

Timber Direct Anchorage System

This training package provides information on the prefabricated Direct Anchorage System for timber roof, walls, floor and sub-floor framing for resistance to cyclonic wind . The system is applicable to village infrastructure and houses common in South-east Asia and the South Pacific region.



Timber Direct Anchorage System

The Direct Anchorage System consist of:

- Timber roof purlins on edge at 900 mm centres designed to support corrugated steel roof sheeting.
- Direct Anchorage roof trusses are spaced at 900 mm centres and consist of double top chords (enabling the lacing and the anchorage studs to pass between) and single bottom chords. The timber lacing is securely nailed between the two top chords and fixed to the bottom chord using steel nailing plates or nailed timber gussets.
- The trusses are bolted to timber anchorage studs between the pairs of top chords.
- Plywood wall bracing
- The timber anchorage studs are bolted to the joists and double bearers.
- Double bearers are bolted to steel posts
- Steel posts are set in concrete piers
- Diagonal timber sub-floor bracing.



Timber Direct Anchorage System

Timber roof purlins on edge spaced at 900 mm centres

DirectAnchorage roof trusses spaced at 900 mm centres

Trusses bolted to timber Anchorage Studs between the pairs of top chords

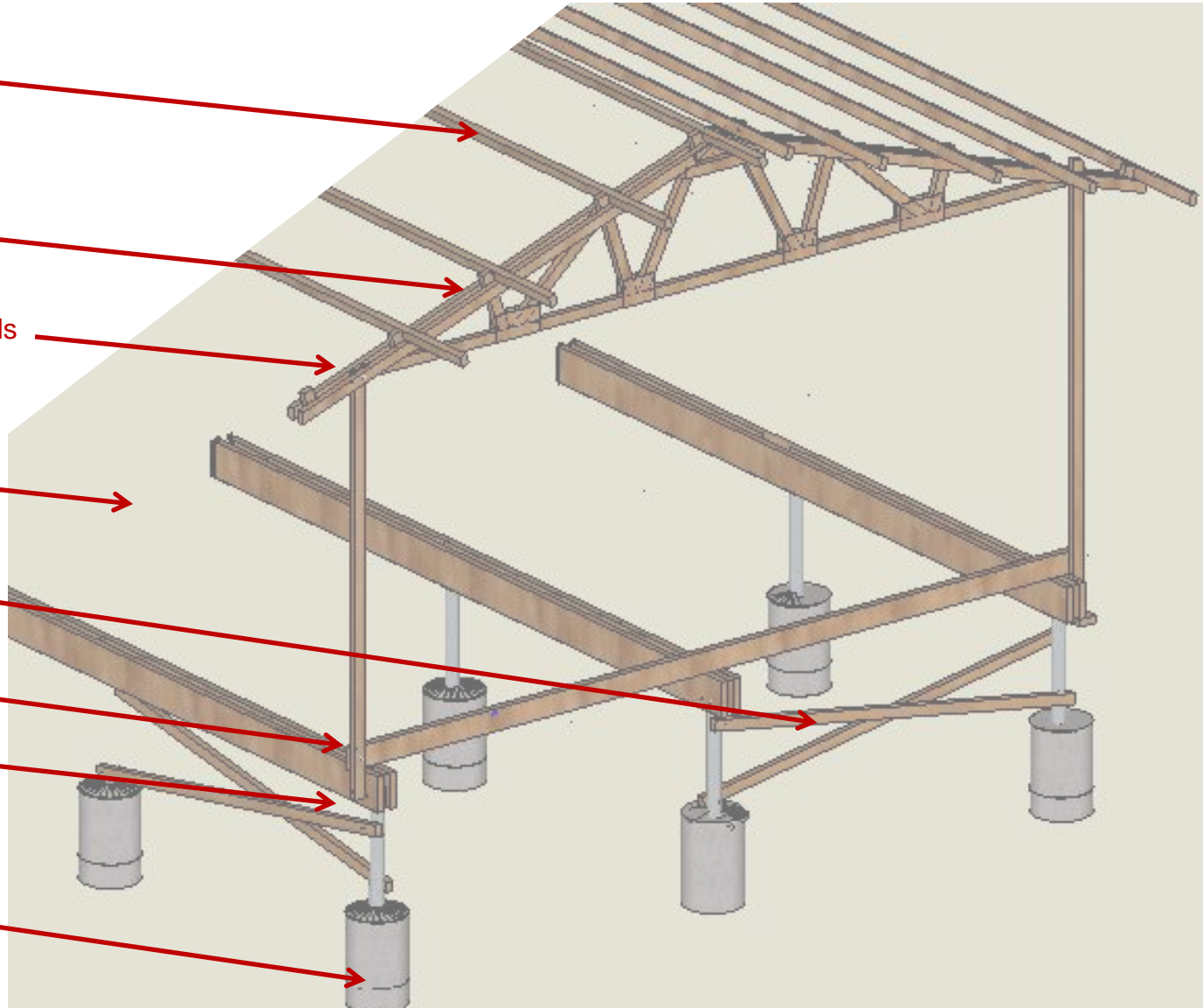
