

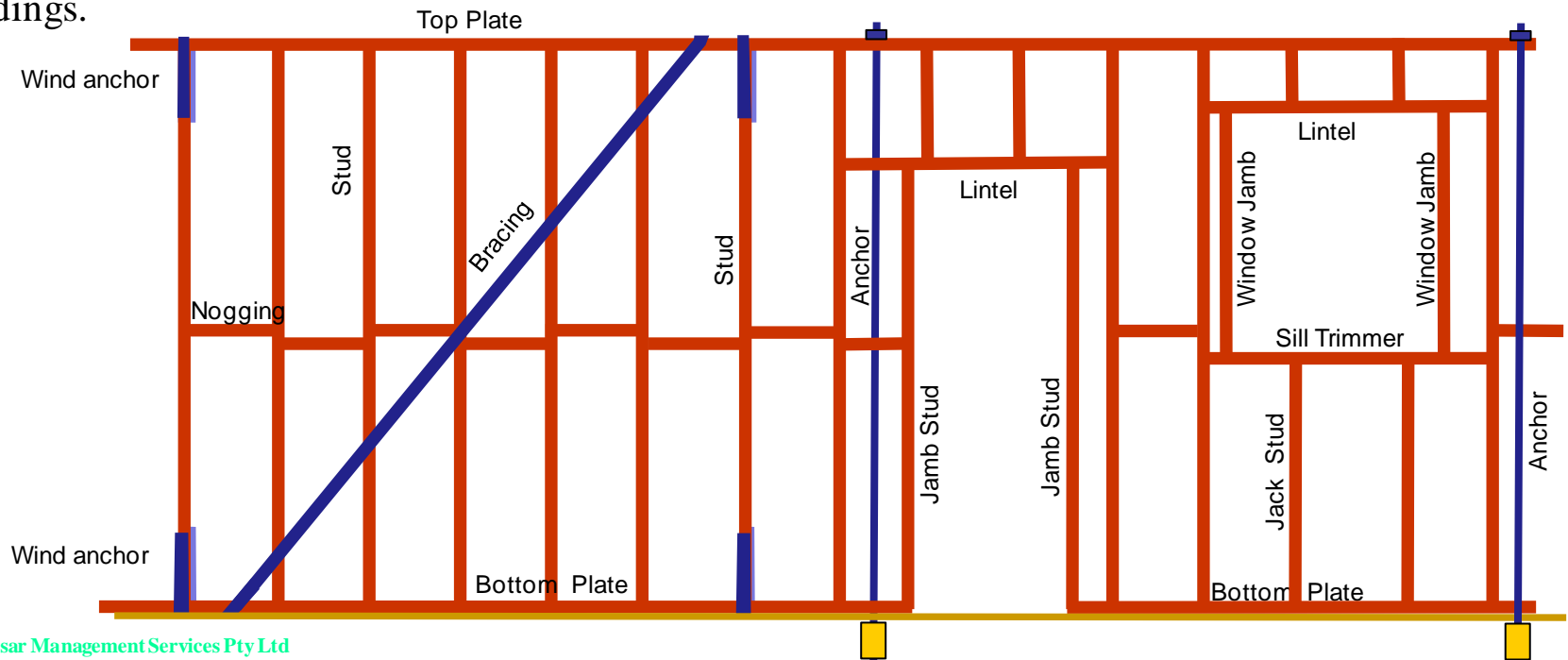
# Timber Wall Frames

This part of the training package provides information on timber wall frames, including materials, top and bottom plates, studs, noggings and lintels for village infrastructure and houses common in South-east Asia and the South Pacific region.



