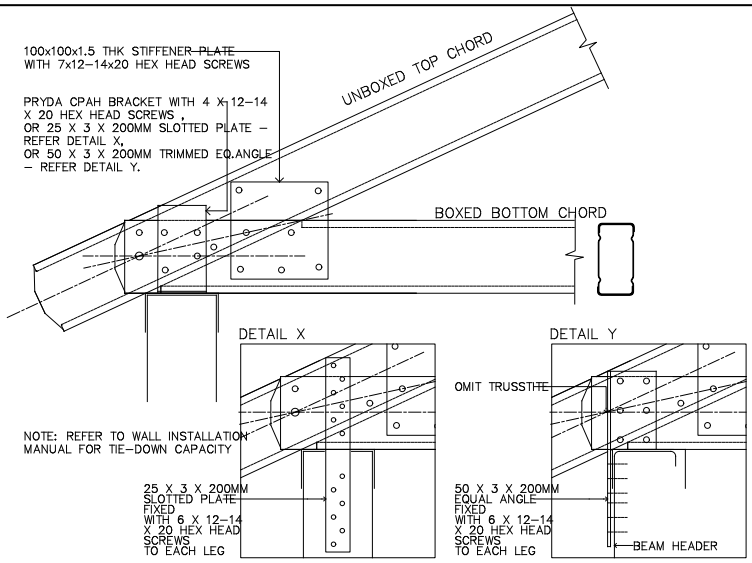
Heel strengthened with CPAH bracket, 25 x 3 x 200mm plate tie or 50 x 50 x 3 x 200mm equal angle tie

Heel E2



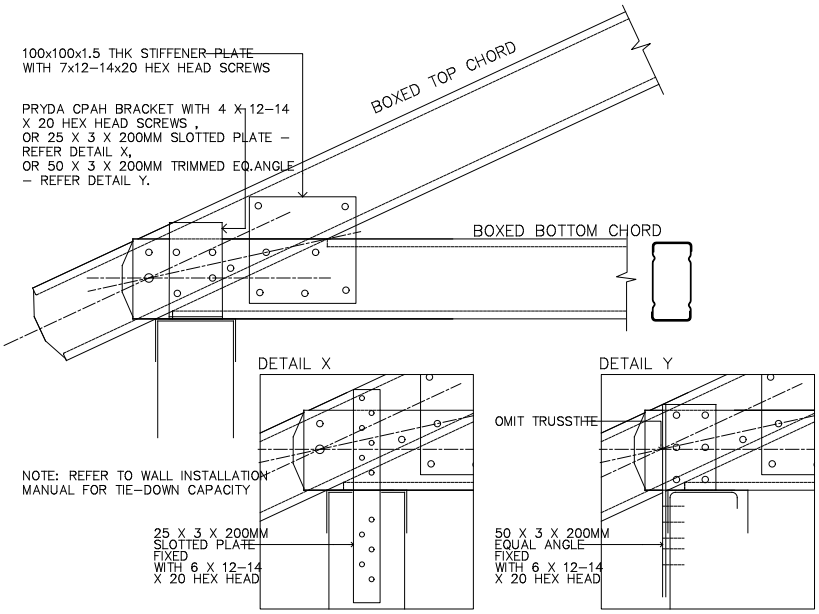
Heel strengthened with CPAH bracket, 25 x 3 x 200mm plate tie or 50 x 50 x 3 x 200mm equal angle tie, with a boxed top chord

Heel F1



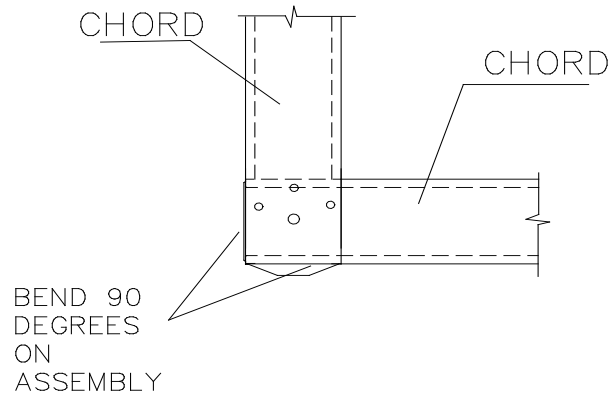
Heel strengthened with CPAH bracket, 25 x 3 x 200mm plate tie or 50 x 50 x 3 x 200mm equal angle tie and 100x100 x1.5mm plate for 75mm truss and 125x125x1.5mm for 90mm truss

Heel F2



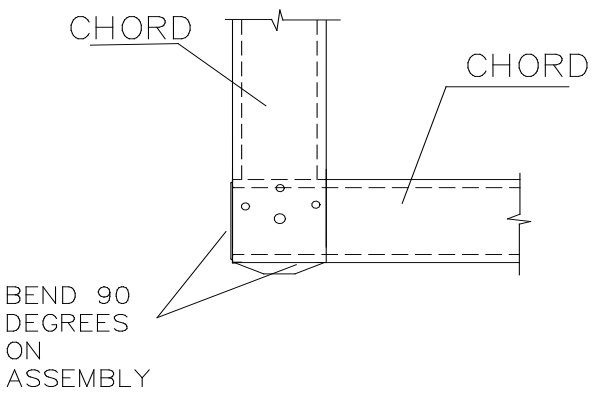
Heel strengthened with CPAH bracket, 25 x 3 x 200mm plate tie or 50 x 50 x 3 x 200mm equal angle tie, and 1.5mm plate with a boxed top chord 100 x 100 x 1.5mm plate for 75mm truss and 125 x 125 x 1.5mm for 90mm truss

HEEL HS



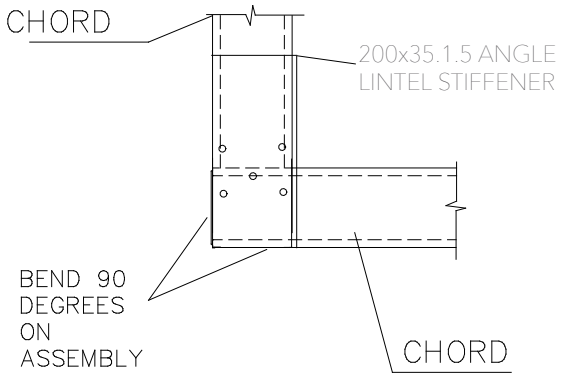
Half Truss Heel where the vertical member is designed as a Chord

HEEL HS-F



Half truss Heel where the end member has chord attributes and is flush

HEEL HSA-F-5-A



Stiffened version of the HS-F connection using a 200x35x1.5mm lintel section

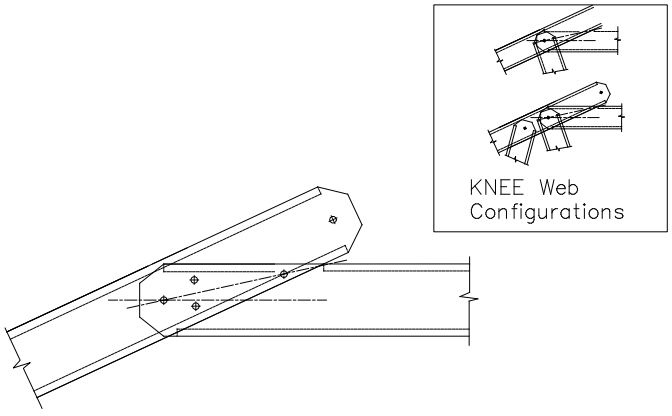
12.6.4 Knee Stiffening

From the appropriate connection drawing, identify the location and type of stiffener and/or the screws required. Install as shown on the drawing. The 35 x 35 x 200 x 1.0mm angle stiffener is provided for high compression knee connections (Knee Type D) or a 125mm x 125mm x 1.5mm plate (Knee Type E).

Summary of Knee Stiffeners is below in Table 5.

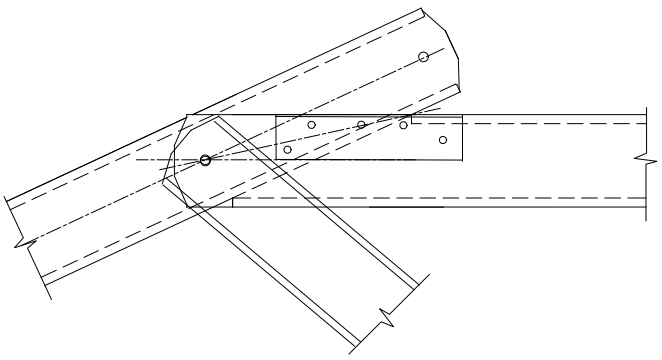
Table 5

Knee A



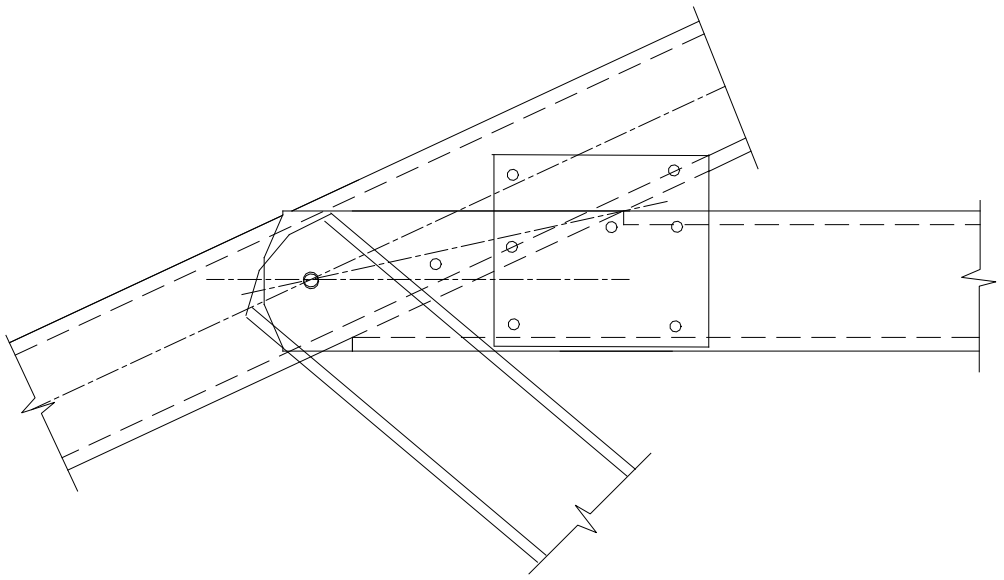
Unreinforced knee

Knee C



Horizontal 35 x 35 x 1.0mm angle stiffener, 200mm long

Knee E

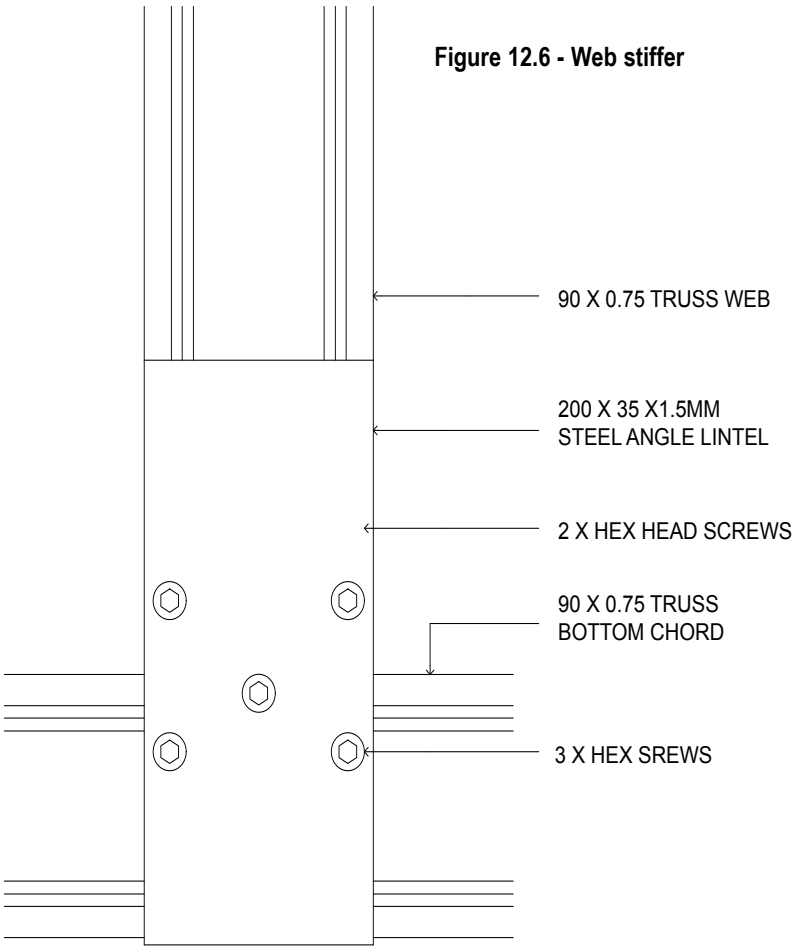


Knee strengthened with 1.5mm plate to top chord preventing buckling
Use 100 x 100 x 1.5mm plate with 75mm chords
Use 125 x 125 x 1.5mm plate with 90mm chords

12.6.5 Web Stiffening

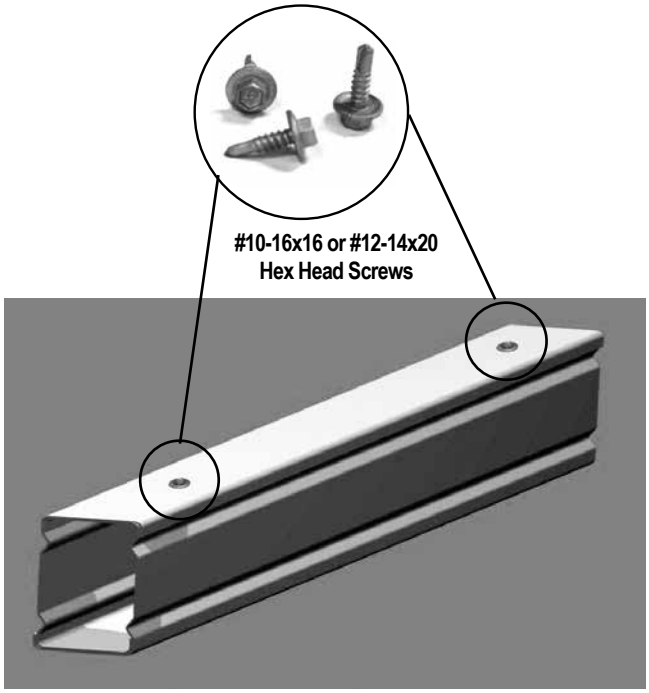
Web stiffening may be required when flush truss is selected to increase the strength of the web in compression. This is done with a 200 x 35 x 1.5mm angle lintel, minimum 90mm long with the nominated number of fasteners into the connection as is shown in the figure below.

Figure 12.6 - Web stiffer



12.6.6 Chord Boxing

Where called for in the Assembly Sheet, chords are to be boxed using supplied boxing channel. Boxing is to be fixed to the chord using #10-16x16 or #12-14x20 hex head self drilling screws through each flange 50 mm from each end of the boxing and at 600 mm nominal centres along the boxing.



Chord Boxing

12.6.7 Web Boxing

Where called for in the Assembly Sheet, webs are to be boxed using supplied boxing channel. Boxing is to be fixed to the web using #10 -16x16 or #12-14x20 hex head self drilling screws through each flange 50 mm from each end of the boxing and at the centre of the web.

13.0 ROOF CONSTRUCTION

13.1 General and design

ENDUROTRUSS® Framing System roof trusses have been designed to engineering standards and it is essential that to perform, as designed, they are handled, erected and braced correctly. The following recommendations apply to roof trusses on standard domestic and light commercial buildings.

The trusses are designed by the ENDUROCADD® design software to suit the specific roof and ceiling geometry and loads applicable site conditions. Additional loading such as Solar Units, Hot Water Tanks, Air Conditioning, etc. require special consideration at the time of design and the placing of these additional loads must be referred back to the designer.

Wind load is an important factor in the design and performance of roof trusses. Ensure that the correct design wind loads have been used and that the tie down of trusses to the wall structure is carried out in accordance with the construction documentation.

13.1.1 Prior to construction

Before commencing roof construction:

Check the support structure in particular the plan dimensions, the plumb and level of the support structure, the straightness of the supporting walls or beams and that the structure is adequately braced, stable and tied down. Rectify support structure if found deficient prior to proceeding.

Roof trusses must be inspected and any damaged parts must be reported immediately to ensure correct rectification. Approval for site rectification should be obtained from the truss manufacturer.

Check that the ENDUROCADD® software generated truss layout matches the building and that all truss set-out dimensions and truss identification marks have been provided.

Roof Truss Numbering

During the detailing / fabrication process the roof trusses are numbered to accurately identify them. These numbers are shown on the roof truss layout and form part of the truss branding. Trusses may have identical shape but may differ in the web configuration or internal connections. Ensure that the correct truss is used in its specified location on the roof.

Safety

Ensure that all barriers or scaffolding used in order to comply with safe work practices are installed so as not to damage or overload roof components.

13.1.2 Internal load bearing

Where trusses are supported by internal walls, the truss web configuration will be designed to satisfy the load concentration at the load bearing point. Ensure that the truss is installed such that bottom chord to web connections are within 5mm to the support points. The builder should ensure that these loads are accommodated in the foundation design.

13.1.3 Fasteners

Generally for roof construction #12-14x20mm hex head self-drilling Class 3 screws are used for all structural connections. Use the recommended number shown on the drawings.