Plywood wall bracing

Diagonal timber sub-floor bracing

Anchorage Studs bolted to joists and double bearers

Double bearers bolted to steel posts

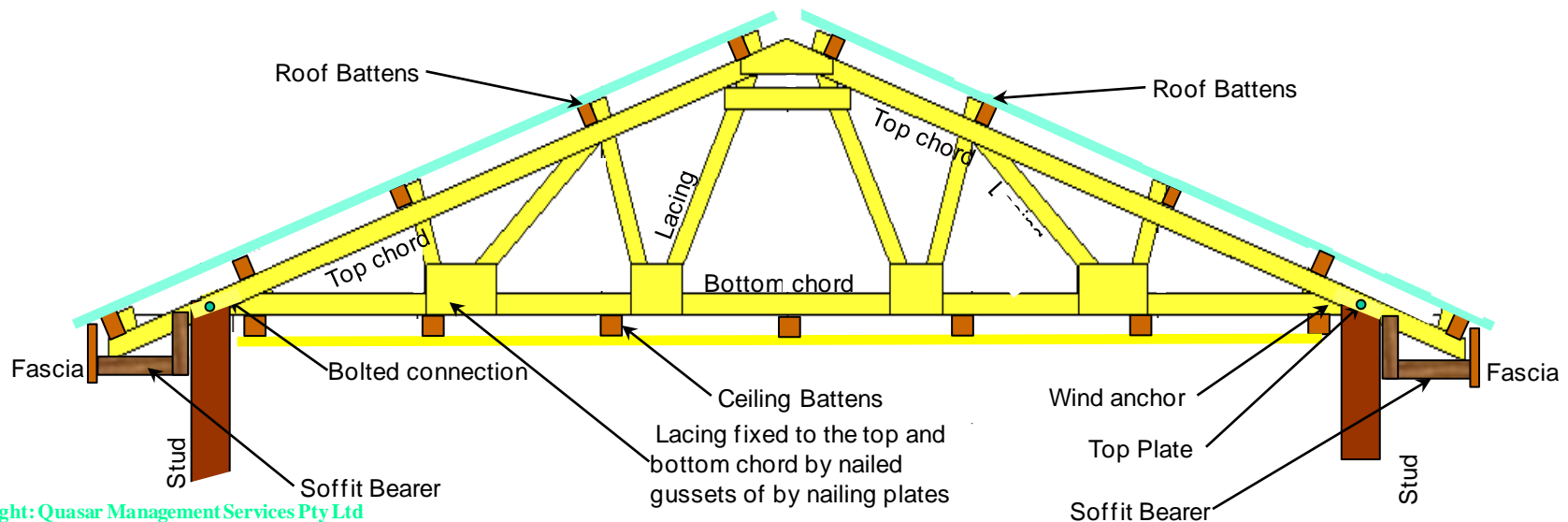
Steel posts set in concrete piers



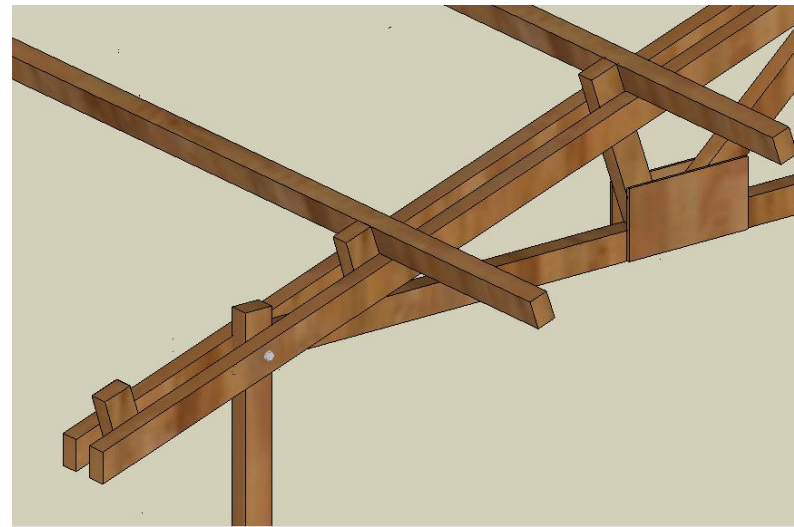
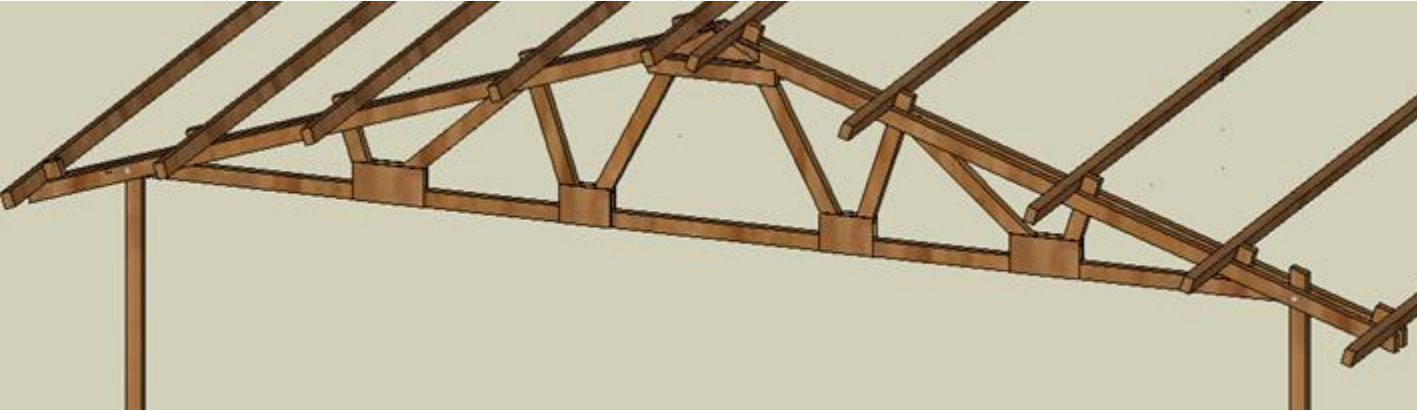
Direct Anchorage Roof System

The roof trusses used for a Direct Anchorage System are similar to conventional trusses, but with some very important improvements to provide additional resistance to cyclonic and non-cyclonic wind uplift. They are generally prefabricated and delivered to site in one or two sections, depending on the length.

1. Timber roof purlins on edge (e.g. 100 or 75 deep x 50 mm wide).span 900 mm at 900 mm centres. This 900 x 900 grid is specifically designed to support commonly available corrugated steel roof sheeting in high wind applications. These purlins are fixed horizontally directly into the timber truss lacing.
2. Direct Anchorage roof trusses are spaced at 900 mm centres and consist of double top chords (enabling the lacing and the anchorage studs to pass between) and single bottom chords.
3. The timber lacing is securely nailed between the two top chords and fixed to the bottom chord using steel nailing plates or nailed timber gussets.
4. The trusses are bolted to timber anchorage studs between the pairs of top chords.