# Walls Framing for Conventional Timber Framed Houses

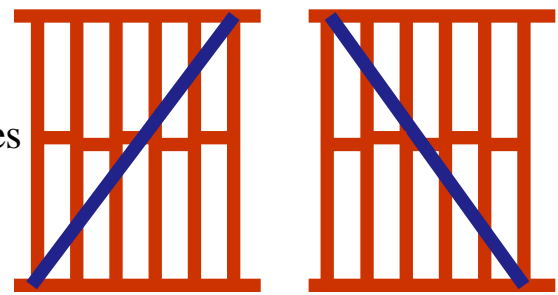
- Conventional timber framed houses usually consist of a non-coupled roof, coupled roof or a truss roof, supported on load-bearing timber framed walls (consisting of studs, top plates, noggings and bottom plates), which are supported on a floor consisting of joists and bearers, supported on posts and/or piers.
- External walls usually support the roof (and are classified as loadbearing), while internal walls usually do not support the roof (and are classified as non-loadbearing)
- Such a system, developed in regions with relatively low wind loads, cater principally for vertical downwards gravity loads.
- In recent decades, designers in tropical and sub-tropical regions have become aware of the need to provide roof and wall tie down anchorages to resist high wind uplift and to provide racking bracing to resist high sideways wind loads. This adds considerable complexity and cost to conventional framed buildings.



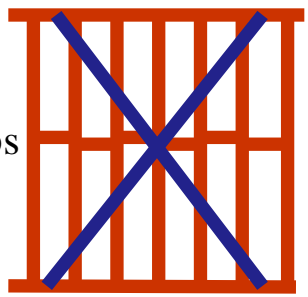
# Walls Bracing for Conventional Timber Framed Houses

- Houses in tropical and sub-tropical regions require roof and wall tie down anchorages to resist high wind uplift and to provide racking bracing to resist high sideways wind loads.
- Following are examples of various types of racking bracing and their horizontal shear capacities, based on AS 1684. For further information on the details and the capacities, refer to AS 1684.

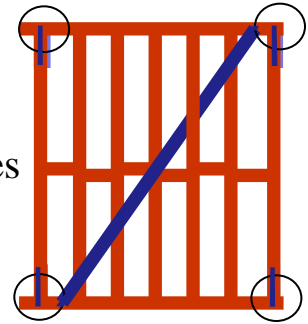
1. Two Diagonally Opposed Timber or Metal Braces