In connections, maintain a minimum fastener spacing of 17mm and minimum distance of 17mm to the end of sections and a minimum 10mm from the edge. Refer to software generated construction diagrams for fastener locations.

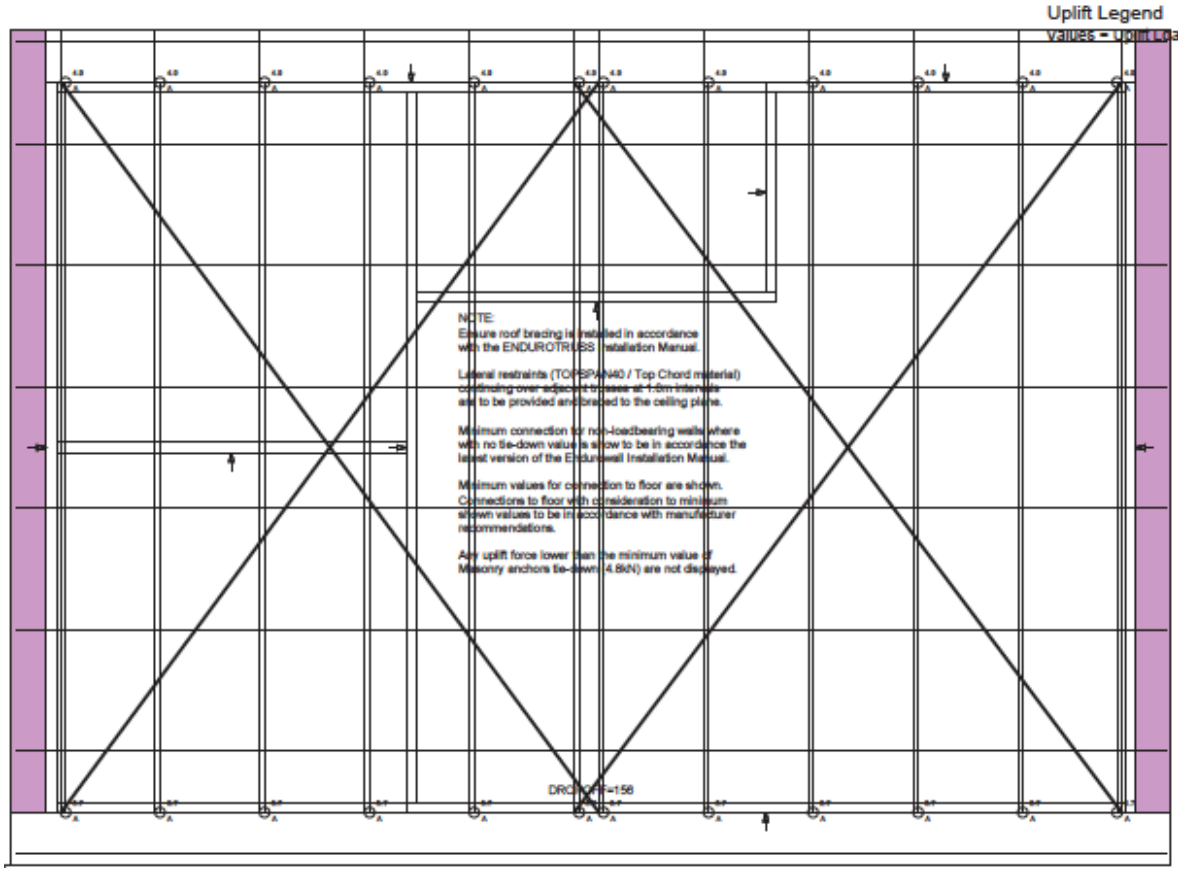


Figure 13.1 Truss layout drawing as generated by ENDUROCADD™.

NOTE: Truss orientation and Position
The layout drawings specifies the correct truss orientation.
The front of the truss is the flat (unlipped) face of the truss chord. Looking at the truss from this direction identifies the Left and Right hand truss ends. Ensure trusses are orientated as shown on the truss layout. Trusses must be positioned within 5mm from their specified position.

Refer to steel marking plan issued by your local Backyard Shack Dealer

13.2 Roof truss set-out

Prior to lifting any trusses into place, mark out the truss locations on the top wall plate, using the supplied Roof Framing Layout as a reference. The trusses may be aligned to load bearing studs. In cases where it is not aligned, sufficient capacity shall be provided for top plate using lintels or stiffeners. Check that design truss spacings have not been exceeded.

If trusses are fixed to the support structure using brackets these are often installed in the marked positions prior to positioning the trusses.

Alternatively service holes may be punched in the top plate above studs to which trusses are to be fixed. These service holes are to act as location points and allow a 25 x 3 x 200mm tie down strap to fit through and fix to the face of the stud.

It is generally best practice to install Girder trusses and Hip ends before proceeding with the installation of standard truss runs.

Whilst erecting roof trusses ensure that each truss is erected in the correct position, correctly orientated with chords aligned with the roof slopes and plumb (using a spirit level).

13.3 Gable End Construction

There are essentially three types of gable ends though some variations may be utilised with different wall and roof cladding types.

End support may be provided by using a gable end truss or by extending the end wall to the roof plane for batten support.

Where a gable end truss is used it is usually positioned just inside the end wall where the ceiling battens may be fixed directly to the truss bottom chord. Framing members are attached directly to the truss outside face to support the wall cladding. These framing members may consist of battens or wall studs and must be designed to span between the ceiling plane and the roof plane. Temporary bracing should be employed to maintain stability during erection. Ensure the truss is installed plumb and correctly positioned so that the external cladding line is maintained. Refer to Section 7.9.1 for temporary bracing.

If the gable end wall is extended to the roof plane to provide wall cladding support, the studs must be designed to span from floor to roof. If there is a ceiling plane below the roof plane then the studs must be fixed so as to transfer end wall wind loads into the ceiling plane.
Refer Fig. 13.2 for connection details.

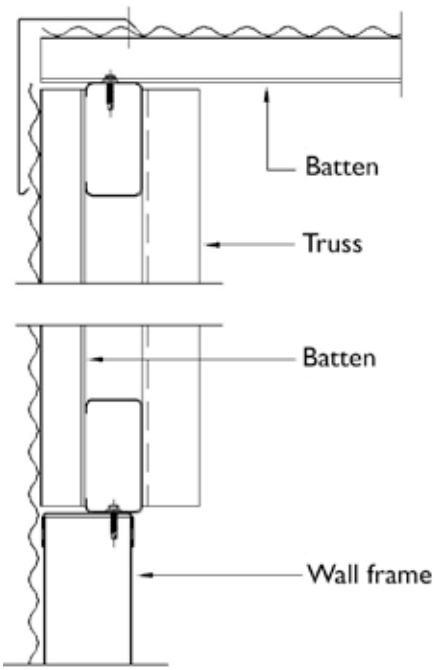


Figure 13.2 Type 1 Flush Gable

For flush gables, roof battens and end wall claddings are directly supported by a raked end wall or a truss fitted with cladding support members. Refer Fig 13.3.

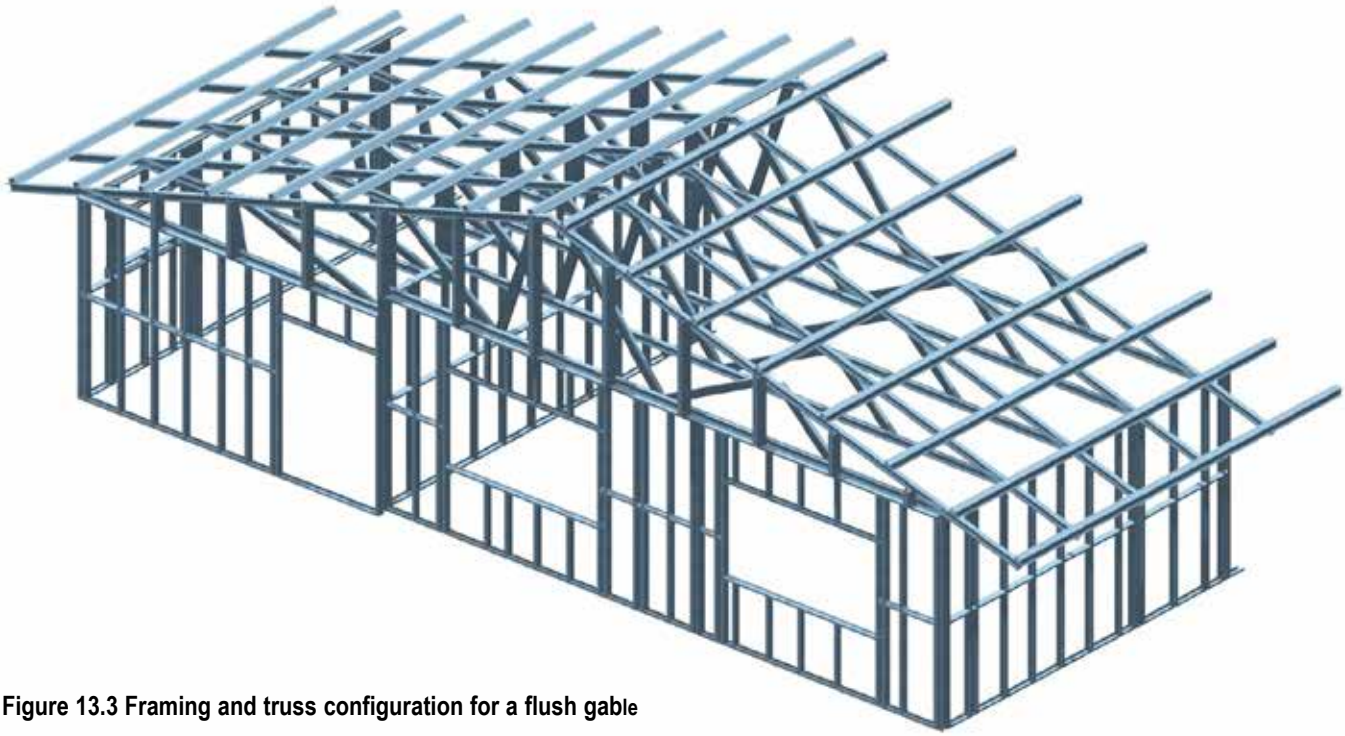


Figure 13.3 Framing and truss configuration for a flush gable

Type 2 Small Verge

Where verges are less than 450 mm, support can generally be provided by the battens as shown in Fig 7.4a and 7.5 A Gable ladder manufactured from wall framing stud and plate is installed under the batten projections to carry the soffit linings, barge fascia and flashings. Where specified, additional ladder support can be provided by doubling the roof battens one truss bay into the roof or by providing structural members such as channels or RHS in lieu of batten support.

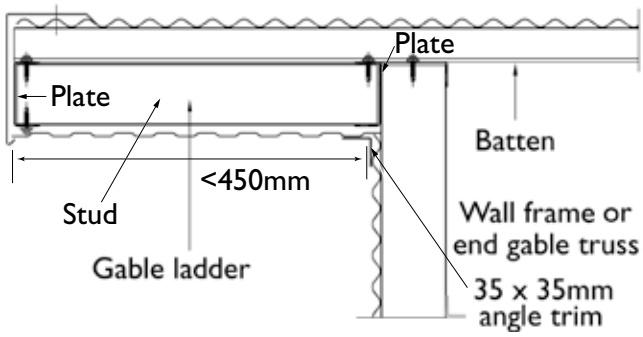


Figure 13.4b Connection detail

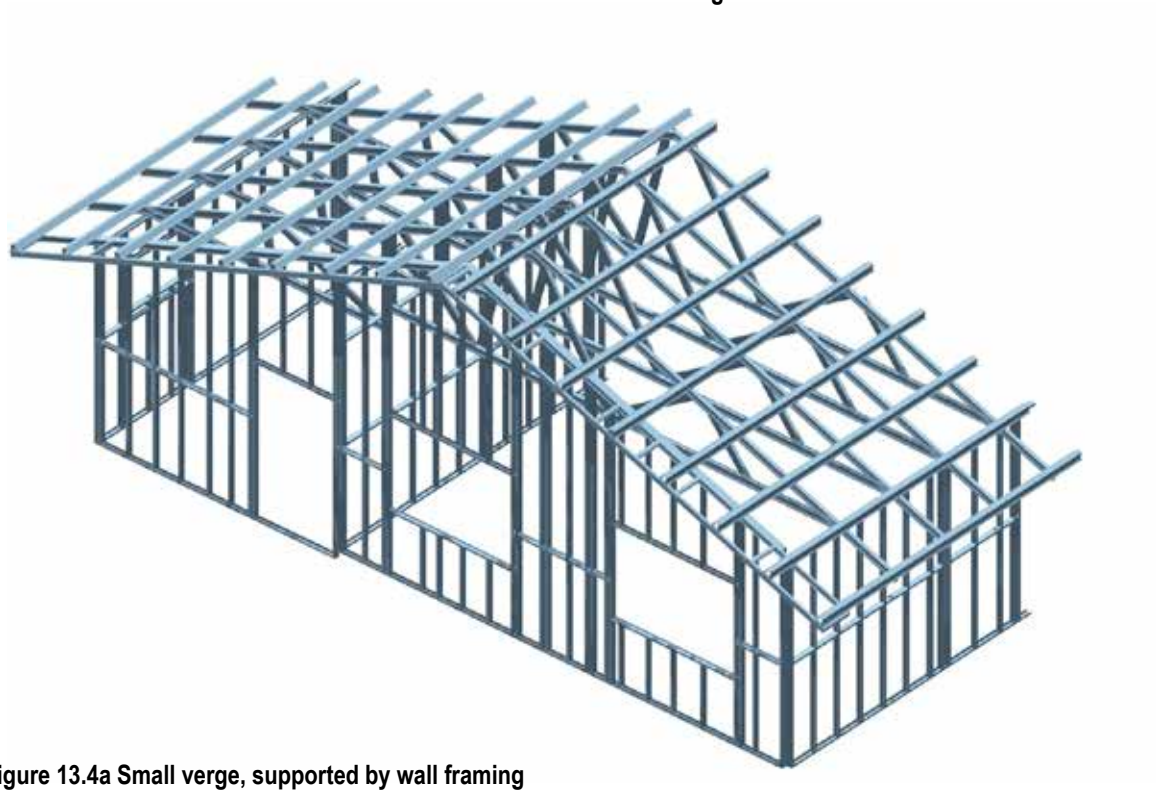


Figure 13.4a Small verge, supported by wall framing

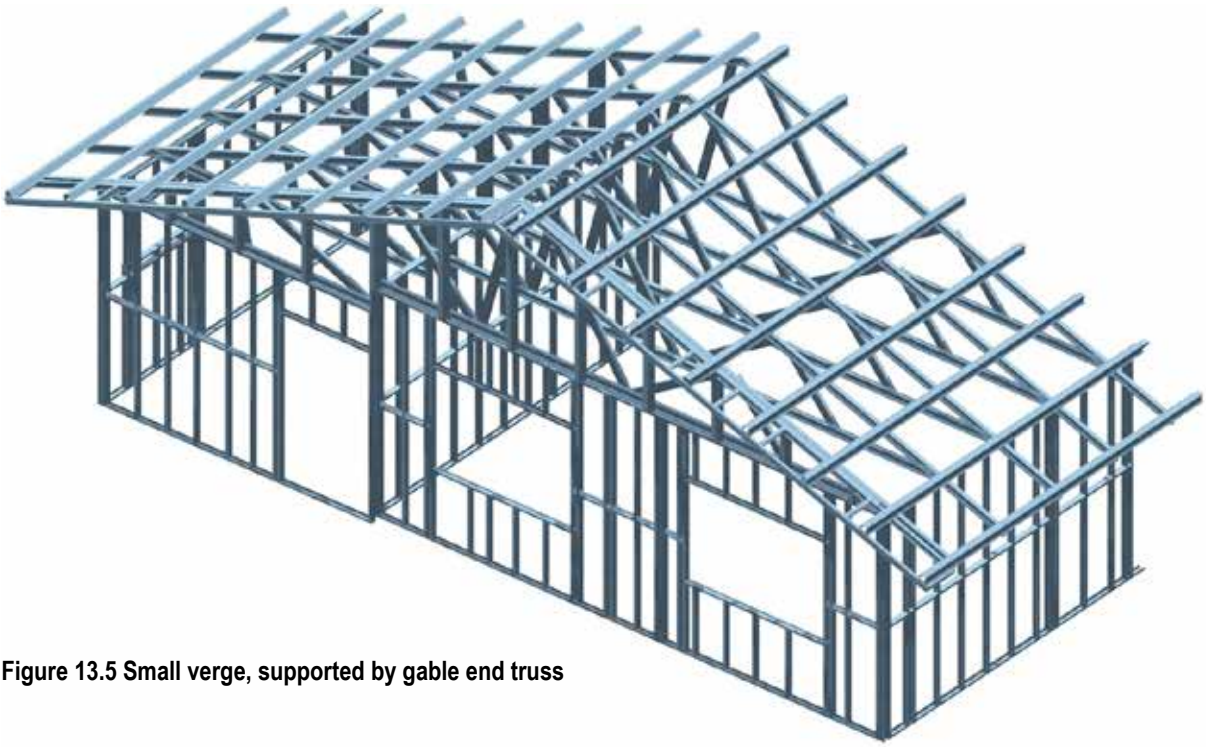


Figure 13.5 Small verge, supported by gable end truss

Figure 13.8c Veed plate hip rafter

Type 3 Large verge overhangs

Where insufficient verge support is offered by battens or structural members a Type 3 gable end may be required. Here the end wall is extended below the roof plane enabling a verge ladder to be fixed to the first truss back from the gable end and connected to the gable end wall top plate and cantilevering to form the verge framing as shown in Figure 13.6a. The gable ladder must be designed to suit the load condition, the cladding material and the verge overhang.