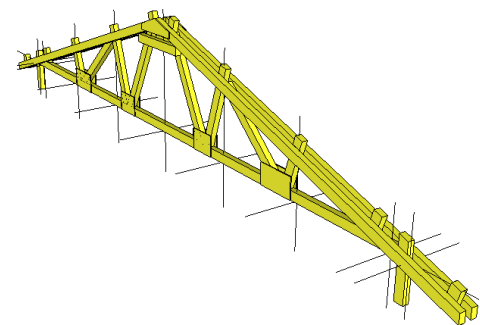
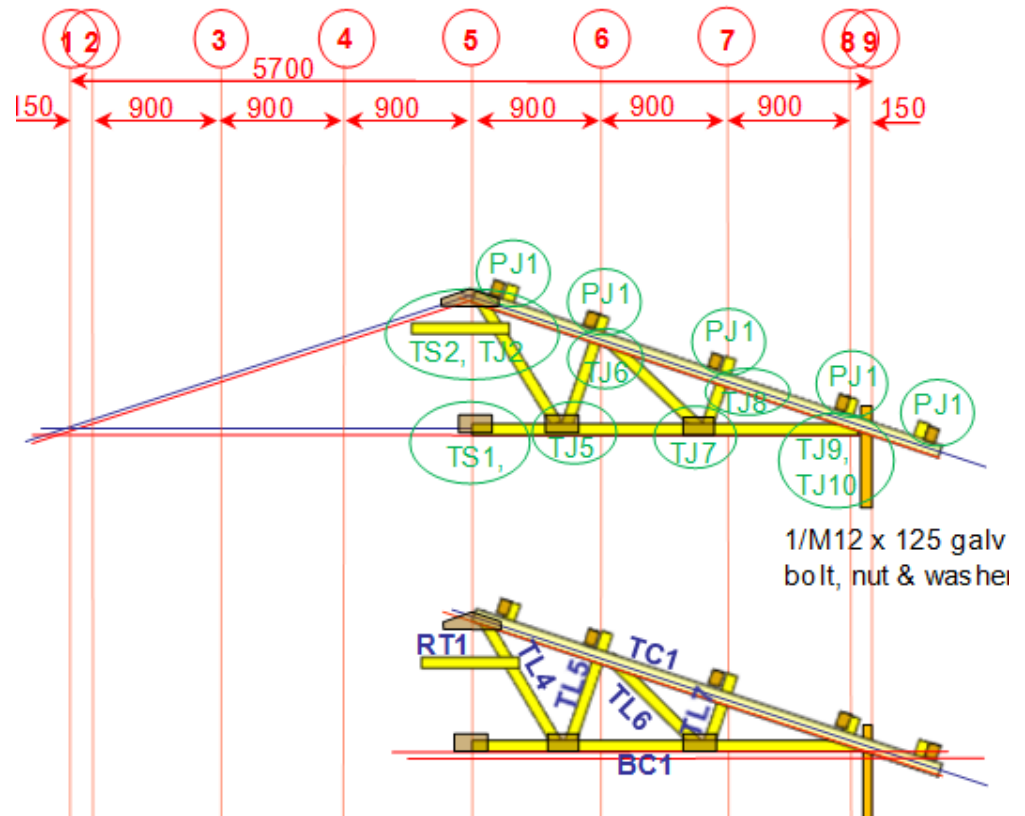


Direct Anchorage Roof System



Direct Anchorage Roof System – Arrangement

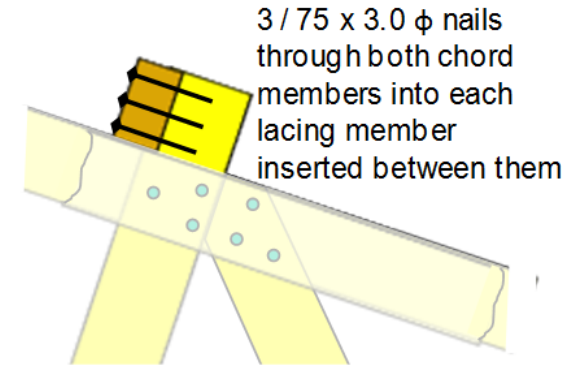
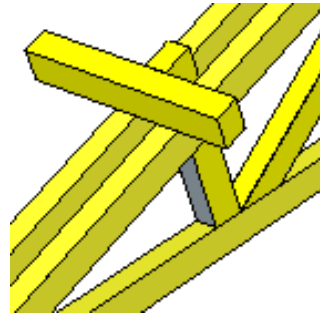
- The Direct Anchorage Roof System is based on 900 x 900 modules. That is, purlins at 900 mm centres and trusses at 900 mm centres.
- To accommodate the double top chord arrangement and the depth of the end stud, the overall length and width of the building are a further 300 mm in addition to the standard 900 mm modules.
- This makes the overall width of standard buildings 5.7 metres and 8.4 metres.



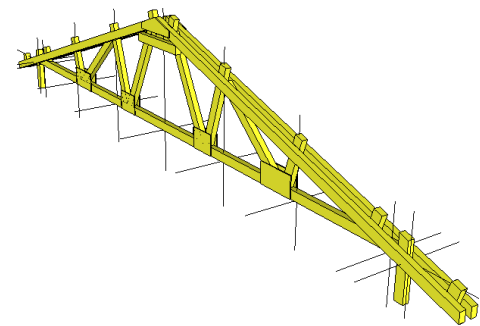
The following examples are for a 5.7 m standard truss.
Other Direct Anchorage Systems will have different details.

Direct Anchorage Roof System – Purlins

1. Timber roof purlins on edge (e.g. 100 or 75 deep x 50 mm wide).span 900 mm at 900 mm centres. This 900 x 900 grid is specifically designed to support commonly available corrugated steel roof sheeting in high wind applications. These purlins are fixed horizontally directly into the timber truss lacing.