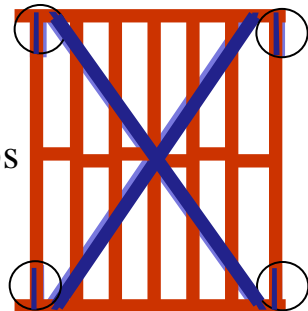
2. Pairs of Tensioned Metal Straps



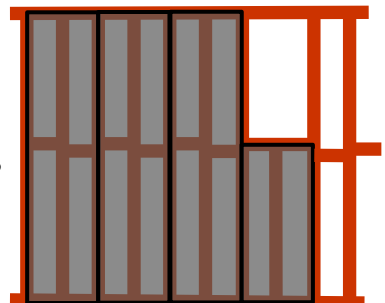
3. Timber or Metal Angle Braces



4. Tensioned Metal Straps with Stud Straps

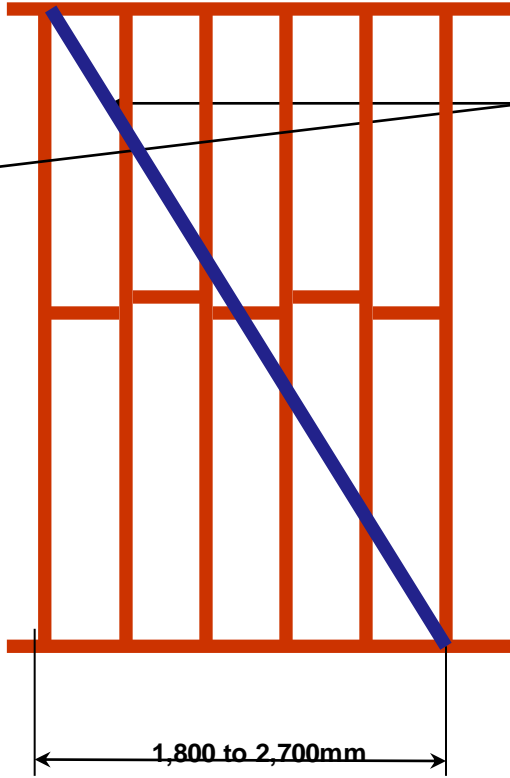
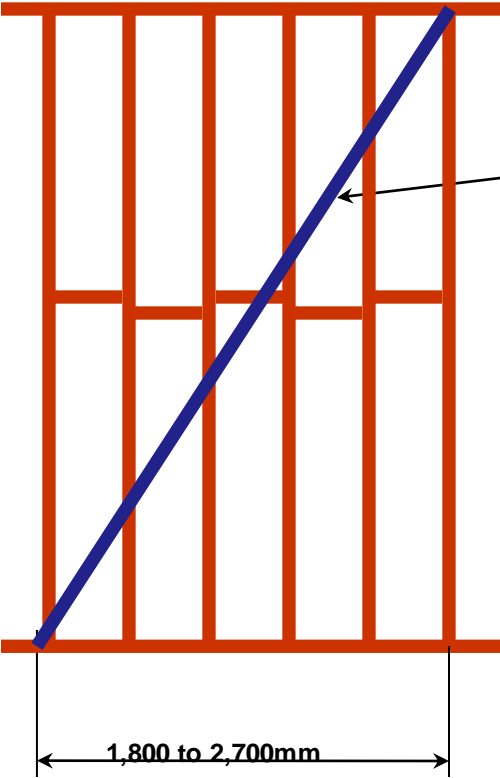


5. Plywood Sheeting Without Additional Connections



# Wall Bracing – Two Diagonally Opposed Timber or Metal Braces

**Capacity 0.8 kN/m length**  
Based on AS 1684.3 Table 8.18 (a)



45 x 19 mm or 70 x 19 mm hardwood timber braces fixed to each stud and plate by 1-50 x 2.8 mm  $\phi$  galvanised flat head nail

OR

18 x 16 x 1.2 mm galvanised steel angle brace fixed to each stud by 1-30 x 2.8 mm  $\phi$  galvanised flat-head nail and nailed to the top and bottom plates by 2-30 x 2.8 mm  $\phi$  galvanised flat-head nails.

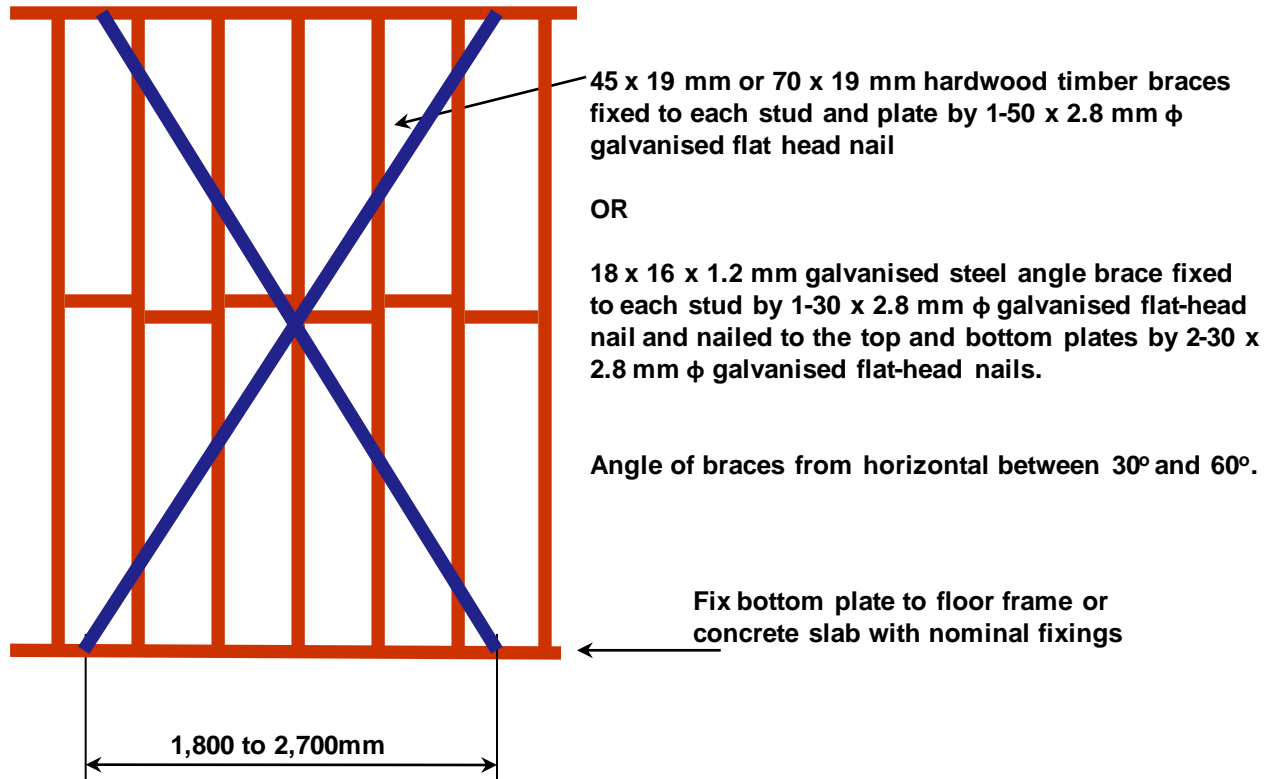
Angle of braces from horizontal between 30° and 60°.