For a 75 x 1.0mm or 90 x 1.0mm ladder frame supporting sheet metal cladding, a maximum verge overhang of 900mm is acceptable in non-cyclonic areas using verge framing members at 1200mm max centres. For tile roof a maximum overhang of 600mm is permitted. Larger overhangs can be achieved by modifying the ladder and should be referred to the detailer.

The steps are as follows:-

STEP 1: Study the entire set of architectural and fabrication drawings.

STEP 2: Erect gable trusses in accordance with Section 7.3.

STEP 3: Install gable ladders for small verges by fixing each batten to both gable ladder plates using 1 #12-14x20 screw per batten. flange. For large verges, the gable ladder is aligned with the truss top chord and cantilevers over the end gable wall (or truss).

STEP 4: Fix the gable ladder to the truss or gable end wall using 2 #12-14x20 hex head screws at 1200mm centers for non-cyclonic areas and 900mm centres for cyclonic areas.

STEP 5: Fix battens to the end truss or gable end wall (where extended to the roof plane) and the gable ladder at the verge projection.

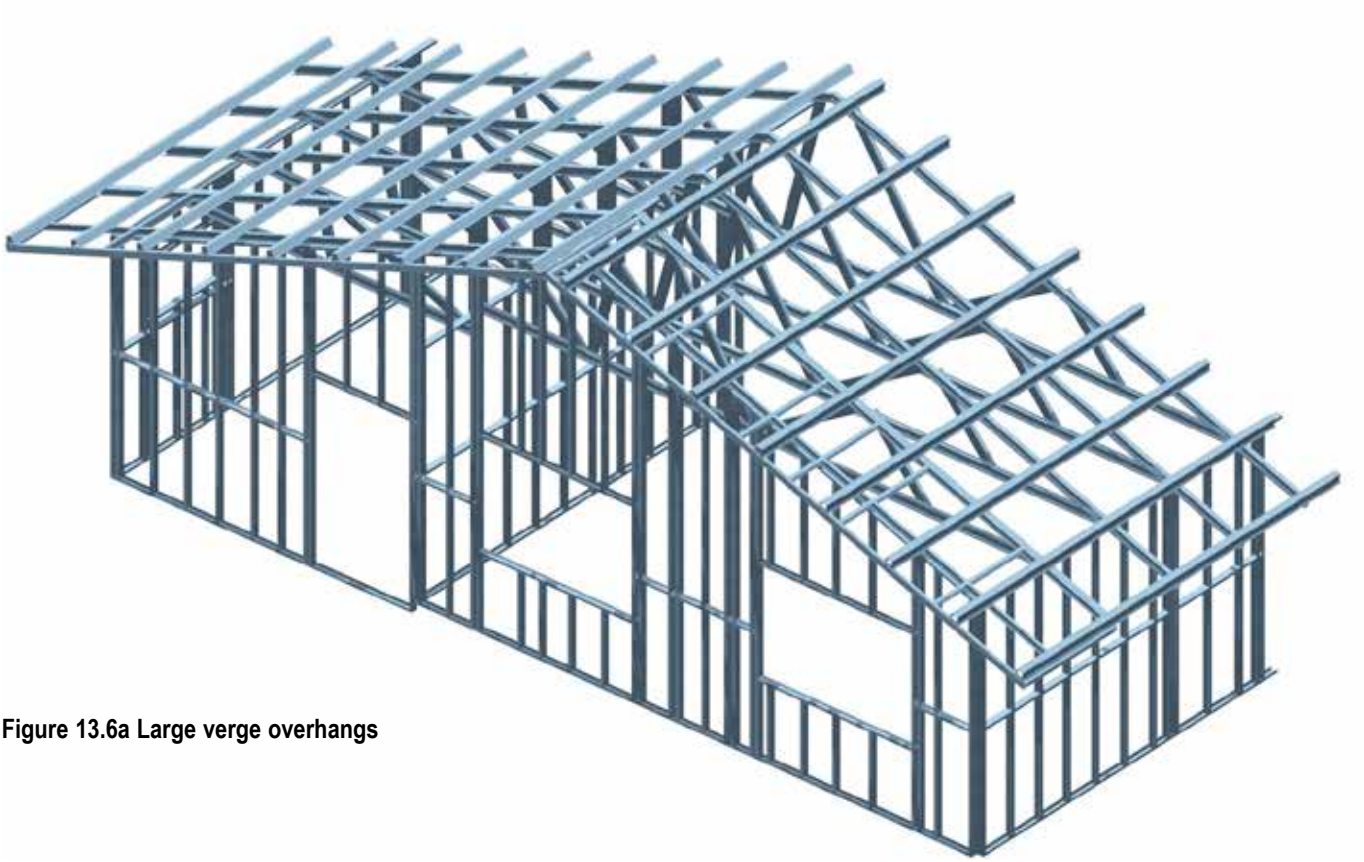
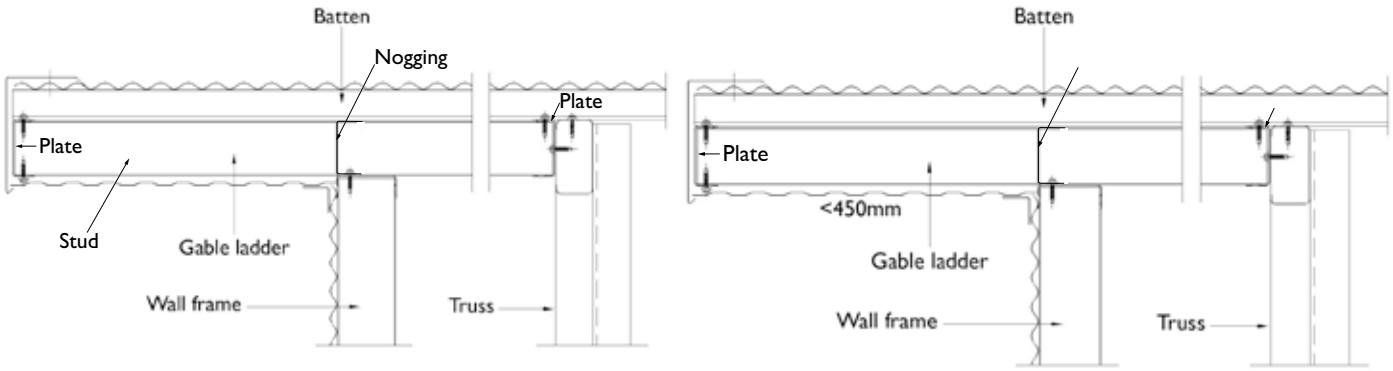


Figure 13.6a Large verge overhangs



13.4 Hip End Construction

Three options are available for hip end construction: Type 1, Type 1A and Type 2. Each option has different configurations for trusses and rafters although the general assembly method is the same. There are also 2 options for hip rafter construction which can be used with each of the hip end and rafter construction methods.

There are 2 types of hip rafter construction which can be used with any type of hip end construction: a Vee plate and a boxed hip rafter. A Veed hip rafter is a pre-manufactured piece which extends back to the second truncated truss. The creeper rafters are pre-attached to the Veed hip rafter and support the fascia. There is a left and a right side with the longer rafter aligned with the bent notch on the horn of the truncated truss.

A boxed hip rafter extends up the length of the hip line and consists of 2 pieces of truss section boxed together.

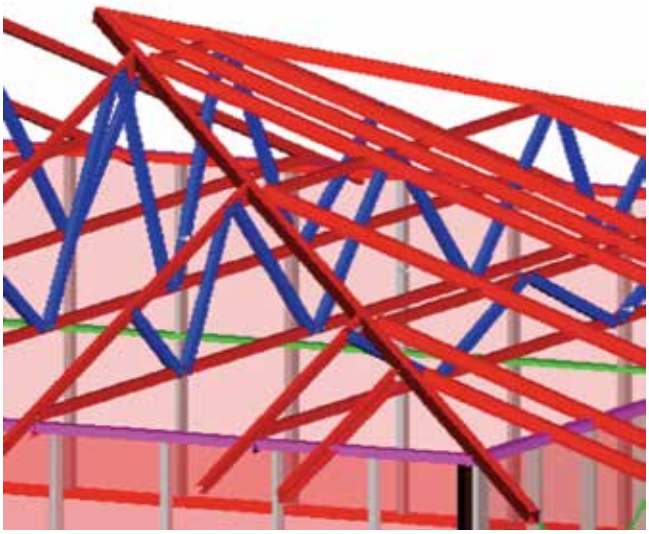


Figure 13.6b Boxed hip rafter

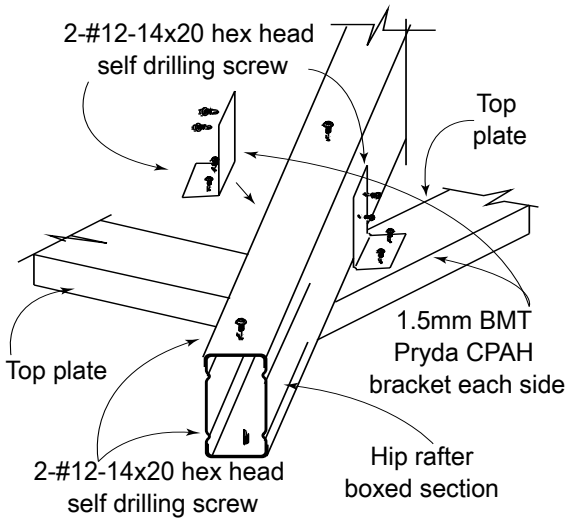


Figure 13.7 Hip rafter to top plate corner intersection

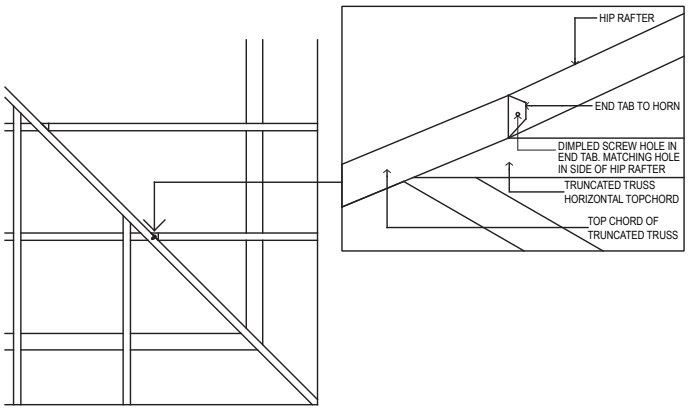


Figure13.8 Boxed hip rafter

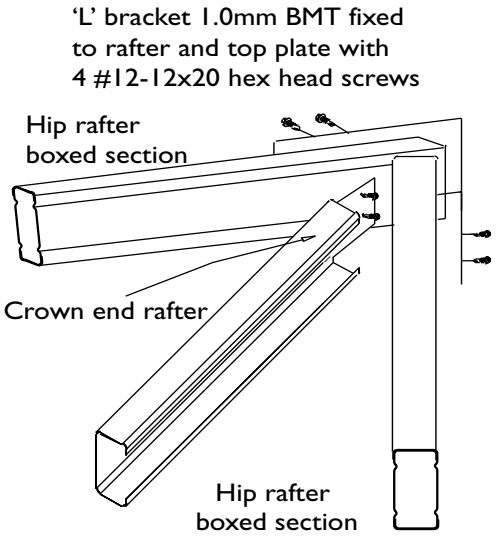


Figure 13.9 Crown end rafter to hip rafter

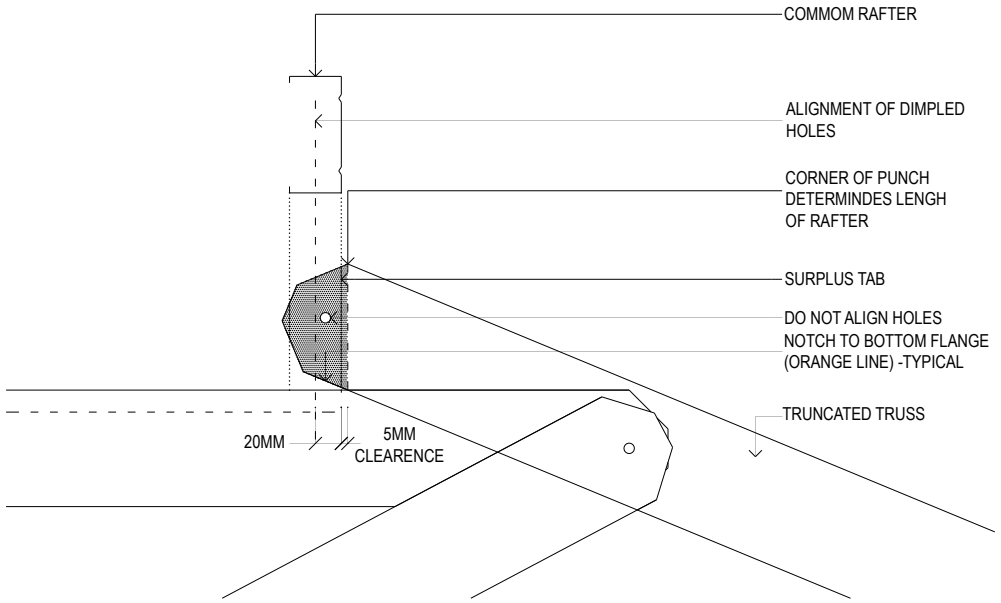


Figure 13.10 Common rafter to truncated truss at hip

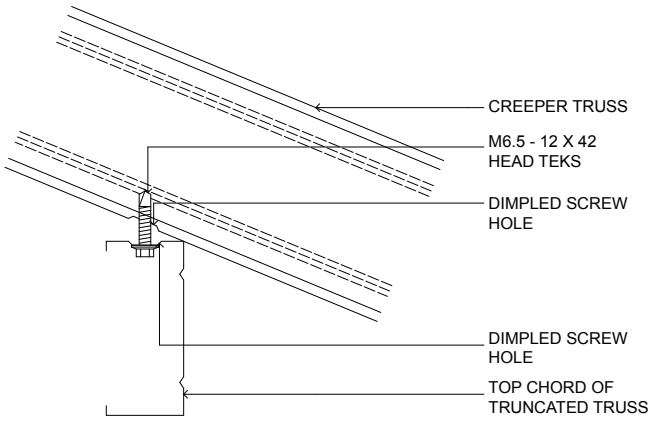


Figure 13.11 Common rafter to truncated truss

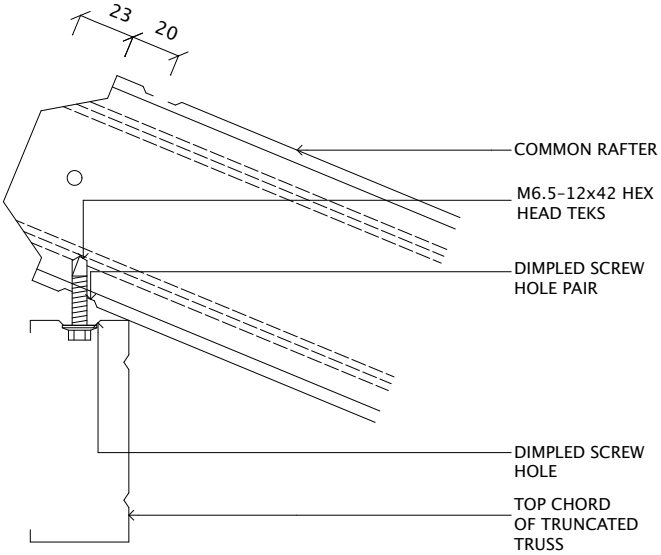


Figure 13.13 Common rafter to truncated top chord end

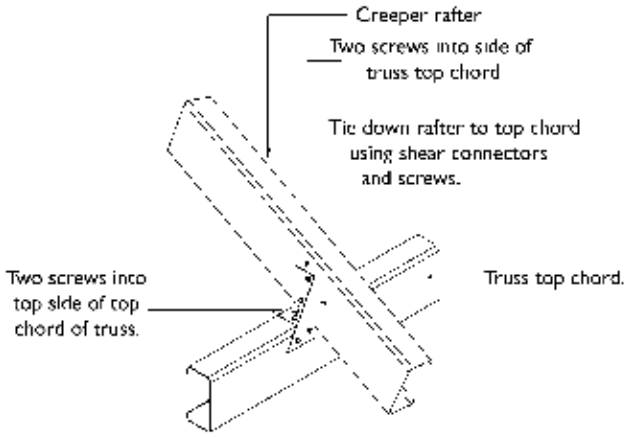


Figure 13.12Common Rafter to truss top chord using shear connectors. Trip-L-grip shown but Multi-grip or angle may also be used