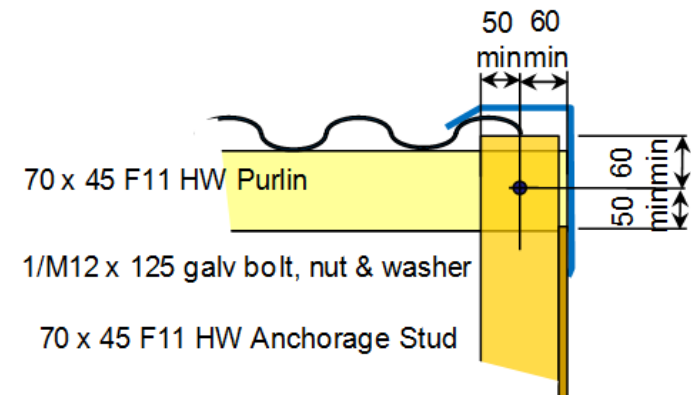
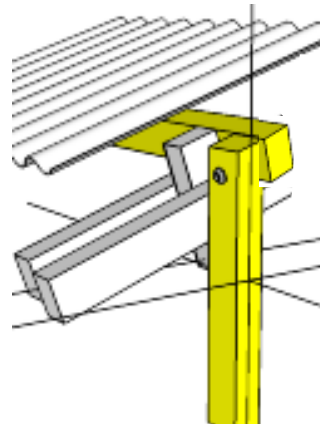


Connection PJ 1 – Purlin to Top Chord



The following examples are for a 5.7 m standard truss.

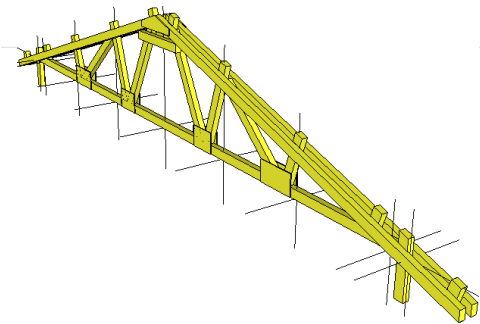
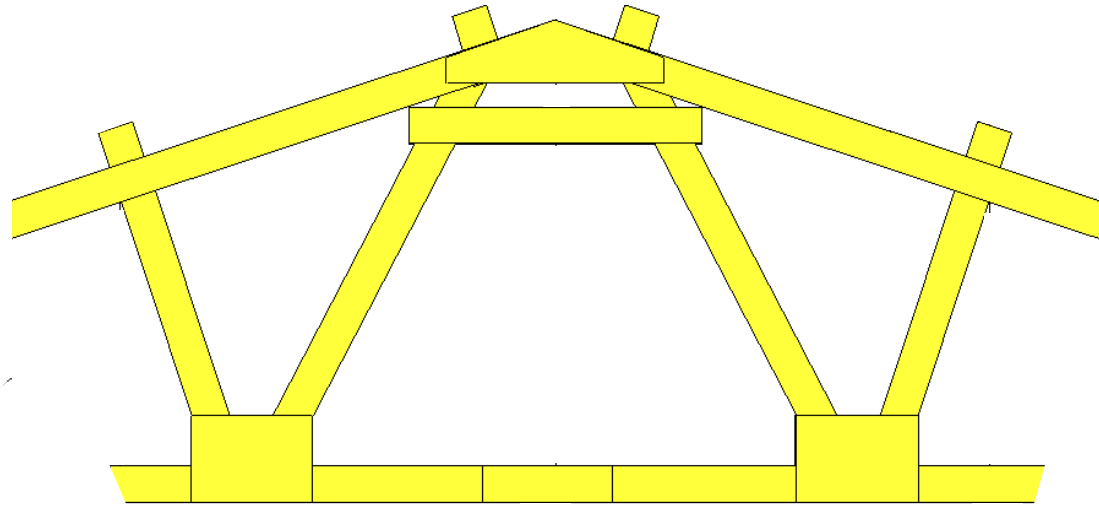
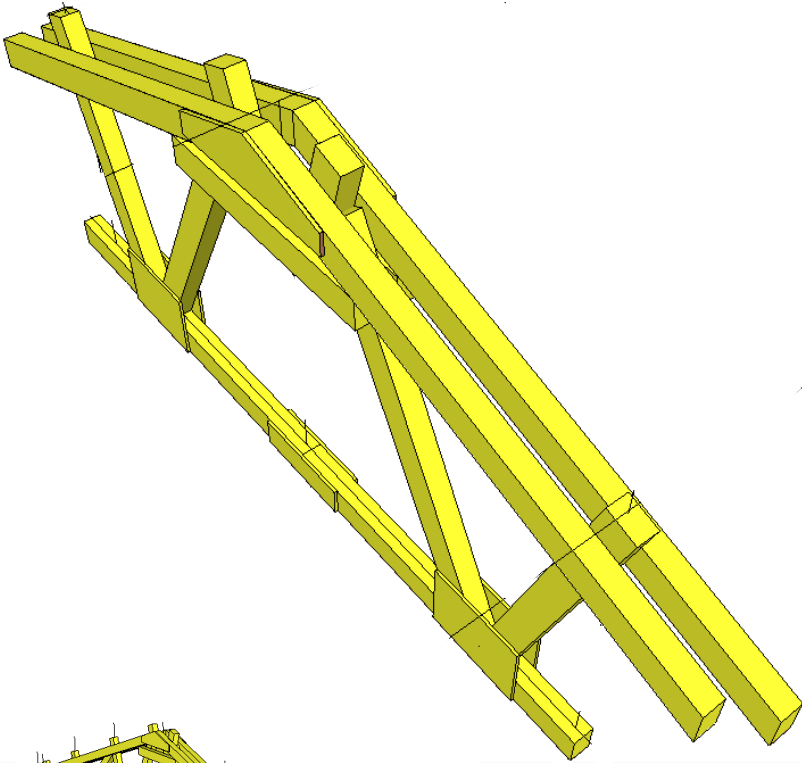
Other Direct Anchorage Systems will have different details.



Connection PJ 2 – Purlin to Anchorage Stud

Direct Anchorage Roof System – Trusses

2. Direct Anchorage roof trusses are spaced at 900 mm centres and consist of double top chords (enabling the lacing and the anchorage studs to pass between) and single bottom chords.