Fix bottom plate to floor frame or concrete slab with nominal fixings

# Wall Bracing – Pairs of Tensioned Metal Straps

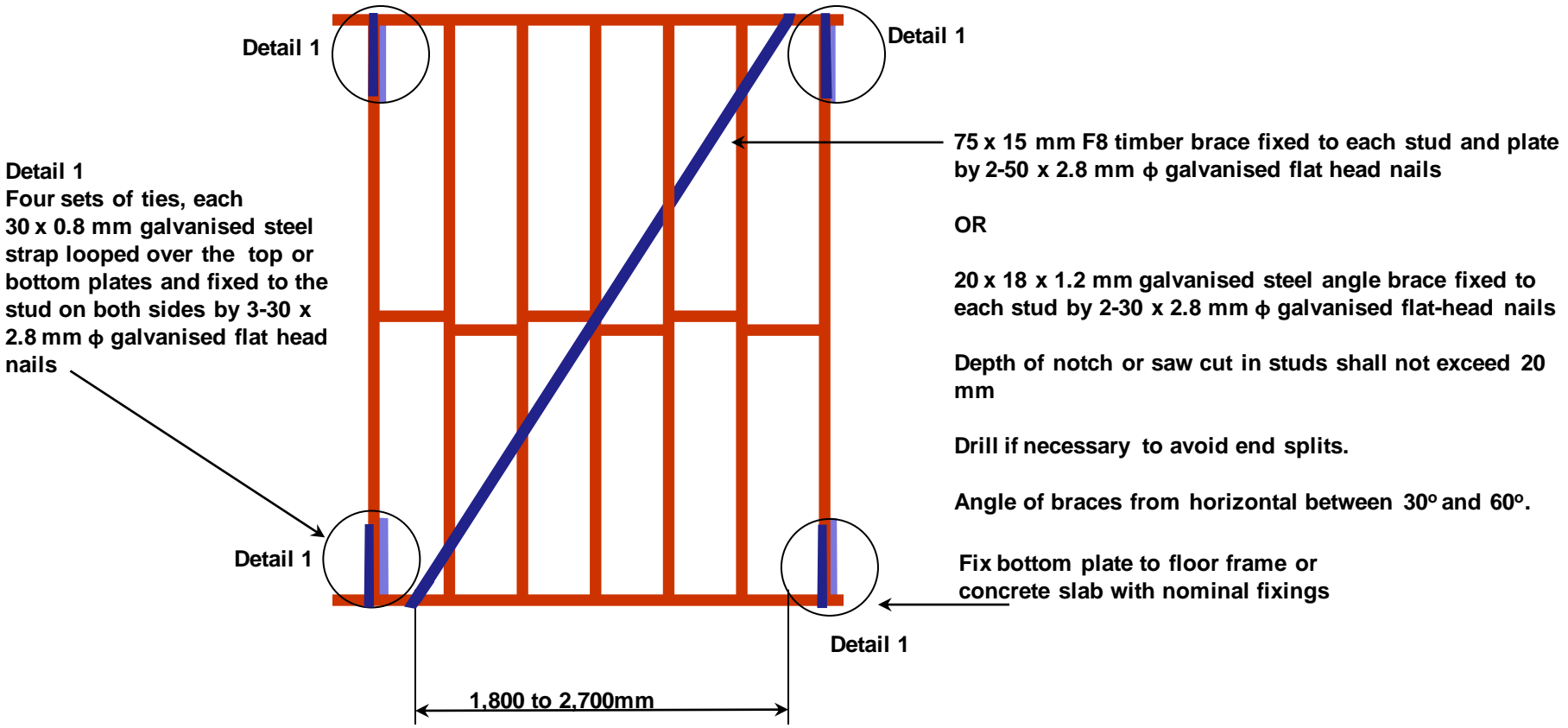
**Capacity 1.5 kN/m length**

Based on AS 1684.3 Table 8.18 (b)



# Wall Bracing – Timber or Metal Angle Braces

**Capacity 1.5 kN/m length**  
Based on AS 1684.3 Table 8.18 (c)



**Detail 1**  
Four sets of ties, each 30 x 0.8 mm galvanised steel strap looped over the top or bottom plates and