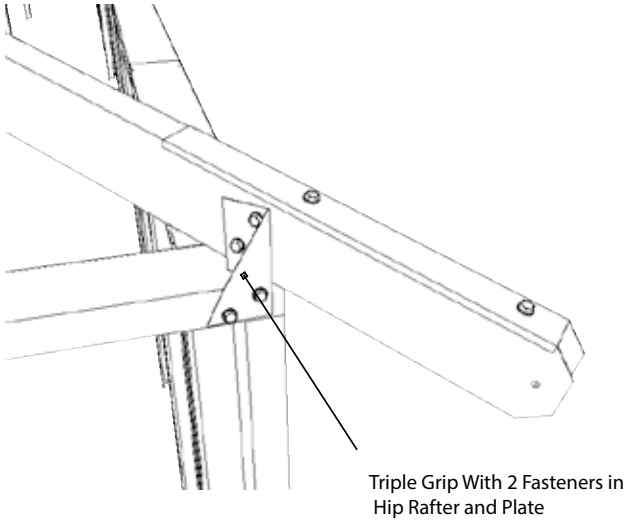


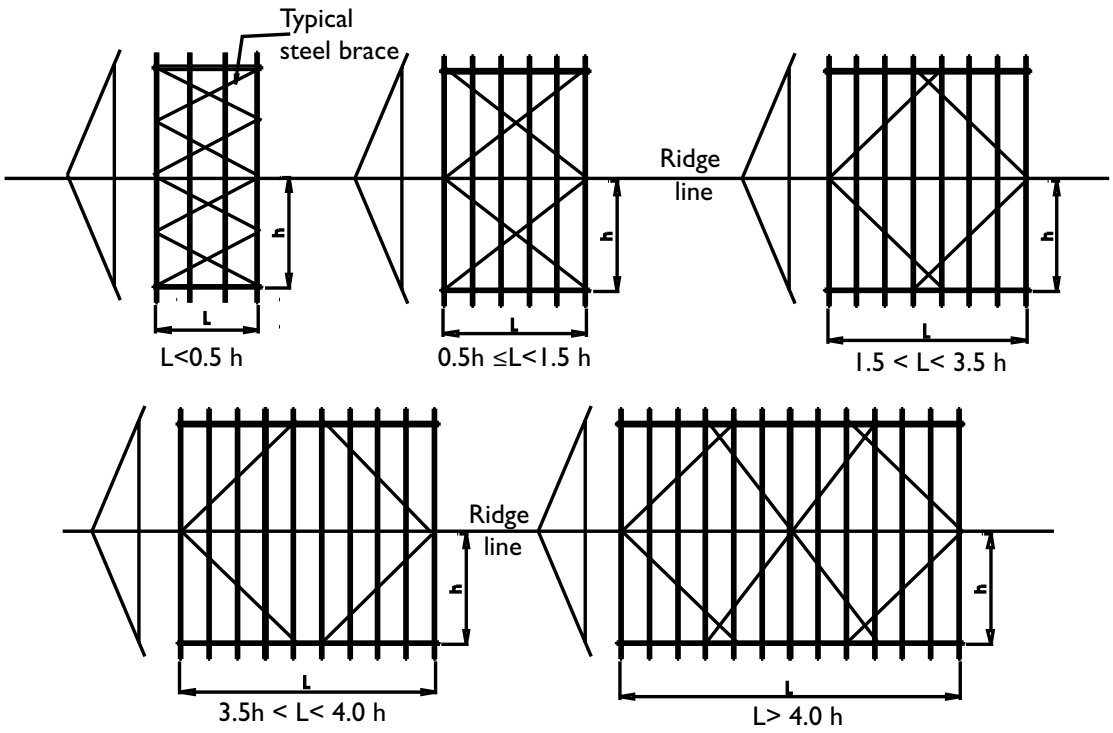
Figure 13.13 Hip rafter tie down using Triple grips. For boxed member option

13.5 Bracing Layout

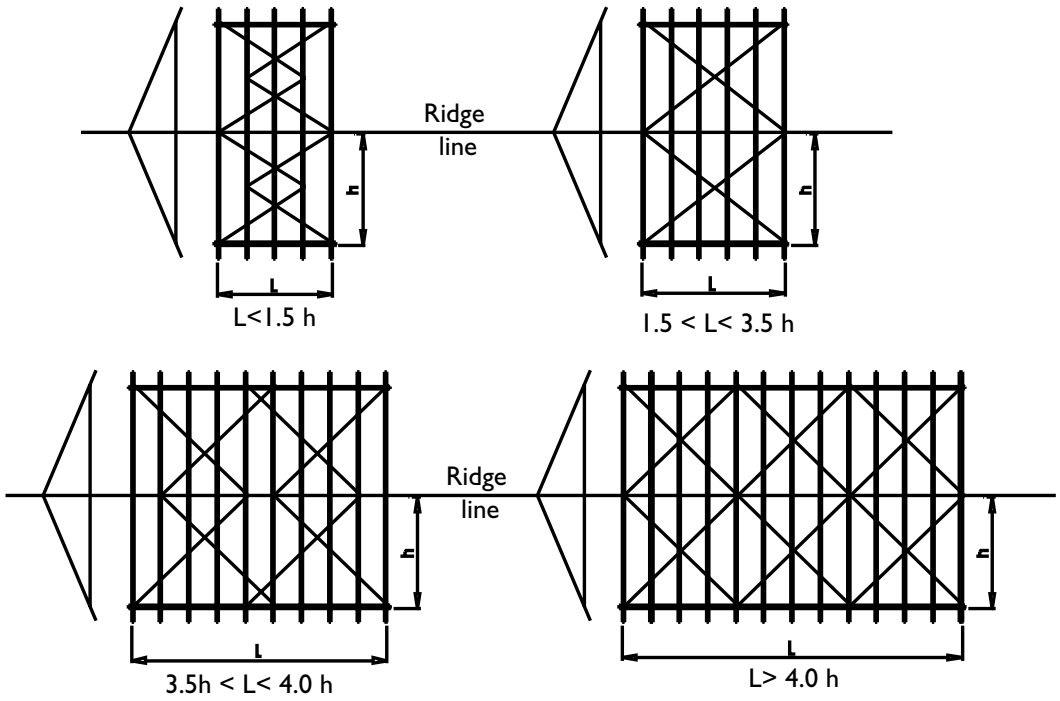
The type and layout of the top chord steel brace are related to the truss span, shape and loading of the roof. The area of the standard truss overhangs is not required to be braced.

13.5.1 Gable roof bracing layout

Truss Spans up to 8m

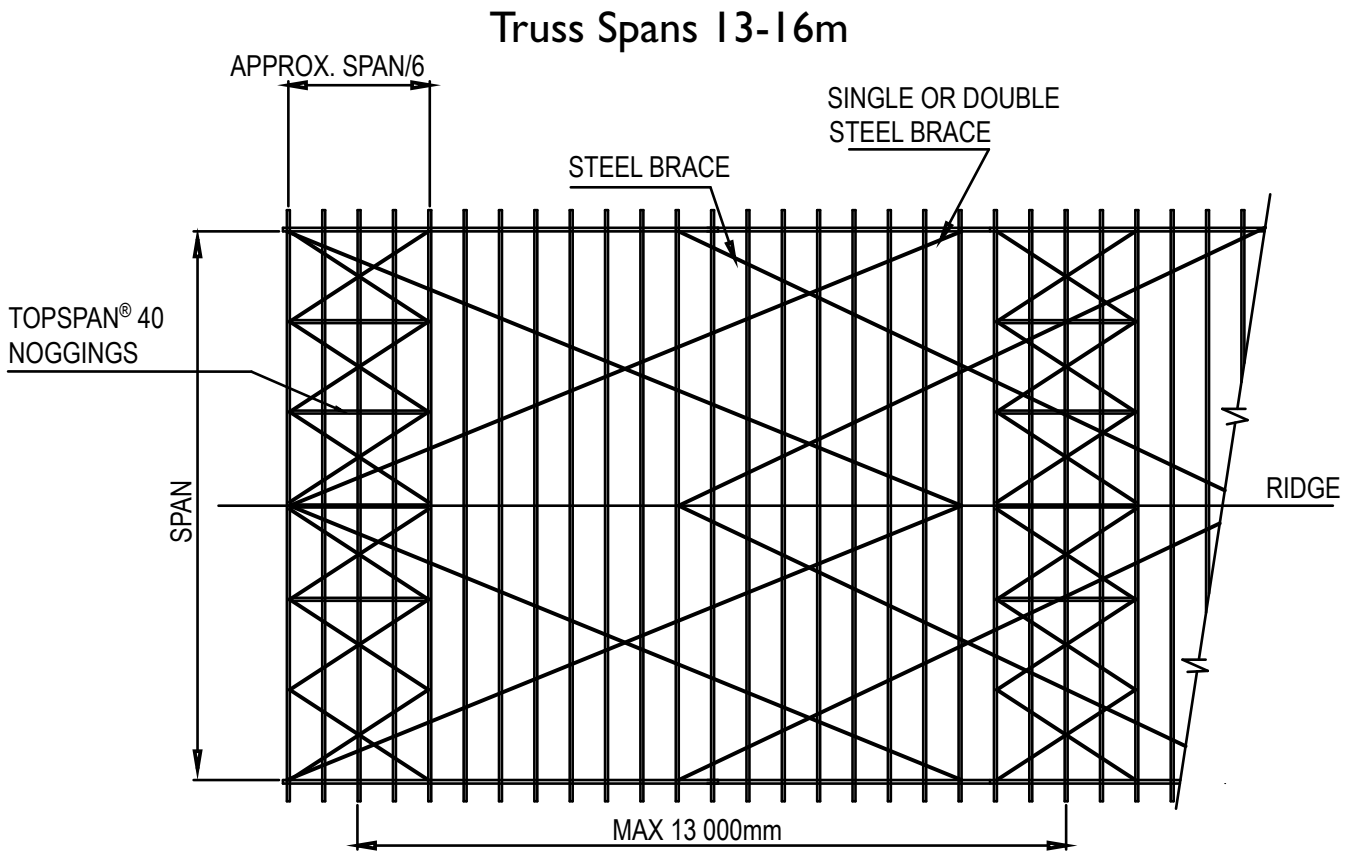


Truss Spans over 8m and up to 13m



Choose the appropriate bracing pattern based on the size and shape of the roof.

13.5.2 **Gable roof** bracing layout



13.5.3 Hip Roof

For roofs with hip zone, the hip rafter serves as bracing and no additional top chord bracing is required in this zone.

Roof length L ≥ half-span of roof truss, h

If the portion of the roof between the hip end or Dutch-hip ends (L) is greater than half span of roof truss (h), then the roof shall be braced as per gable roof.

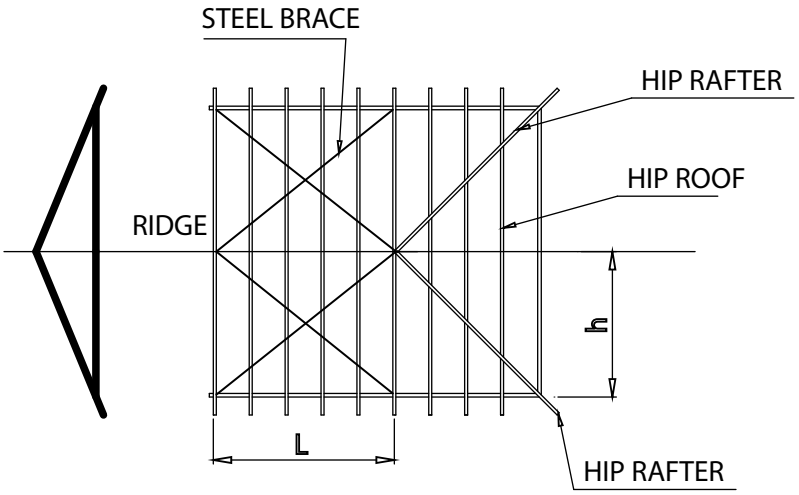
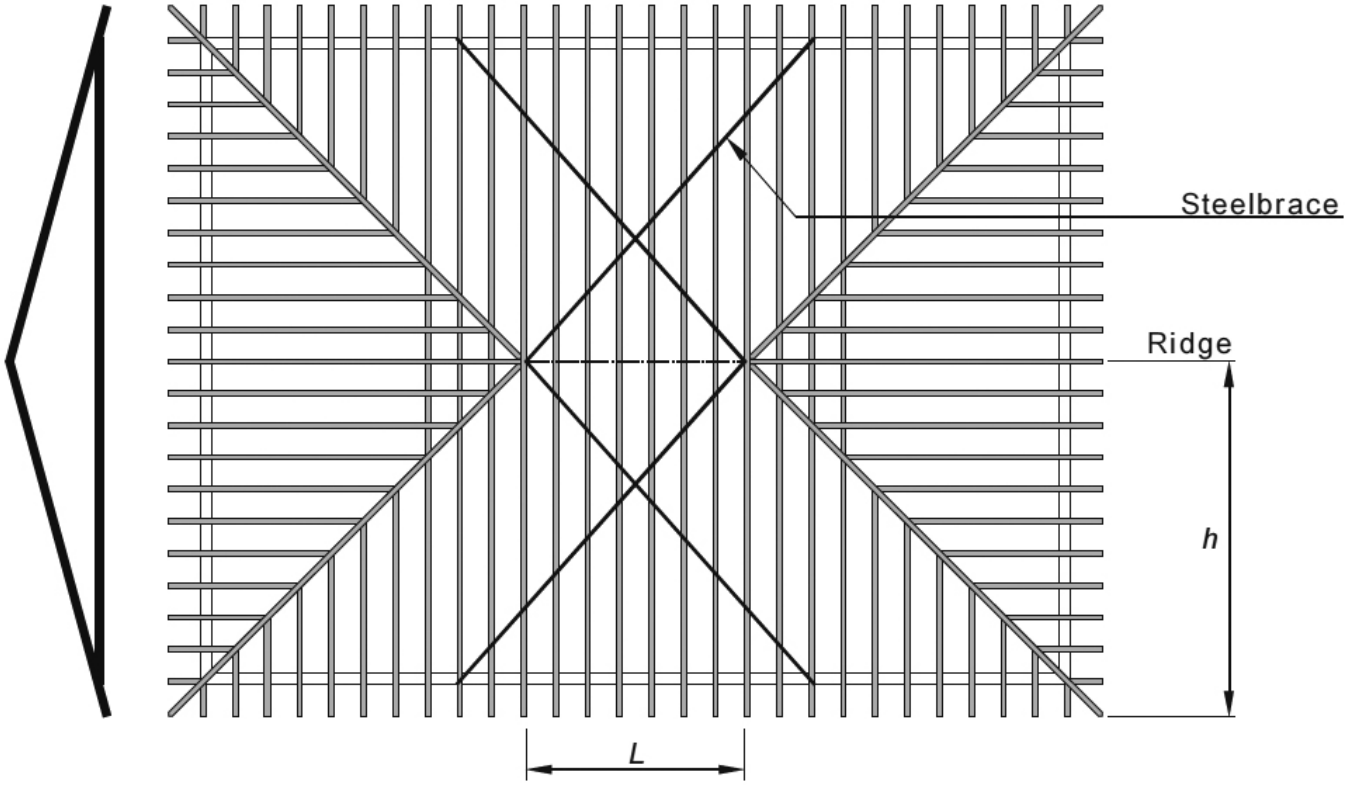


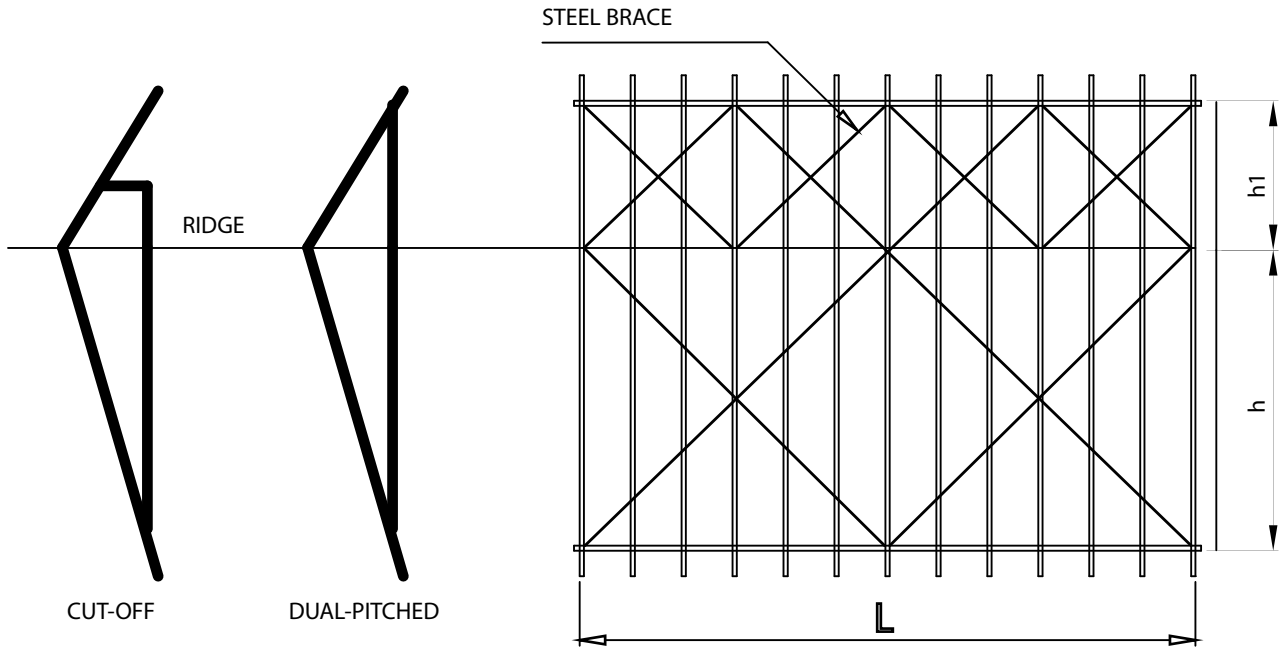
Figure 13.6 Roof length L ≥ half-span of roof truss, h

Roof length L< half-span of roof truss, h



13.5.4 Dual Pitched Roof

On dual-pitched or cut-off roofs where the ridgeline is not central on the building, each side of the ridge shall be considered as a separate case and gable end details shall be applied.