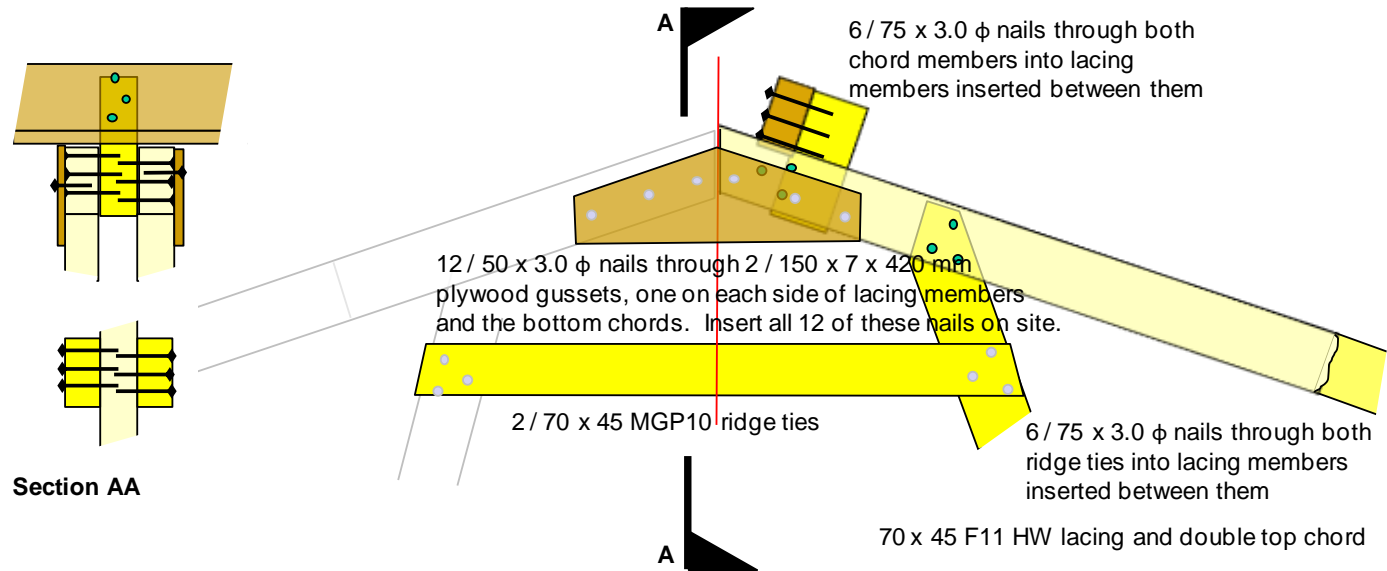


The following examples are for a 5.7 m standard truss.

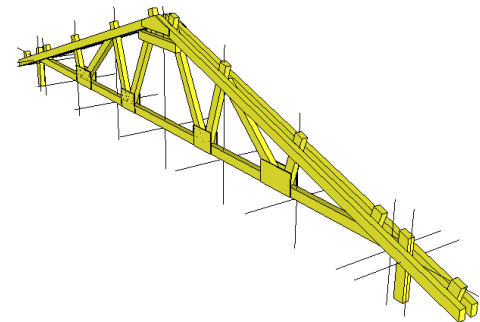
Other Direct Anchorage Systems will have different details.

Direct Anchorage Roof System – Lacing and Connections

- The timber lacing is securely nailed between the two top chords and fixed to the bottom chord using steel nailing plates or nailed timber gussets.



Connection TJ2a – Lacing to Truss Top Chord
Connection TS2 a–Truss Top Chord Splice



The following examples are for a 5.7 m standard truss.

Other Direct Anchorage Systems will have different details.

12 / 50 x 3.0 ϕ nails through 2 / 70 x 7 x 270 mm plywood gussets, one on each side of the bottom chords. Insert 6 of these nails on site

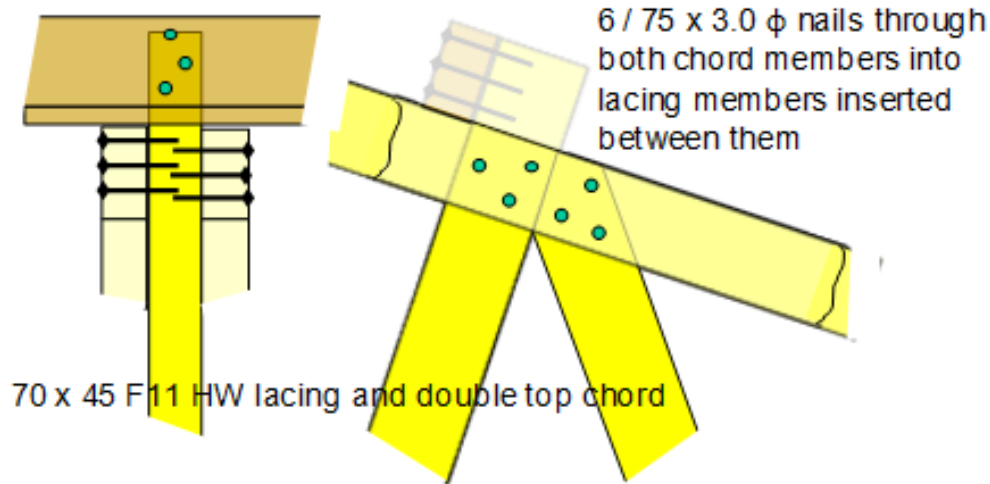
70 x 45 F11 HW lacing and double top chord



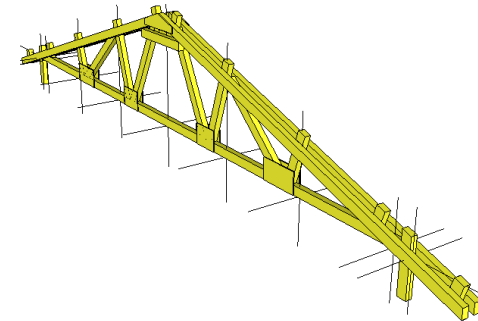
Connection TS1 a–Truss Bottom Chord Splice

Direct Anchorage Roof System – Lacing and Connections

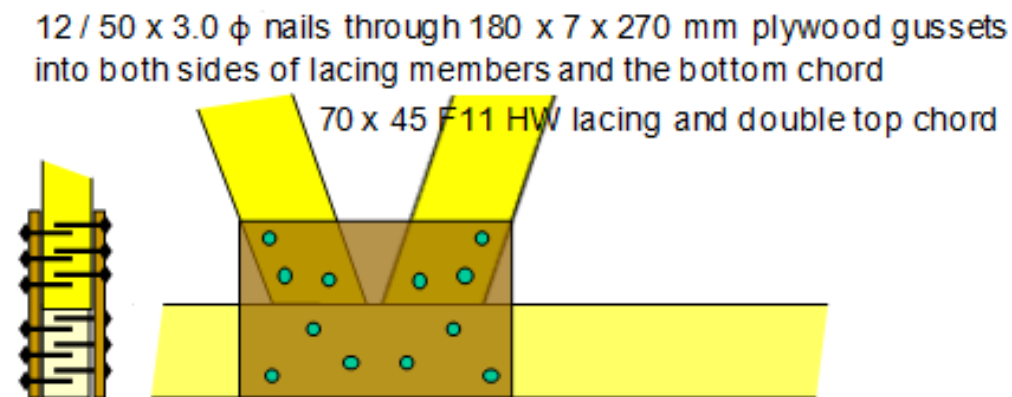
3. The timber lacing is securely nailed between the two top chords and fixed to the bottom chord using steel nailing plates or nailed timber gussets.