fixed to the stud on both sides by 3-30 x 2.8 mm  $\phi$  galvanised flat head nails

75 x 15 mm F8 timber brace fixed to each stud and plate by 2-50 x 2.8 mm  $\phi$  galvanised flat head nails

OR

20 x 18 x 1.2 mm galvanised steel angle brace fixed to each stud by 2-30 x 2.8 mm  $\phi$  galvanised flat-head nails

Depth of notch or saw cut in studs shall not exceed 20 mm

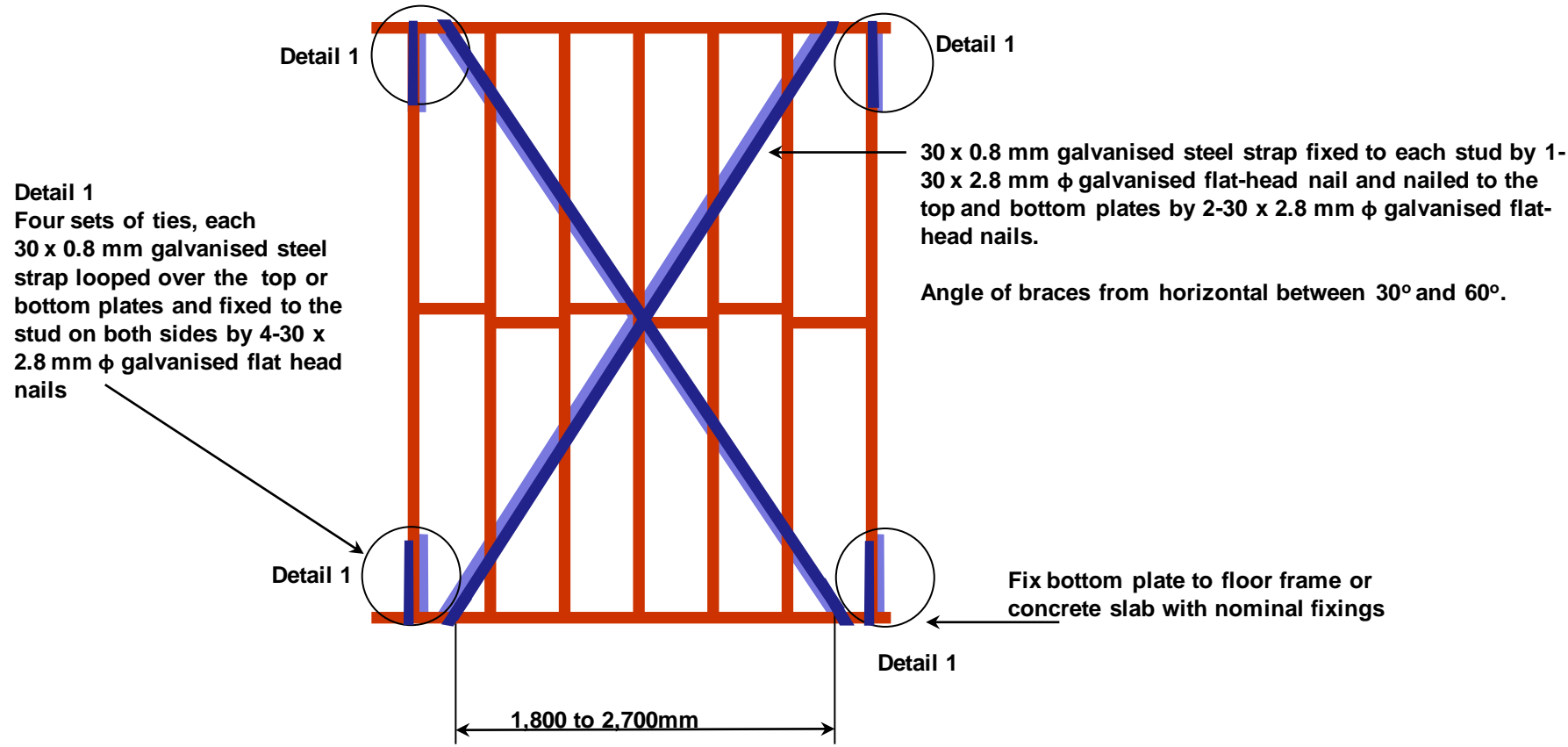
Drill if necessary to avoid end splits.