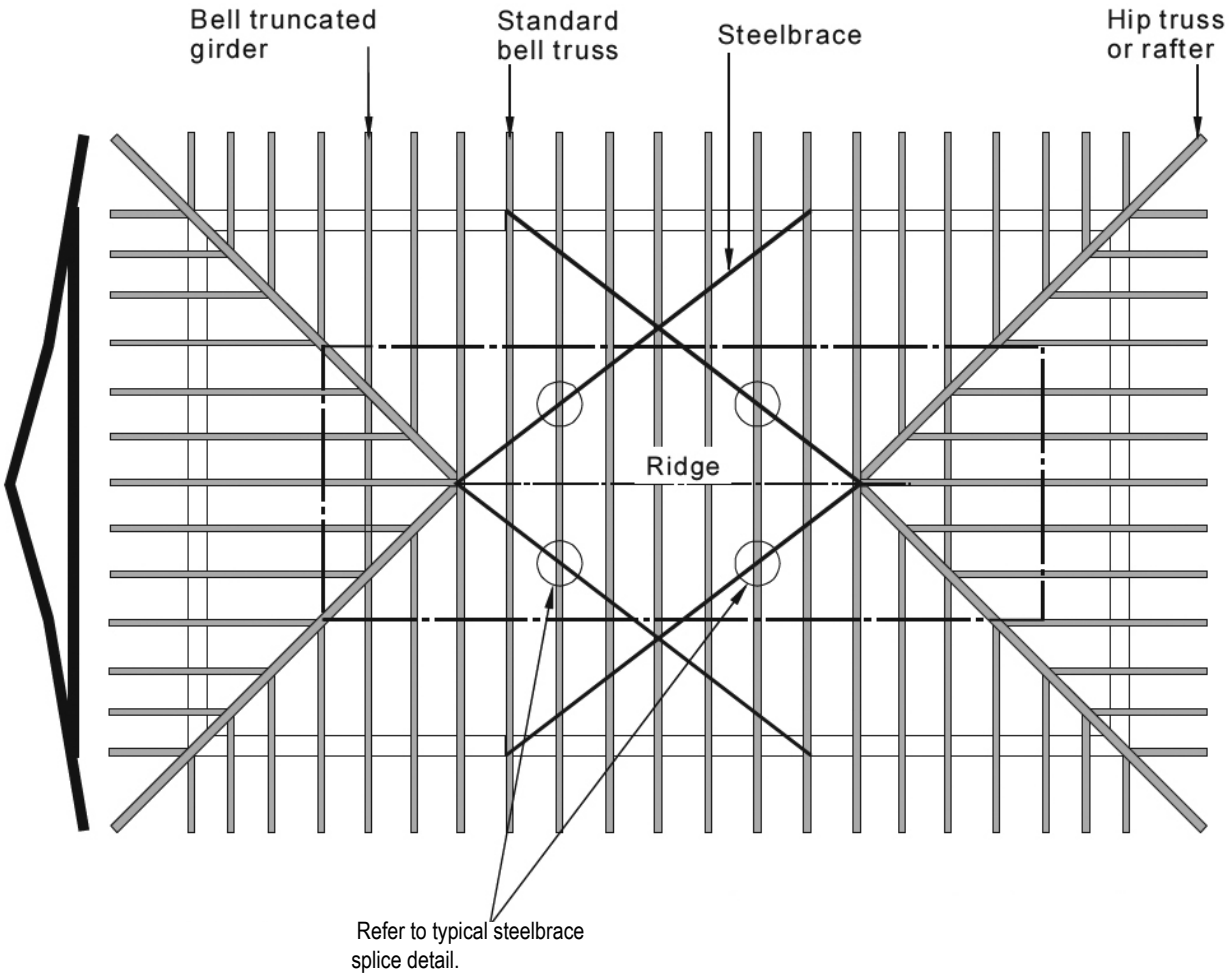


13.5.5 Cut-off Roof

On dual-pitched or cut-off roofs where the ridgeline is not central on the building, each side of the ridge shall be considered as a separate case and gable end details shall be applied.

13.5.6 Bell Roof

For bell trusses, the steelbrace should be spliced at the bell breaks as shown below. Refer to typical steelbrace splice detail.



13.6 Bottom chord bracing

Bottom chord bracing is required to provide restraint to bottom chords of trusses when they are in compression due to wind uplift. Where ceiling battens are mechanically fixed to the bottom chord of trusses, using screw fasteners the ceiling battens (along with ceiling sheeting) provide adequate bottom chord bracing.

For suspended ceilings, clip on battens or exposed bottom chords where ceiling battens do not provide lateral restaint, bottom chord ties shall be provided.

Bottom Chord bracing consists of bottom chord ties and diagonal bracing. Bottom chord ties may be roof battens or truss chord material (Minimum TOPSPAN® 22) fixed to each at spacing specified by roof designer and used in the truss design. The diagonal bracing may be minimum 32 x 1.2 strap brace fixed at each end in accordance with the bracing layout, tensioned and then fixed to each intermediate truss bottom chord.

Ties and bracing to be fixed to supporting walls to transfer bracing loads to the structure.

13.7 Web bracing

The slenderness and capacity of web members of longer lengths can be enhanced by boxing of sections or by providing lateral restraints. The lateral restraint extends out at right angles to the plane of the truss and along the building and is braced back to the ceiling on roof plane at each end of building. This manual (Fig. 13.30) shows ties which are suitable for cases when trusses are parallel to each other and webs of trusses line up. A web rail is suitable when trusses are parallel to each other but the webs do not line up, as illustrated i n Fig. 13.31.

Web rails are usually 75 x 38 x 1.0mm or 90 x 38 x 1.0mm channel and the lateral ties are usually specified as TOPSPAN® 40. The detailer will advise if lateral bracing is required. Typical web rail and lateral ties fixing details are shown in Fig. 13.32.

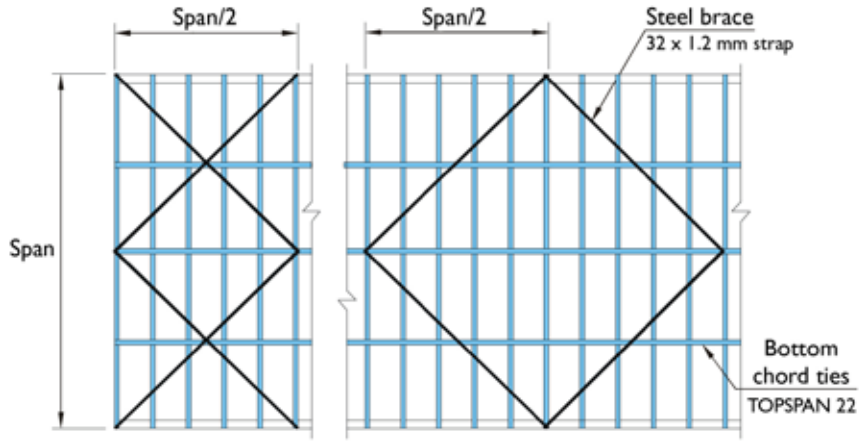


Figure. 13.32 Typical bottom chord ties bracing layout

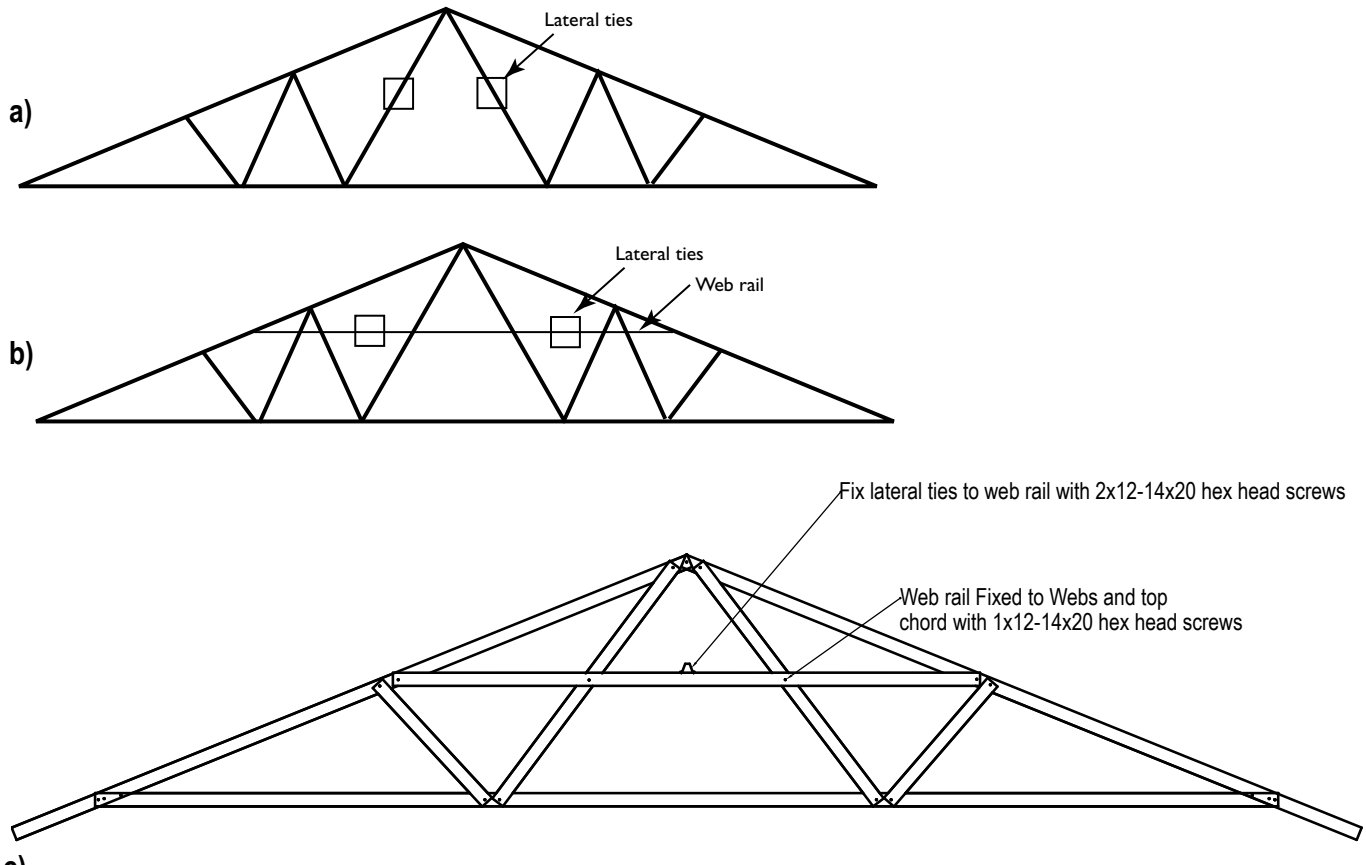


Figure.13.32 Examples of web bracing

13.8 Battens

13.8.1 Ceiling battens and plasterboard angles

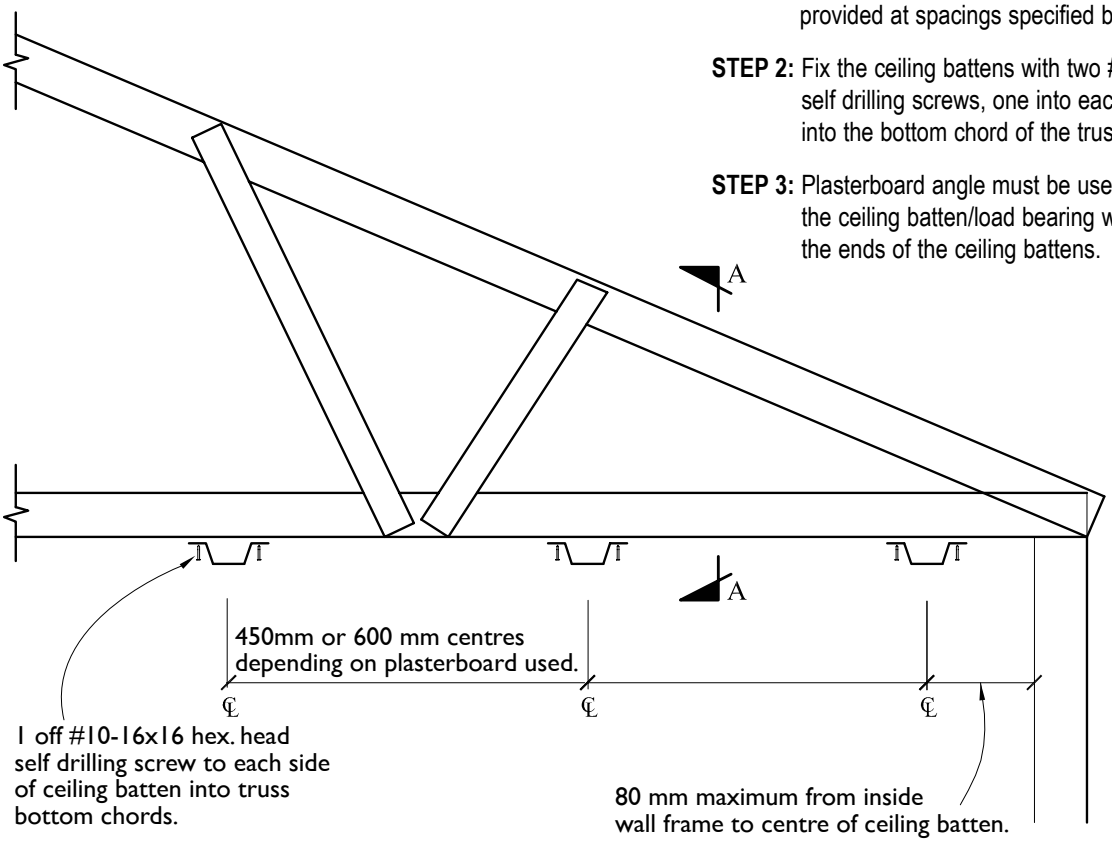
Ceiling battens must be fitted immediately after the roof trusses have been installed. By fixing the ceiling battens at this stage the roof trusses will be laterally restrained without the need of bottom chord ties.

STEP 1: When all trusses are erected, install ceiling battens to the underside of the bottom chords. Ceiling battens can be spaced at 600mm centres or 450mm centres depending on the type of plasterboard that will be used for the ceiling (check the specifications).
Ceiling batten sizes shall be selected from batten manufacturer's technical literature and sized to suit span, spacings and loads.

NOTE: Ceiling battens spacing is dependent on ceiling lining. For suspended ceilings, lateral restraints must be provided at spacings specified by the building designer.

STEP 2: Fix the ceiling battens with two #10-16x16mm hex head self drilling screws, one into each flange of the batten into the bottom chord of the truss.

STEP 3: Plasterboard angle must be used at the intersection of the ceiling batten/load bearing wall junction to support the ends of the ceiling battens.