Connection TJ6 (Typical) – Lacing to Truss Top Chord

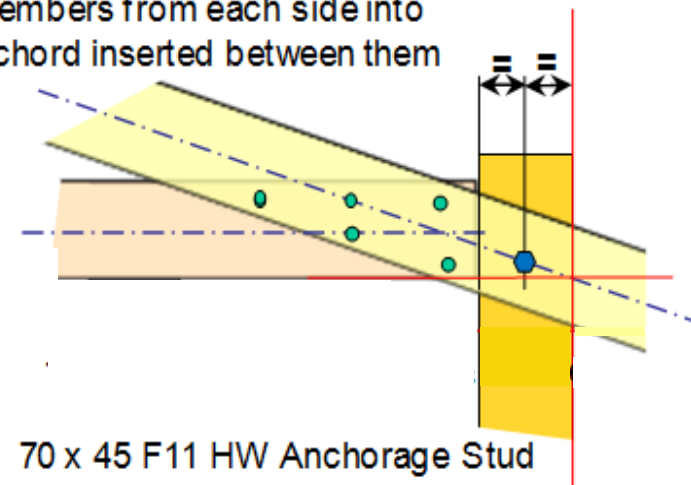


The following examples are for a 5.7 m standard truss.
Other Direct Anchorage Systems will have different details.



Connection TJ5 (Typical) – Lacing to Truss Bottom Chord

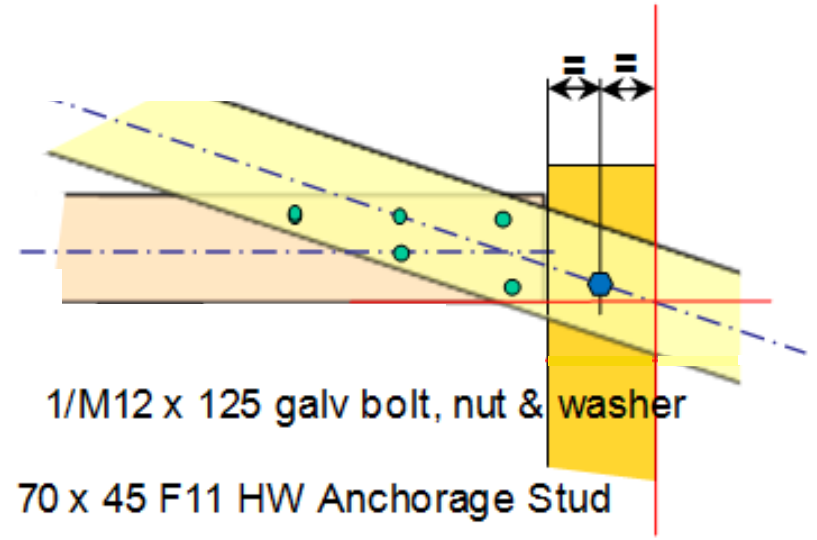
5 / 75 x 3.0 φ nails through both top chord members from each side into bottom chord inserted between them



Connection TJ9 – Top Chord to Bottom Chord

Direct Anchorage Roof System – Anchorage Studs

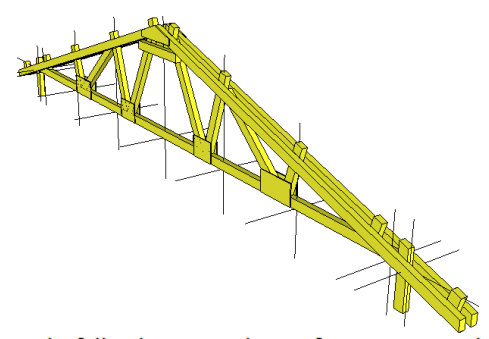
4. The trusses are bolted to timber anchorage studs between the pairs of top chords.