Angle of braces from horizontal between 30° and 60°.

Fix bottom plate to floor frame or concrete slab with nominal fixings

# Wall Bracing – Tensioned Metal Straps with Stud Straps

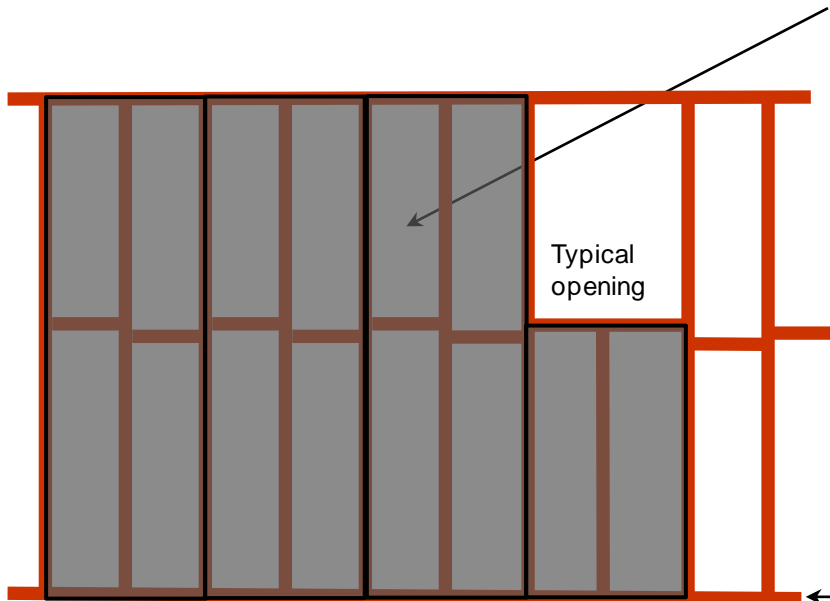
**Capacity 3.0 kN/m length**  
Based on AS 1684.3 Table 8.18 (d)



# Wall Bracing – Plywood Sheeting Without Additional Connections

**Capacity 3.4 kN/m length**

Based on AS 1684.3 Table 8.18 (g)



Plywood sheets fixed:

- Around perimeter to top plate, bottom plate and end studs at 150 mm centres by 30 x 2.8 mm  $\phi$  galvanised flat head nails; and
- To internal studs (and noggings where required) at 300 mm centres by 30 x 2.8 mm  $\phi$  galvanised flat head nails.

Sheets may be butt jointed horizontally, provided they are fixed horizontally at the edges to noggings. Provide an additional row of nogging at half height of the wall, if required.