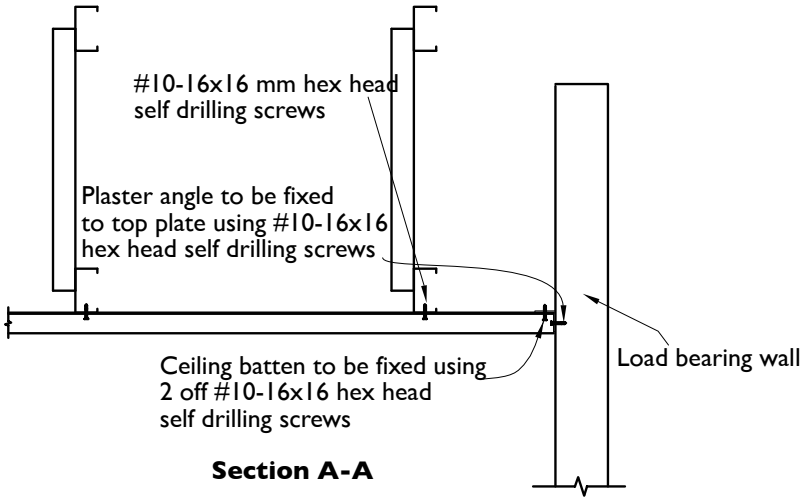


Figure 13.31
Celing battens fixed to trusses with screws

13.9 Internal wall support and shear transfer

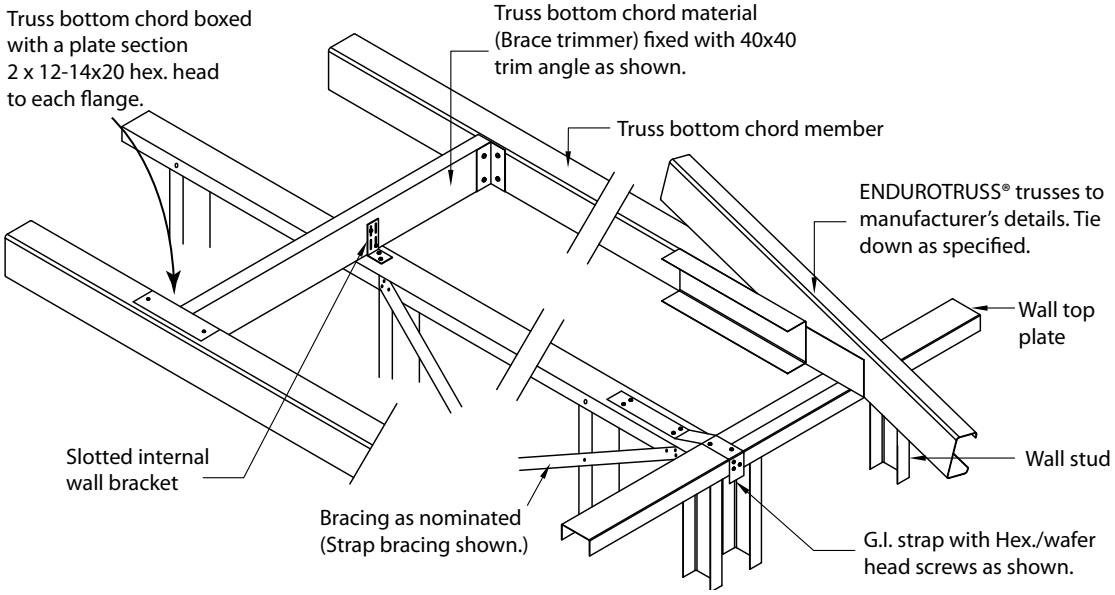


Figure 13.32 - Transfer of Racking Loads to Internal Bracing Walls - Internal Wall Parallel to Trusses

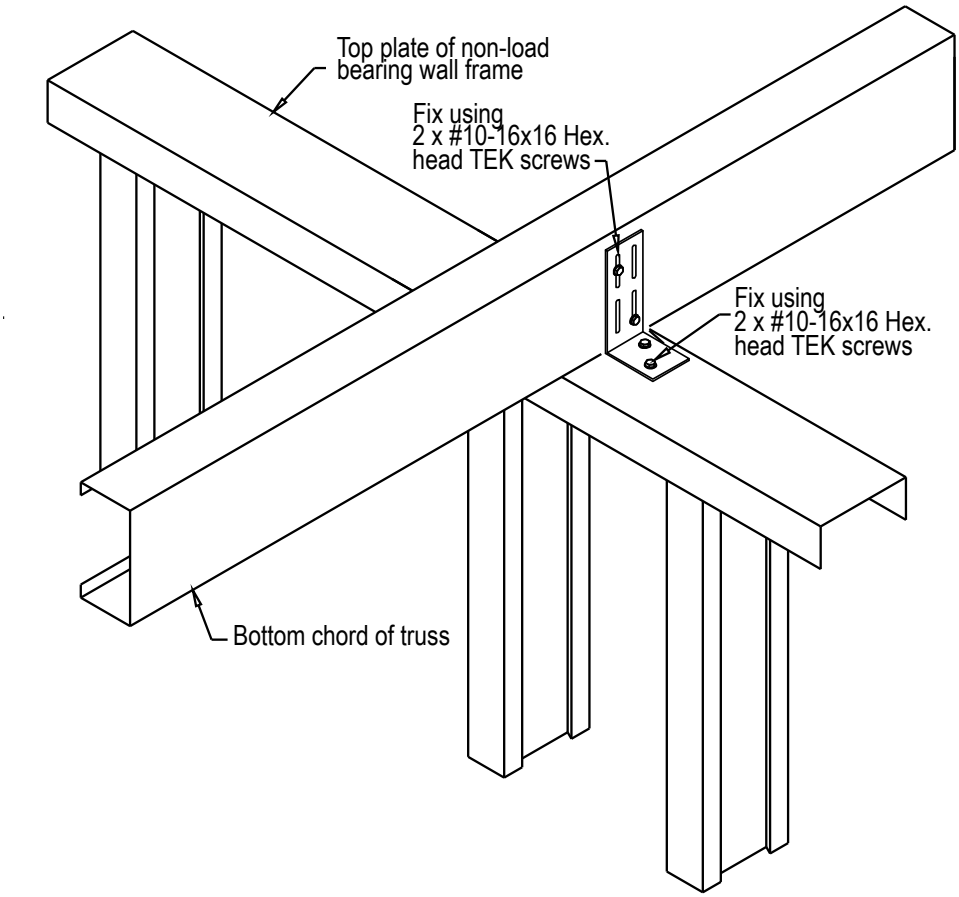


Figure 13.33 - Transfer of Racking Loads to Internal Bracing Walls - Internal Wall Perpendicular to Trusses

For shear transfer, refer to Wall Installation manual.

STEP 4: Fix one #10-16x16mm hex head self drilling screw down through the top of the bracket and into the top of the ceiling batten to stop the bracket sliding.

STEP 5: Bend the bracket down to the top plate of the internal wall and fix two #10-16x16mm hex head self drilling screws through the foot of the bracket into the top plate.

Refer to Figure 6.31.

STEP 6: Install hitch brackets to the bottom chord of trusses at a maximum of 1200mm centres. Fix two #10-16x16mm hex head self drilling screws into the side of the flat face of the bottom chord.

STEP 7: Now fix two #10-16x16mm hex head self drilling screws through the foot of the bracket into the top plate.

Refer to Figure 6.32.

13.10 Roof battens and spacings

The bracing of top chords is achieved via the overlying roof battens. Ensure roof batten spacings and fixings provide the restaint assumed in the truss design.

STEP 1: Maximum roof batten spacing is shown on the documentation. Batten spacings are usually defined in sheet manufacturer's tables. Batten spacing of 900mm batten centres should be used unless otherwise specified for sheet roofs. Ensure both spacings do not exceed the maximum used by the detailer in the design. Roof batten sizes shall be selected from the manufacturer's technical literature and sized to suit span, spacing and loads.

STEP 2: Fix roof battens to trusses using #10-16x16mm hex head self drilling screws, to both batten flanges at each truss.
Roof battens shall be fixed to every truss, including each ply of girder truss.

NOTE: For roofing fix a roof batten each side of the line formed from the intersection of the jack rafters and the chords of the truncated trusses to finish the hip roof line. Use two #12-14x20mm hex head self drilling screws at each intersection.

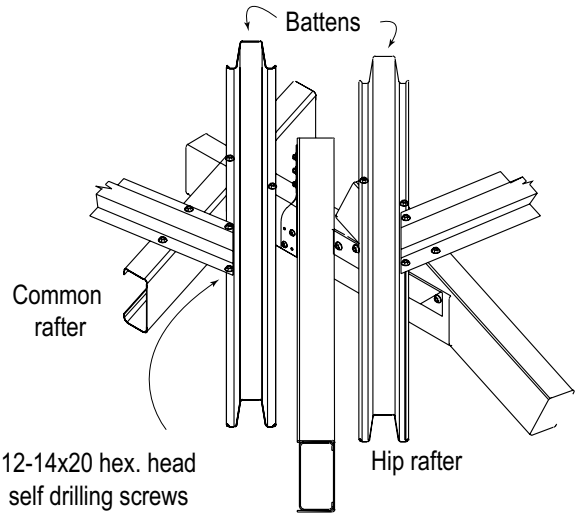
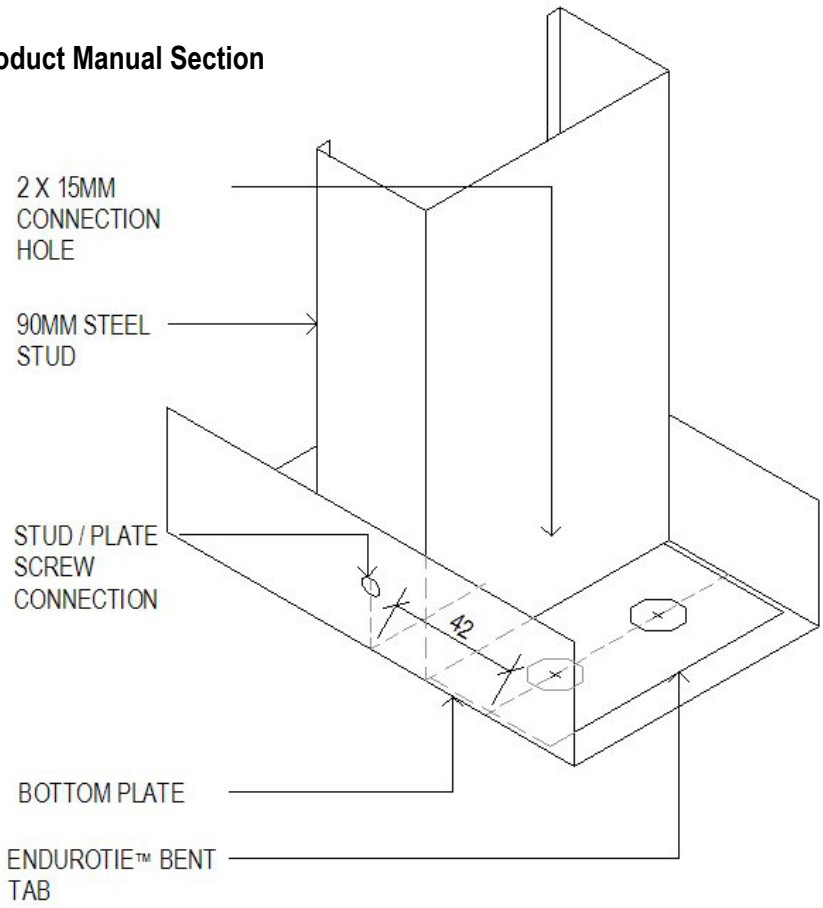


Figure.13.34 Hip rafter and batten arrangement

13.11 Hold Down Connection Option 1

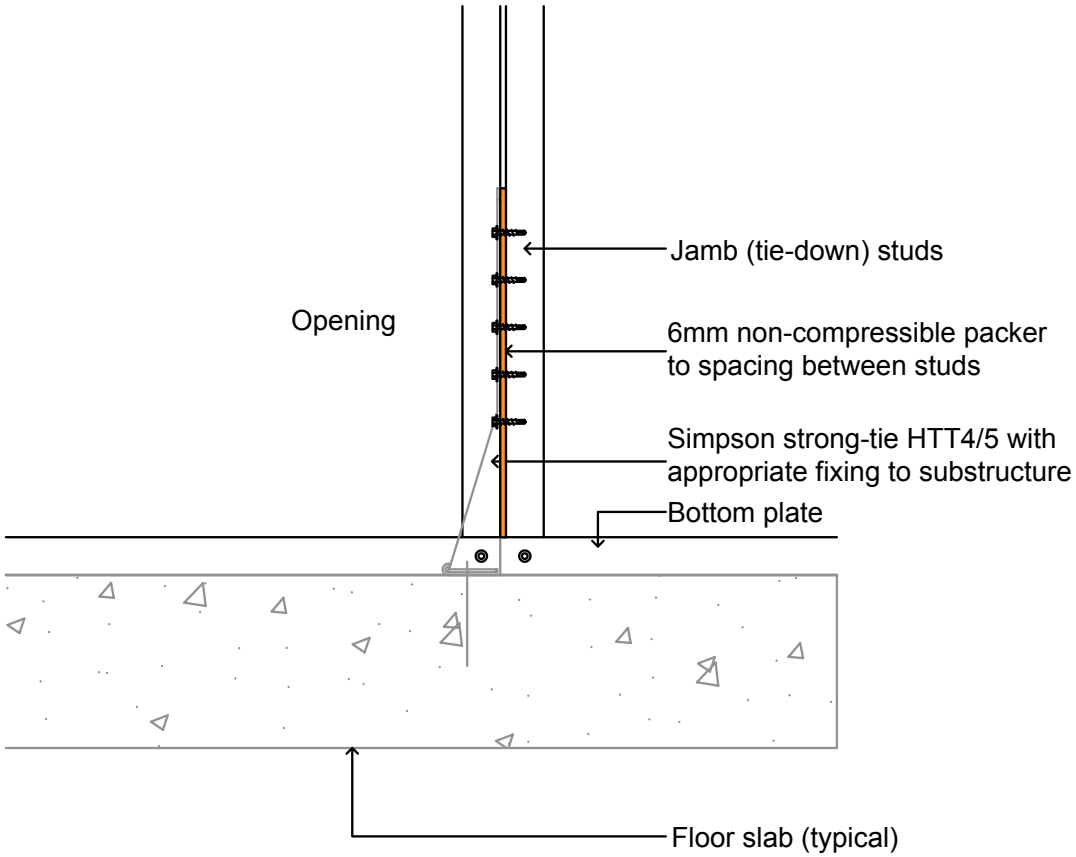
Endurotie™: Refer Wall Product Manual Section 13.8.6



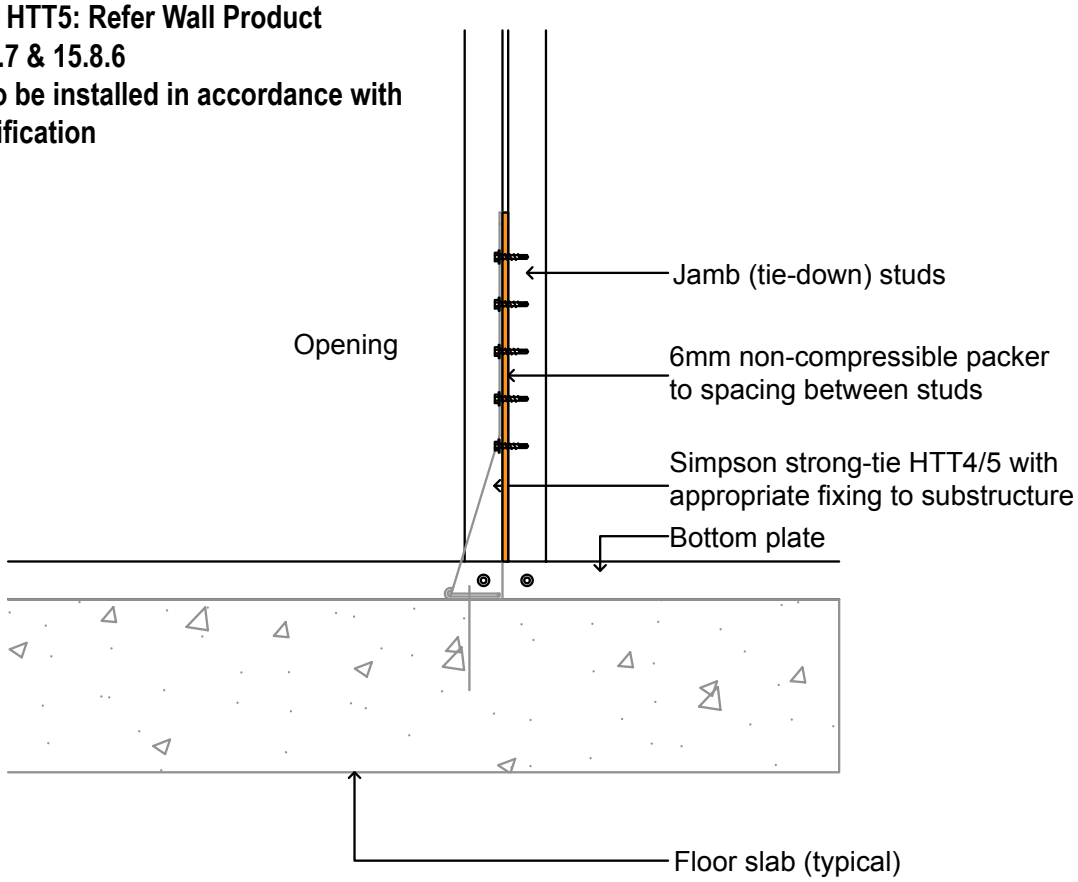
13.12 Hold Down Connection Option 2

Simpson Strongtie® HTT4:

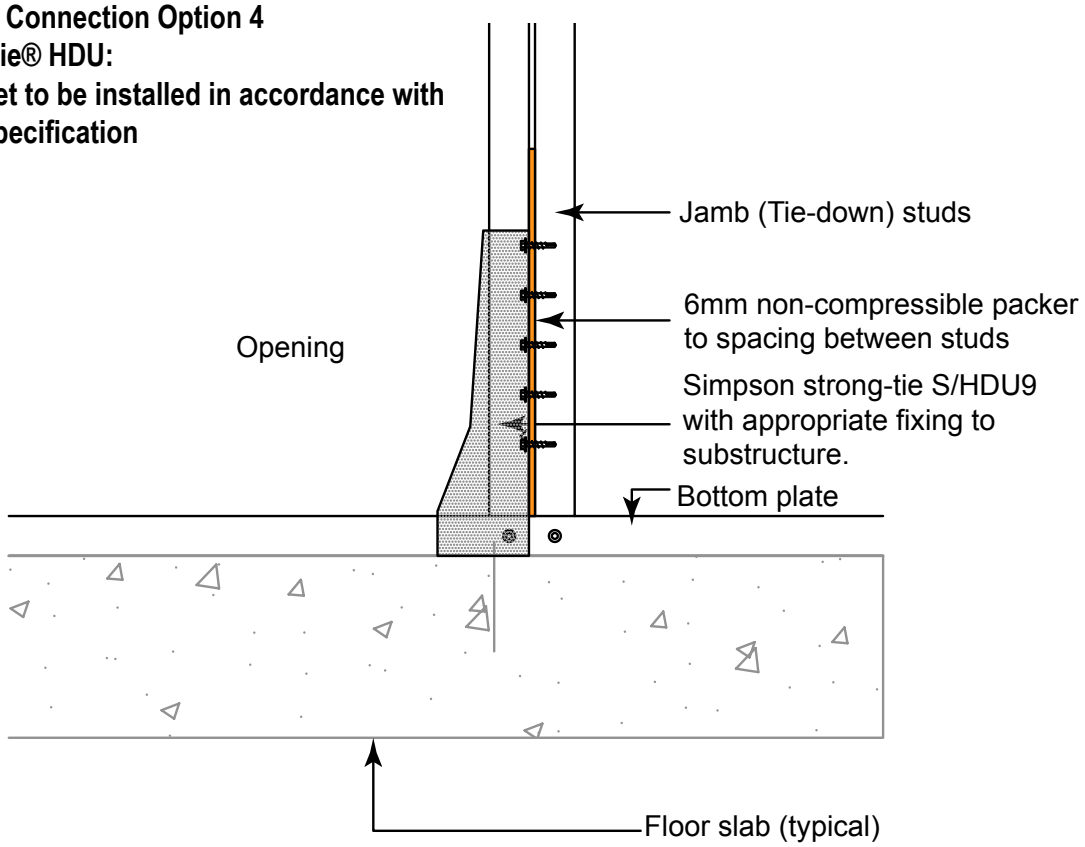
Note: This bracket to be installed in accordance with manufacturers specification



13.13 Hold Down Connection Option 3
Simpson Strongtie® HTT5: Refer Wall Product Manual Section 15.3.7 & 15.8.6
Note: This bracket to be installed in accordance with manufacturers specification



13.14 Hold Down Connection Option 4
Simpson Strongtie® HDU:
Note: This bracket to be installed in accordance with manufacturers specification



13.15 Stud to Bottom Plate/Floor Connection

A pair of holes is punched in both the stud and the plate in the offset dimensions shown. The default is to bend the tab towards the lips, however if the adjacent stud is closer than 200mm centre to centre, the tab will be bent in the opposite direction. In both cases, a 40x40x5mm square washer is placed over the bent tab.