1/M12 x 125 galv bolt, nut & washer

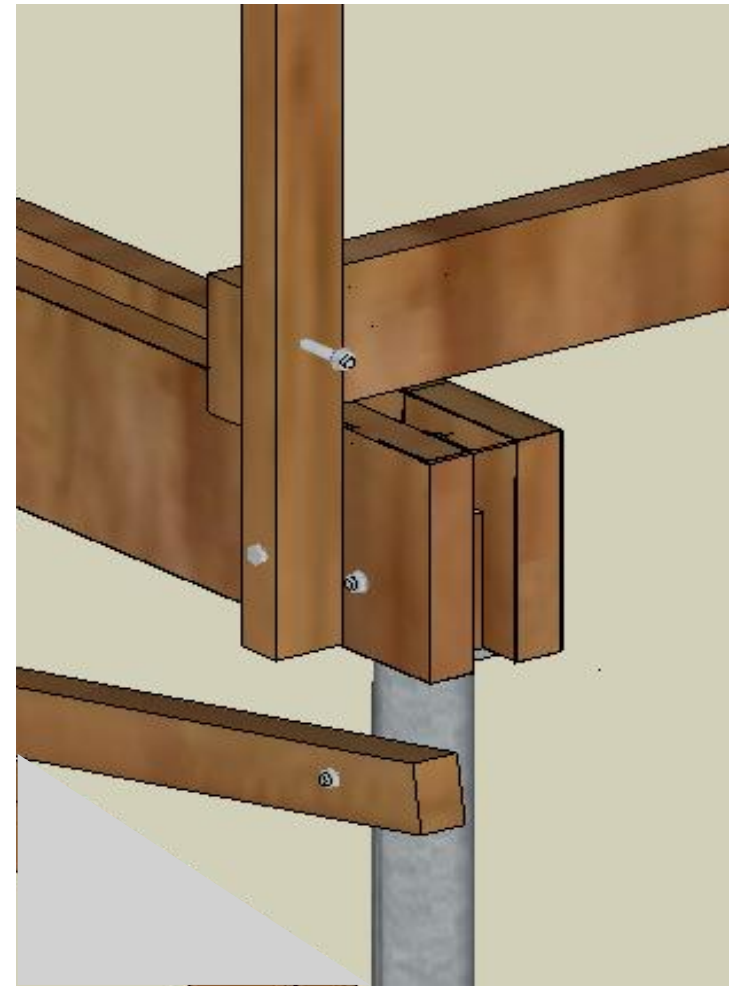
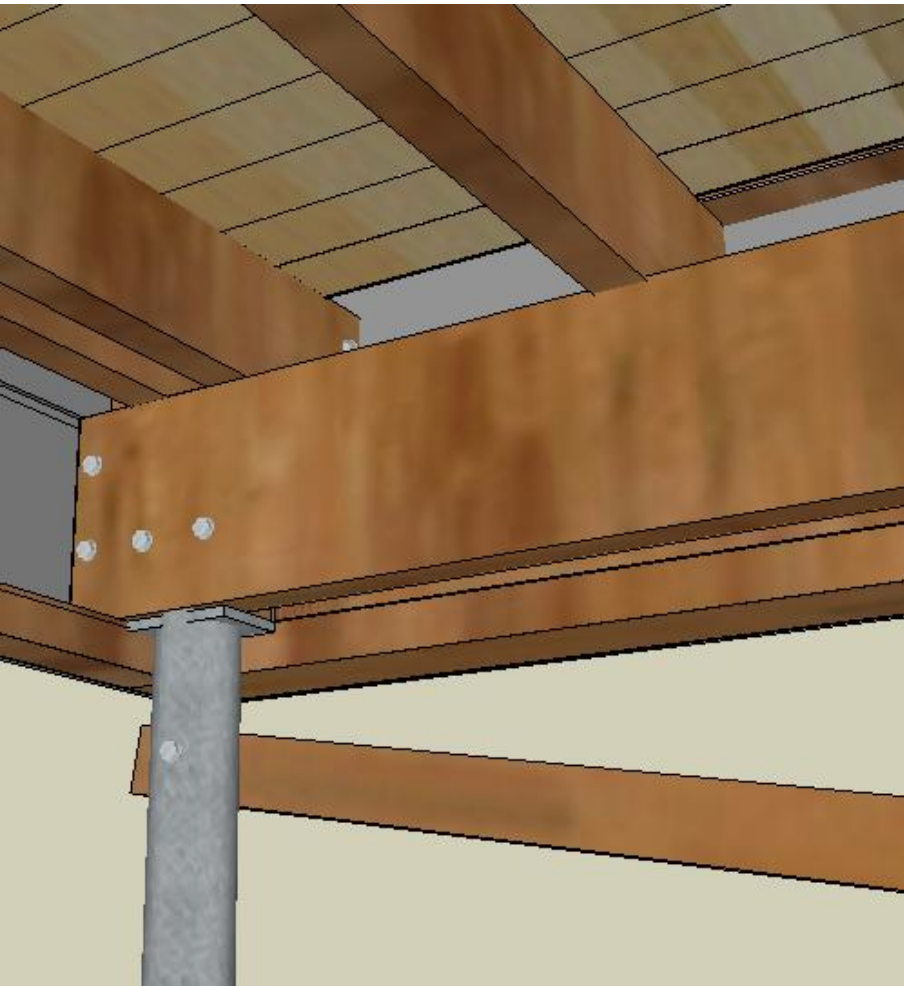
70 x 45 F11 HW Anchorage Stud