Minimum Plywood Thickness				
Stud Spacing	450 mm	600 mm	450 mm	600 mm
Stress Grade	No nogging (except at horizontal butt joints)		One row of nogging	
F8	7 mm	9 mm	<b>7 mm</b>	7 mm
F11	4.5 mm	7 mm	4.5 mm	4.5 mm
F14	4 mm	6 mm	4 mm	4 mm
F27	3 mm	4.5 mm	3 mm	3 mm

Sheathed panels shall be fixed to the sub-floor. Fix the bottom plate to floor frame or concrete slab with nominal fixings.



# Pro-forma Inspection Schedules

The close control of construction is critical to the correct function of a building structure.

The following slides provide a sample Inspection Schedule to indicate the type of inspection that may be warranted. These can be adapted to assist in the site control function.

The details of any Inspection Schedule should be developed by the designer to suit the particular requirements of the application.



# Design and Construction Checklist

**Site**

**Activity** Timber Wall Framing

Item or Product	Required	Acceptance	Hold Witness	Date, Inspector, Comment
<b>Anchorage Stud</b>				
Anchorage stud spacing	0.900 m			
Anchorage stud type	USHWD F11			
Anchorage stud depth	75 mm			
Anchorage stud width	50 mm			
Anchorage stud fixing	1/M12x125 galv bolts, single shear, parallel to grain			
<b>Common Stud</b>				
Common stud max spacing	0.450 m			
Common stud type	USHWD F11			
Common stud depth	75 mm			
Common stud width	50 mm			
Common stud fixing	2/90x3.15φ galv nails, shear, side grain			
<b>Wall Bottom Plate</b>				
Wall bottom plate type	USHWD F11			
Wall bottom plate depth	75 mm			
Wall bottom plate width	50 mm			
Wall bottom plate fixing	2/90x3.15φ galv nails, shear, side grain			
<b>Wall Top Plate</b>				
Wall top plate type	USHWD F11			
Wall top plate depth	75 mm			
Wall top plate width	50 mm			
No of components in each membe	1			
Wall top plate fixing type	2/90x3.15φ galv nails, shear, side grain			
<b>Wall Nogging</b>				
Wall nogging type	USHWD F11			
Wall nogging depth	75 mm			
Wall nogging width	50 mm			
Wall nogging fixing	2/90x3.15φ galv nails, shear, side grain			

<b>Lintel</b>					
Lintel span	0.900 m				
Lintel type	USHWD F11				
Lintel depth	75 mm				
Lintel width	50 mm				
Lintel fixing type	2/90x3.15φ galv nails, shear,	side grain			
<b>Plywood Wall Bracing</b>					
Wall bracing height	2.400 m				
Wall bracing type	7.0 mm F8 plywood, 30 x 2.8	flat-head nails @ 50 mm crs			
Wall bracing width	900 mm				
Wall bracing thickness	7 mm				
No of components in each member	1				
Wall bracing fixing	7.0 mm F8 plywood, 30 x 2.8	flat-head nails @ 50 mm crs			
<b>Diagonal Timber Wall Bracing</b>					
Wall bracing height	2.400 m				
Wall bracing type	USHWD F11				
Wall bracing width	75 mm				
Wall bracing thickness	50 mm				
Wall bracing fixing	2/90x3.15φ galv nails, shear,	side grain			
Notes					

# Disclaimer & Copyright

## Disclaimer

This training package covers broad engineering principles and building practices, with particular emphasis on affordable housing and associated village infrastructure in the Asia-Pacific region. These broad principles and practices must be translated into specific requirements for particular projects by professional architects, engineers or builders with the requisite qualifications and experience. Associated sample specifications and drawings are available in electronic format, with the express intention that architects, engineers and builders will edit them to suit the particular requirements of specific projects. The design, construction and costing of structures must be carried out by qualified and experienced architects, engineers and builders, who must make themselves aware of any changes to the applicable standards, building regulations and other relevant regulations. The authors, publishers and distributors of these documents, specifications and associated drawings do not accept any responsibility for incorrect, inappropriate or incomplete use of this information.

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