13.16 Internal wall support and shear transfer

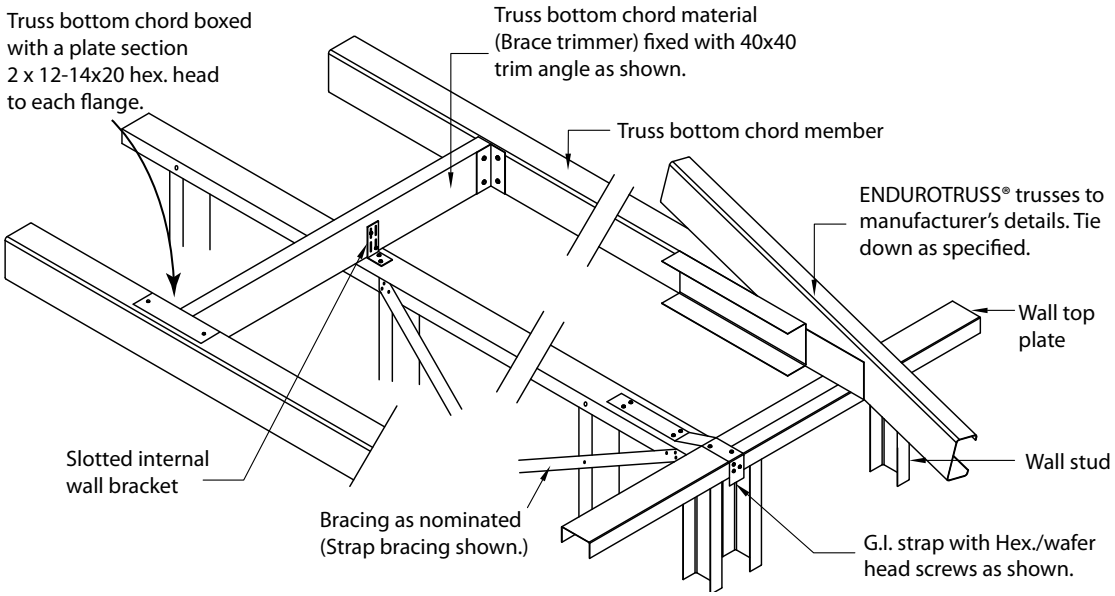


Figure 13.16a - Transfer of Racking Loads to Internal Bracing Walls - Internal Wall Parallel to Trusses

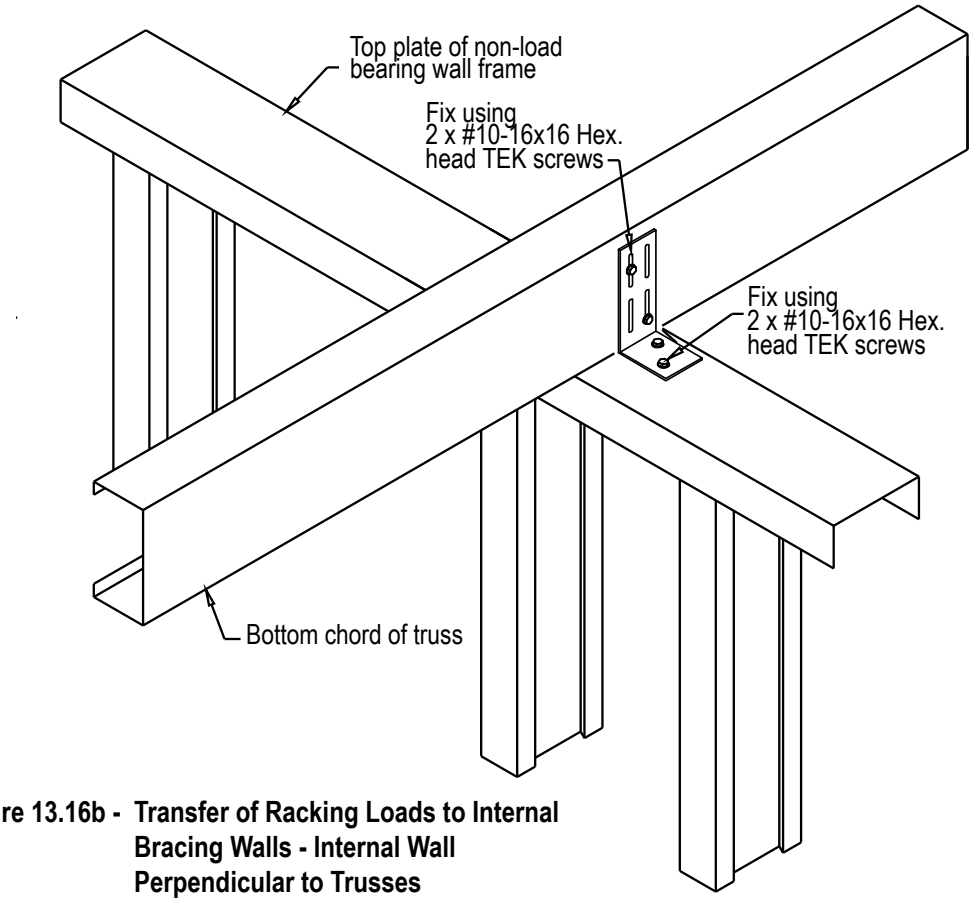
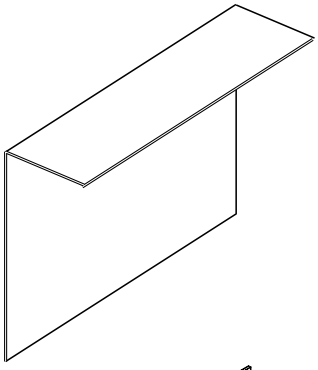
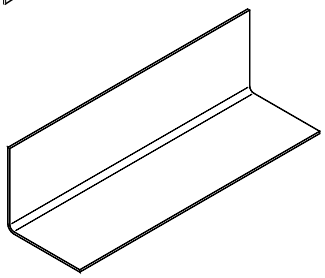
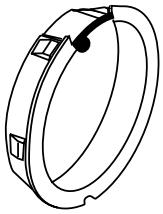
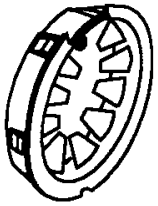
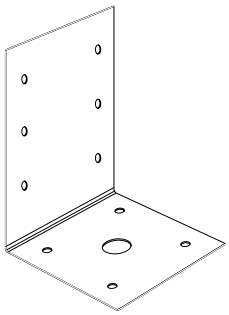
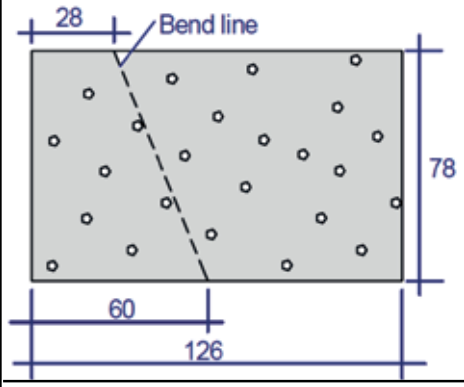
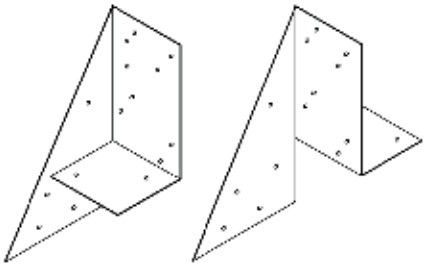


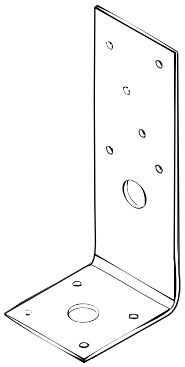
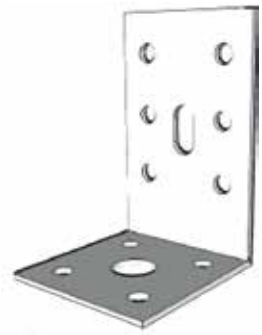
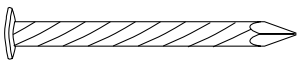
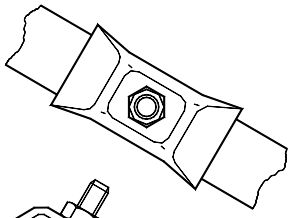
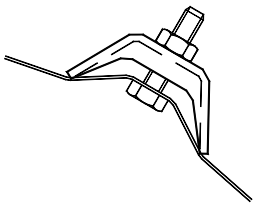
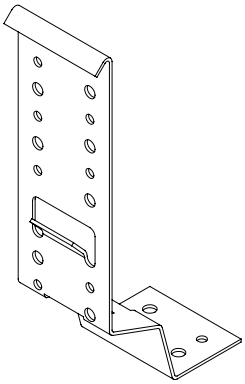
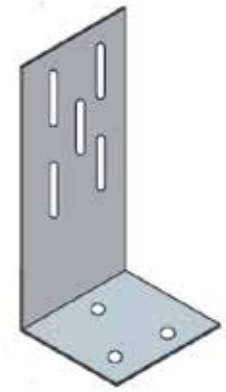
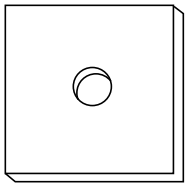
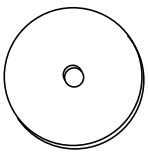
Figure 13.16b - Transfer of Racking Loads to Internal Bracing Walls - Internal Wall Perpendicular to Trusses

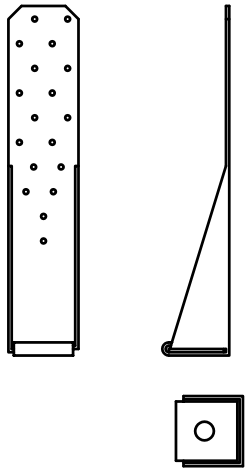
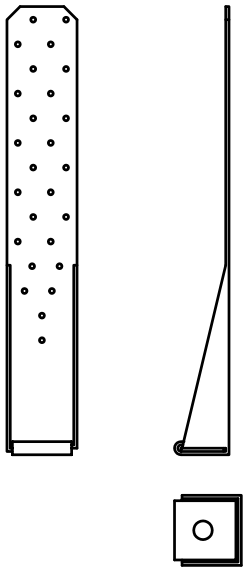
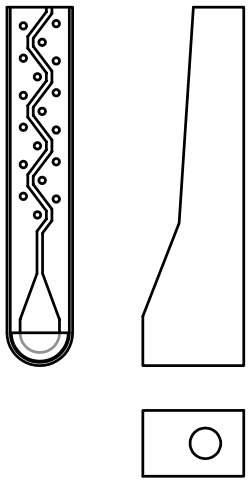
14.0 Components

Profile	Product	Base Metal Thickness (mm)	Grade of Steel	Coating
	Angle Lintel 200 x 35 mm	1.0 1.5	G550 G450	AM100 AM100/ Z275
	Angle Trim 35 x 35	0.75 1.00	G550 G550	AM100 AM100

	Accessory	Material
	Electrical Grommet 28mm	Nylon 6 - Black
	Plumbing Grommet 28mm	Nylon 6 - Black

Picture	Description	Application	Drawing Number	Supplier	Part Number
	CPAH Hold down bracket 1.9mm BMT Zincform G450 Z275	Hold down bracket		Pryda	Pryda CPAH
	Hip Mitre Plate 1.9mm BMT Zincform G450 Z275	Hip Mitre Plate		Pryda	Pryda MT15
	Triple Grip (left or right hand) 1.6mm BMT Zincform G450 Z275	Connectors		Pryda	Pryda AR, BR

Profile	Accessory	Material
 	Pryda CPAH Hold-down Bracket) Modifiied CPAH bracket	1.9 mm ZINCFORM G450 Z275 1.9mm BMT G450 Z275
	Duofast Nail or equivalent	Ø3.3 x 5.5 mm Zinc Plated Steel
 	Brace Tensioner Set	3.0 mm B.M.T. ZINCFORM G300 Z275 c/w 1/4” Zinc plated bolt & nut
	Internal Wall Bracket	1.0 mm Galvanized Steel
	Pryda Hitch	1.0 mm Galvanized Steel
 	Square washer/ Round washer	Galvanised 50x50x5mm ø14mm hole ø32 x 2.5mm with ø6mm hole

	Hold Down Brackets	Base Metal Thickness (mm)	Coating
	Simpson HTT4 H=330mm W=63mm Heavy duty tie down bracket Uplift resistance: 2x.75 = 49.5kN 2x1.0 = 68.9kN 2x1.2 = 71kN Fixed with 18 x #14-10x25 Hex Head Self Drilling Screws	2.8	Galvanised
	Simpson HTT5 H=406mm W=63mm Heavy duty tie down bracket Uplift resistance: 1x1.0 = 28.9kN 2x1.0 = 31kN 1x1.2 = 28.6kN Fixed with 18 x #14-10x25 Hex Head Self Drilling Screws	2.8	Galvanised
	Simpson S/HDU H=314mm W=63mm Heavy duty tie down bracket Uplift resistance: 1x.75 = 21.2kN 2x.75= 29.7kN Fixed with 18 x #14-10x25 Hex Head Self Drilling Screws	3.28	Galvanised

Section 3 - CLADDING INSTALLATION

15.0 Installing pierce-fixed cladding

Pierce-fixing is the method of fixing sheets using fasteners which pass through the sheet. This is different from the alternative method called concealed-fixing. The method of fixing you use is determined by the cladding profile you are using.

You can place screws through the crests or in the pans/valleys, however, to maximise watertightness, always place roof screws through the crests. For walling, you may fix through either the crest or valley/pan (Figure 15.1).

Always drive the screws perpendicular to the cladding, and in the centre of the corrugation or rib.

The following procedures are described for roofs, but the same general principles apply to walls.

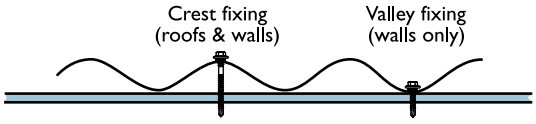


Figure 15.1
Crest and valley fixing (CUSTOM ORB)

15.1 General installation procedure

Check flatness, slope and overhang

Before starting work ensure that:

- the supports for your cladding are truly in the same plane;
- the minimum roof slopes conform to Section 2.5 (Low-roof-pitches); and
- the overhangs of sheets from the top and bottom supports don't exceed those in the Construction Drawings whilst also overhanging a nominal length (50mm) into gutters.

Make any necessary adjustments before you start laying sheets, because they will be difficult or impossible to rectify later.

Orient sheets before lifting

For maximum weathertightness, start laying sheets from the end of the building that will be in the lee of the worst-anticipated or prevailing weather (Figure 15.1.1).

It is much easier and safer to turn sheets on the ground than up on the roof. Before lifting sheets on to the roof, check that they are the correct way up and the overlapping side is towards the edge of the roof from which installation will start.

Place bundles of sheets over or near firm supports, not at mid span of roof members.

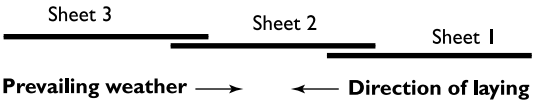


Figure 15.1.1
Lay sheets towards prevailing weather

Position first sheet

With particular care, position the first sheet before fixing to ensure that it is correctly located in relation to other parts of the building.
Check that the sheet:

- is aligned with the end-wall (or its barge or fascia), bearing in mind the type of flashing or capping treatment to be used; and
- aligns correctly at its ends in relation to the gutter and ridge (or parapet or transverse wall).

Fix the sheet as described later in this chapter.

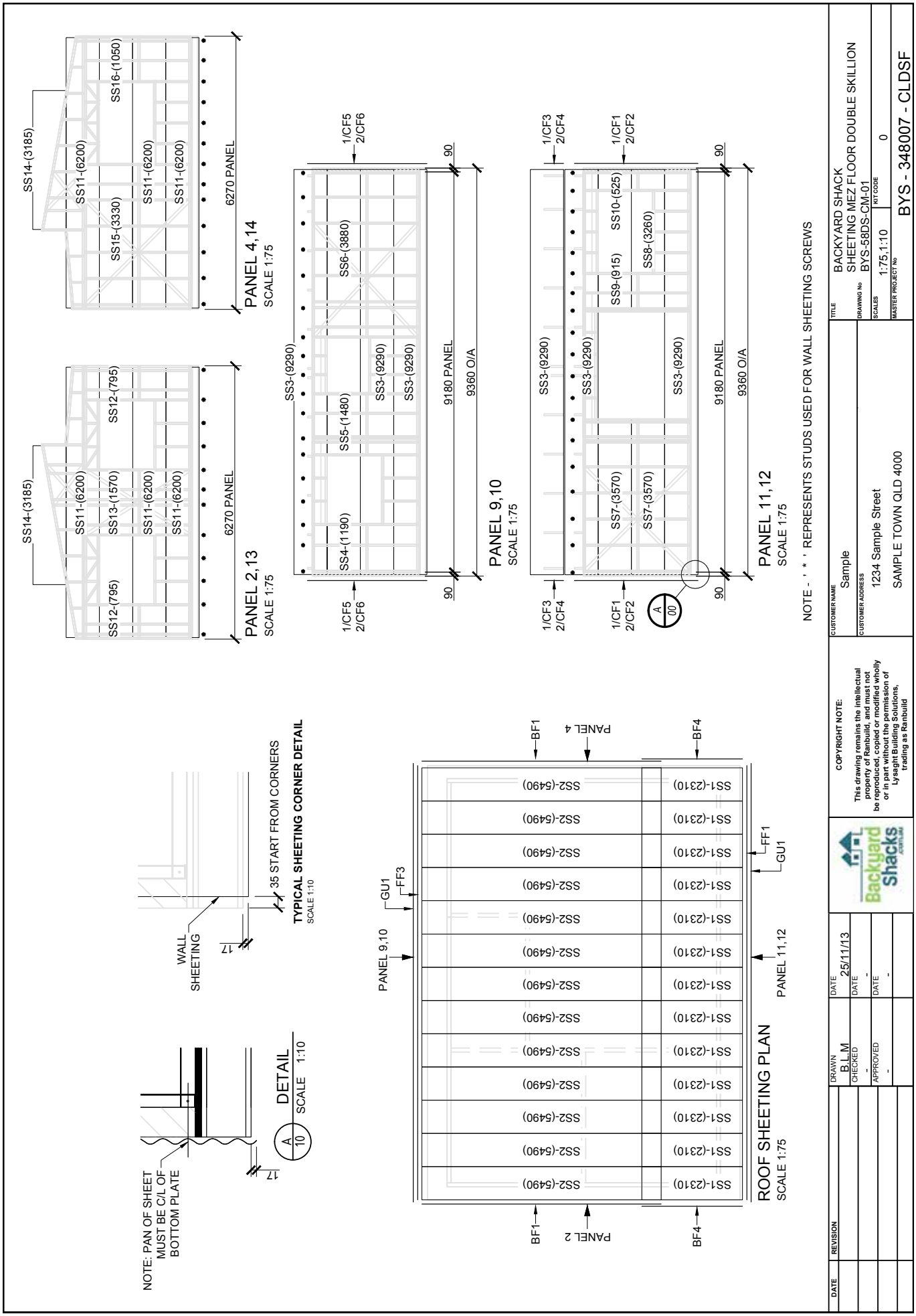


Figure15.1 Cladding layout

Position other sheets

After fixing the first sheet in position, align the following sheets using:

- the long edge of the previous sheet; and
- a measurement from the end of the sheet to the fascia or purlin at the gutter. It is important that you keep the gutter-end of all sheets in a straight line.

Fix the sheet by either:

- fixing each sheet completely, before laying the next; or
- fix the sheet sufficiently to ensure it can't move, complete laying all sheets, then return to place all the intermediate fasteners later.

Check alignment occasionally

Occasionally check that the sheets are still parallel with the first sheet, by taking two measurements across the width of the fixed cladding (Figure 15.1.2).

At about half way through the job, perform a similar check but take the measurements from the finishing line to aim for the final sheet to be parallel with the end of the roof. If the measurements are not close enough, lay subsequent sheets very slightly out of parallel to gradually correct the error by:

- properly align and fix a lap, then
- fix the other edge of the sheet, placing the fasteners slightly closer or further from where they would normally be if there was no error. (Gradually correct the error by placing the fasteners in such a way as to slowly bring the sheets back into correct alignment.)

15.2 Side-lapping & positioning pierce-fixed sheets

To prevent moisture being drawn into laps by capillary action, the edges of sheets are slightly modified. CUSTOM ORB and CUSTOM BLUE ORB have the edges of the sheet over-curved, other products like SPANDEK, TRIMDEK, INTEGRITY 820 and SPANRIB all have flutes formed into the underlapping rib. It is important that sheets be lapped correctly. This means there should only be one overlap/underlap - double lapping is not recommended. (Figure 15.2.1)

After fixing the first sheet, place the next (and subsequent) sheet with its side lap snugly over the previous sheet (Figure 15.2.1). Secure the sheet firmly in place until each end of the sheet has been fixed.

You can do this easily by:

- align the bottom edge accurately by a measurement from the end of the sheet to the fascia or purlin at the gutter;
- clamp the lap with a pair of vice grips (Figure 15.2.2);
- at the top of the sheet: nestle the side lap snugly, check alignment, and fix the sheet with a fastener.

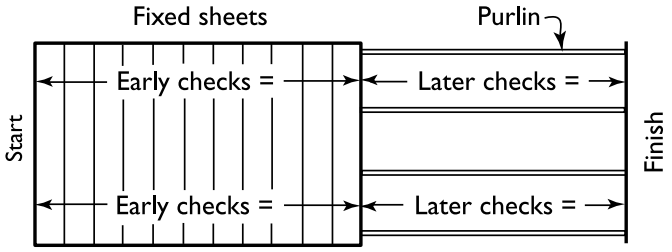


Figure 15.1.2
Check alignment occasionally

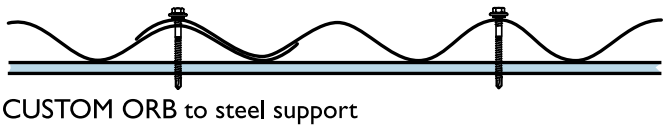


Figure 15.2.1
Crest fixing

15.3 Pierce-fixing on crests

Crest fixing is recommended for roofs made from:

- CUSTOM ORB
- CUSTOM BLUE ORB

Crest fixing may also be used for these products when they are used as walling.

15.4 Pierce-fixing on valleys (for walling only)

Wall fasteners may be placed on the crests, but they are usually placed in the valley of wall cladding because:

- they are less conspicuous and don't break the aesthetic lines of the steel cladding;
- there is no risk of the profile being deformed, because the fastener is placed through the cladding where it rests flat against its support (Figure 15.4.1); and
- water penetration is not a problem.

However, when valley-fixed, the cladding needs a side-lap fastener in all laps, at each support. You will find it more economical in labour, time and cost of fasteners to use a crest fastener at each side lap in place of the lap fastener and adjacent valley fastener (Figure 15.4.2).

15.5 Pierce-fixing on side-laps

Where roofing is installed according to the support spacings shown in Tables xxxxx.12.1 and/or xxxxx.13.1, side-lap fasteners are generally not required.

You may need to use side-lap fasteners where the cladding is laid a little out of alignment, where the weather resistance of a joint is questionable, at the end of overhangs, where insulation results in the lap opening, or for any number of reasons. Decide on the number of side-lap fasteners by what looks effective in each individual case.

The side-laps of shallow roof profiles on curved roofs (convex and concave) would be considered to have reduced weather resistance, and especially over the crest of the roof due to inadequate drainage from insufficient slope. It is common industry practice to provide side-lap fastening over the curved roof and in particular over the crest region where sealant is used.

Typical practice is to space the side-lap fasteners at 900mm maximum.

For cyclonic regions where resistance against flying debris is required the maximum recommended spacing of side-lap fasteners is 600mm.

Where valley fasteners are used (walling), you need side-lap fasteners along each lap at each support. Alternatively a crest fastener may be used at each side-lap, in place of the side-lap fastener and adjacent valley fastener (as mentioned above in Section 15.4).

Side-lap fasteners are located in the centre of the crest of the overlapping rib (Figures 15.4.1 and 15.4.2)

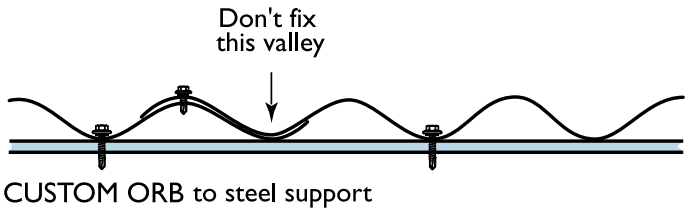


Figure 15.4.1
Typical valley fixing (for walls only)

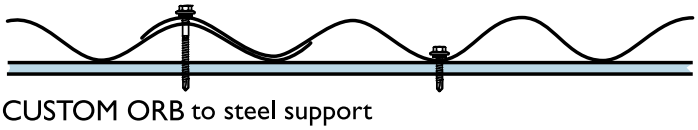
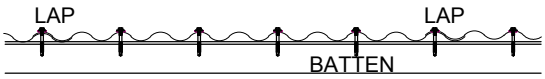


Figure15.4.2
Alternative valley/pan fixing with crest fixing at side laps (for walls only)

CUSTOM ORB PROFILE
PAN FIXED
CYCLONIC 0.42 BMT (MIN), 5 - M6.5-12x30 HEX. CYCLONIC

WALL CLADDING CYCLONIC

: CLADDING SHALL BE FIXED TO WALL STUDS AT 600 mm MAX. SPACING



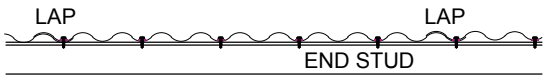
CUSTOM ORB PROFILE
CREST FIXED
CYCLONIC 0.42 BMT (MIN), M6.5 - 12 x 55 CYCLONIC ZIPS

ROOF CLADDING CYCLONIC

CLADDING SHALL BE FIXED TO ROOF BATTENS AT 600 mm MAX. SPACING,

CUSTOM ORB PROFILE
PAN FIXED
NON CYCLONIC 0.42 BMT (MIN), #10-16 x 22 TEKS

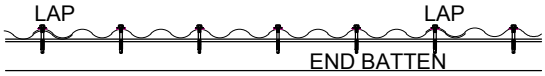
CUSTOM ORB PROFILE
CREST FIXED
NON CYCLONIC 0.42 BMT (MIN), M6-11 x 50 ROOF ZIPS



CUSTOM ORB PROFILE
PAN FIXED
NON CYCLONIC 0.42 BMT (MIN), #10-16 x 22 TEKS

WALL CLADDING NON-CYCLONIC

: CLADDING SHALL BE FIXED TO WALL STUDS AT 600 mm MAX. SPACING



CUSTOM ORB PROFILE
CREST FIXED
NON CYCLONIC 0.42 BMT (MIN), M6-11 x 50 ROOF ZIPS

ROOF CLADDING NON-CYCLONIC

NOTE : CLADDING SHALL BE FIXED TO ROOF BATTENS AT 900 mm MAX. SPACING

Figure15.4.3
Cladding fixing

16.0 Fasteners

The class of fasteners should be as stipulated in AS3566.
Fasteners used should be BlueScope Steel approved.
The fasteners below are suitable for fixing structural steel frames together, as specified below.

Description	Uses
 5/16"-12x17 hex. head #17-15x15 hex. head with trilobular thread forms	Structural connections on trusses.
 12-14x20mm hex. head self drilling screw	Structural fixing screw, tiles roof truss fixing, girder/truss heel bracket fixing, roof
 10-16x16mm Wafer head self drilling screws	Flush fixing screw where flush surface finish is required, e.g. Plasterboard® corner angles.
 14-10x20mm	Structural fixing screw low wind area.
 6-20x50mm CSK wing self drilling screws	Architraves, reveals and skirtings. General finishing and fixing timber screw.
 6-20x65mm CSK self drilling screws	Architraves, reveals and skirtings. General finishing and fixing timber screw.
 6-18x30mm bugle needle point self drilling screws	Plasterboard fixing to ceiling battens
 6-20x25mm bugle drill point self drilling screws	Plasterboard fixing to wall frame studs.
 8-18x25 SEH extended point self drilling screws	Fibrous cement fixing screw (wet areas.)

17.0 Definitions of terms

17.1) Gable ladder: A pre-fabricated panel used to form a gable overhang.

17.2) Common Rafter: A member on a hip end supported by truncated trusses and supporting roof battens.

17.3) Creeper Rafter A member on a hip end supported by the hip rafter and end wall supporting roof battens.

17.4) Hip Rafter: A prefabricated member from channel section running down the hip ridges supporting creeper rafters and battens.

17.5) Whaling Plate: A length of chord section fixed to the outside face of a dutch gable truss to support common rafters.

17.6) Bridge Bracket: Connects a bridge truss to a girder truss.

17.7) Wind Bracing: Bracing fitted diagonally over the roof plane from the top plate to the ridge line to transfer bracing loads in to the supporting structure.

17.8) Bottom Chord Tie: A section fixed at right angles to the bottom chord to provide lateral restraint.

17.9) Temporary Braces: Structural sections used to brace trusses in position before the application of permanent bracing. Temporary bracing must be fastened for solid support.

17.10) Bottom Chord Tie: A section fixed at right angles to the bottom chord to provide lateral restraint.

17.11) Bracing Strap: Light-gauge metal strap 25x1 used to brace roof frames. Two straps diagonally opposed on one plane form one brace.

17.12) Bracing- Roof: Bracing fitted diagonally over a roof plane from the top plate to the ridge line to transfer bracing loads in to the supporting structure.

17.13) Bracing Wall: Component fixed to the face of a wall panel to provide shear strength in the plane of the wall. Bracing may be Strap, Panel or K type.

17.14) Chords: Steel components forming the external perimeter of a truss.

17.15) Cladding: Wall or roof lining- Covering to structural frame to provide weather protection to the building.

17.16) Dutch Gable (Dutch Hip): A block end type where the rafter face is truncated by a vertical face some distance back from the hip end pitching line.

17.17) Eave Block: A block outside the building pitching perimeter defining the extent of rafter or truss top chord extension past the pitching line

17.18) Gridlines: A series of equal spaced vertical and horizontal reference lines with origin at the building Start point. They offset in both polar directions towards the 2 ends of the building. Grid-lines may form the basis of stud-spacing, truss spacing or wall cladding joint location.

17.19) Heel: The truss connection at an end support point.

17.20) Hip Line: The interface between block faces where the difference between the 2 adjoining block top faces is more than 180 degrees

17.21)Load Bearing Wall: A wall which carries vertical loads from the construction above and or lateral loads resulting from the wind. Internal or external walls may be load bearing.

17.22) Non-Load Bearing walls: Internal walls which do not support roof or floor loads are considered non load-bearing. However Internal walls may be sued as lateral bracing walls and are required to resist internal wind pressures.

17.23) Panel Point: The connection point of a truss web to a chord.

17.24) Pitching line: The external perimeter of a buildings roof. It is the intersection between the bottom of a truss bottom chord and the bottom of a truss top chord or for cut off or half trusses of the bottom chord and the external face of the end chord. It is often aligned with the external face of an external wall.

17.25) Rafter Crown: A rafter positioned at the centre of a standard hip face running from the intersection point of the hip lines to the outside edge of the eave block

17.26) Rafter Face: A top face of a roof block whose battens are supported by rafters. Standard faces are triangular and extend over the entire width of a rectangular block end.

17.27) Rafters - Creeper: Rafters positioned in a hip that are not supported by trusses but by hip rafters, load bearing walls or fascias only.

17.28) Rafters - Common: Rafters positioned in standard locations extending from hip rafter to fascia supported by truncated trusses

17.29) Rafters - Hip: Hip rafters provide rafter and batten support at the edge of a rafter face where the difference between the 2 adjoining block top faces is more than 180 degrees

17.30) Rafters - Valley: Valley rafters provide rafter and batten support at the edge of a rafter face where the difference between the 2 adjoining block top faces is less than 180 degrees

17.31) Ridge: The interface between two block faces where the difference between the 2 adjoining block top faces is more than 180 degrees.

17.32) Shear wall: This is the structural system consisting of flat tensile braces, studs and hold-down connectors. It is used to resist racking loads and is discretely placed within a wall panel to transfer racking loads to the foundation. Wall breakpoints should NOT be placed within the location of a shear wall brace.

17.33) Soffit: The finished underside of a roof overhang or porch ceiling that covers the rafter bottoms or eaves.

17.34) Truss Station: In a Hip end the truss station is its position from the hip end pitching line expressed in terms of mm or truss spans. eg where trusses are spaced at 600mm centres the first or 600mm station truss is placed 600mm from the hip end pitching line.

17.35) Valley End: A combination of Girder Truss supporting bridge trusses in an adjoining roof block and Saddle trusses forming the ridge line between the 2 blocks.

17.36) Valley Line: The interface between two block faces where the difference between the 2 adjoining block top faces is less than 180 degrees.

17.37) Webs: Steel Members that join the top and bottom chords of a roof or floor Truss, which form triangular patterns usually carrying tension or compression forces.

17.38) Whaling Plate: A steel section fixed to the outside face of a dutch gable truss to support common rafters. May be a channel or pressed steel component.

17.39) Detailer: A person who has been through a structured training program under the supervision of an approved trainer. That person must hold a current certificate from BlueScope Steel stating they are qualified to design and detail residential structures, utilising the ENDUROCADD™ software, which are fit for manufacture and erection.

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