Connection TJ 10 – Top Chord to Anchorage Stud

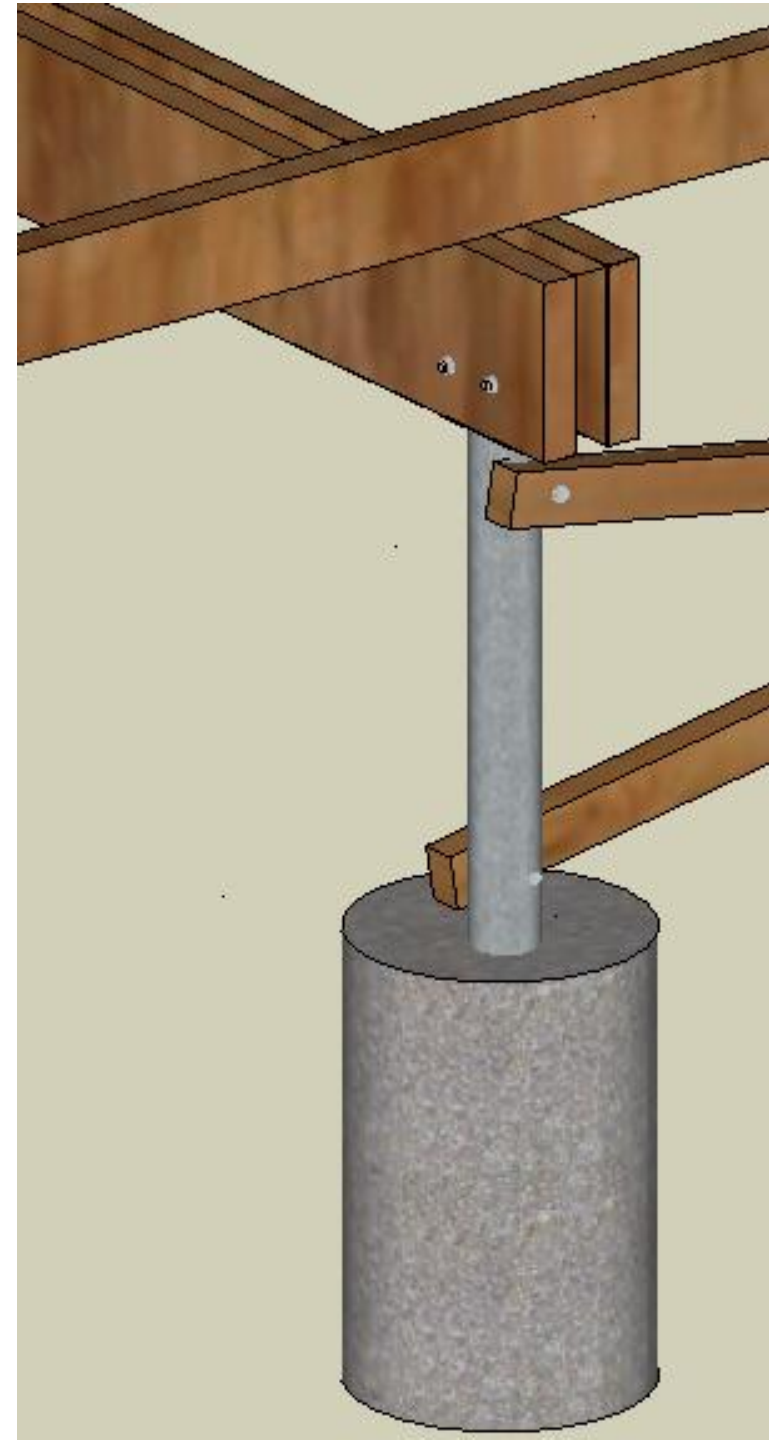


The following examples are for a 5.7 m standard truss.
Other Direct Anchorage Systems will have different details.

Anchorage Studs, Joists, Bearers, Posts and Bracing



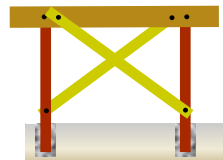
Joists, Bearers, Posts, Piers and Bracing



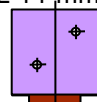
Joists, Bearers, Posts, Piers and Bracing

Steel Posts with timber diagonal bracing are suitable for the Direct Anchorage System. In the system described herein for houses, steel posts are set in concrete footings or piers. For larger structures, steel posts are fitted with base plates and are fixed to holding down bolts embedded in concrete footings or piers.

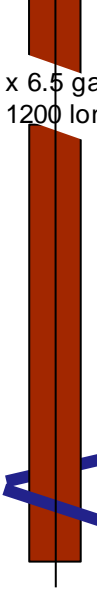
Direct Anchorage Detail
Fix diagonal braces at the top directly to the bearers or joists (as appropriate), to provide a direct load path to the ground



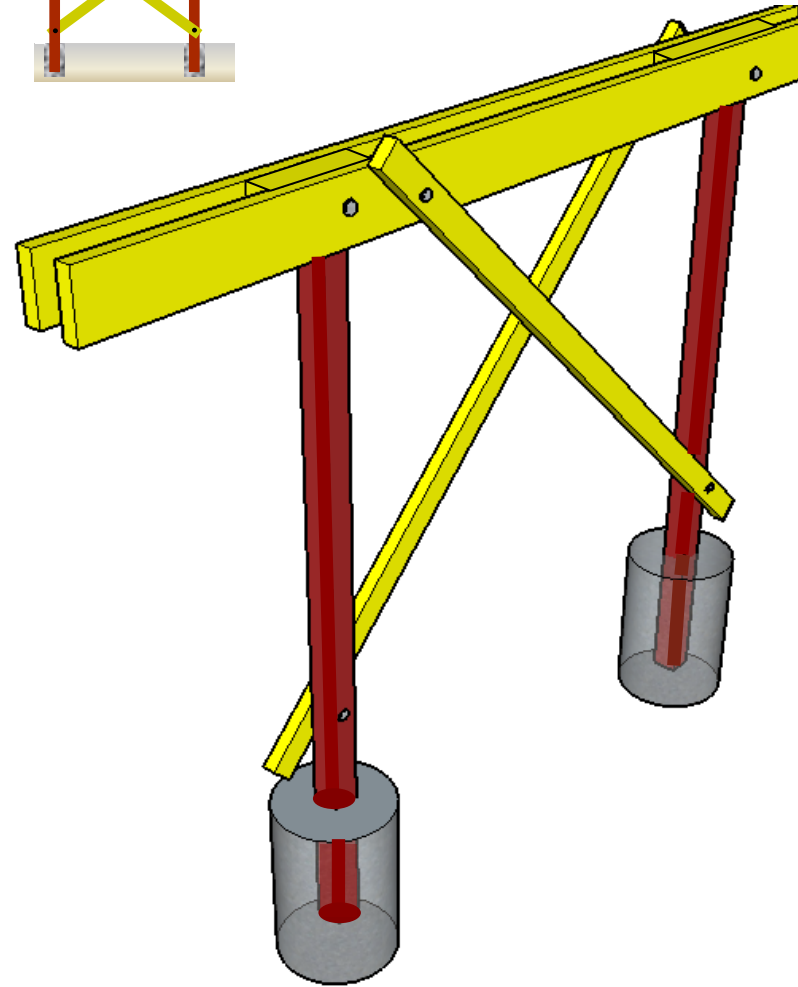
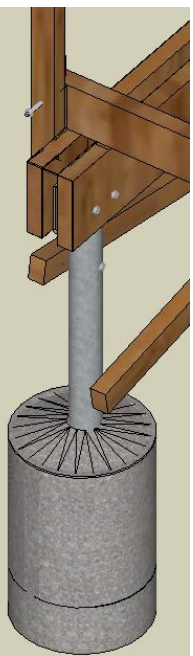
125 x 75 x 6 L drilled with 2-14 mm holes



80 NB x 6.5 galvanized pipe x 1200 long



Steel posts ex stock



Braced Post

Braced Post in Concrete Backfill Capacity 16 kN

Based on AS 1684.3 Table 8.7. For other diameters, depths and corresponding capacities, refer to the standard.

Application:

Wind classification up to AS 4055 “cyclonic” C1.

For stronger winds, reduced capacities must be calculated using AS 2870.

Soil classification to AS 2870

- A – sand and rock sites
- S – slightly reactive clay sites
- M – moderately reactive clay sites

Braced Post in Compacted Soil Backfill Capacity 9.5 kN

Based on AS 1684.3 Table 8.8. For other dimensions, depths and corresponding capacities, refer to the standard.

Application:

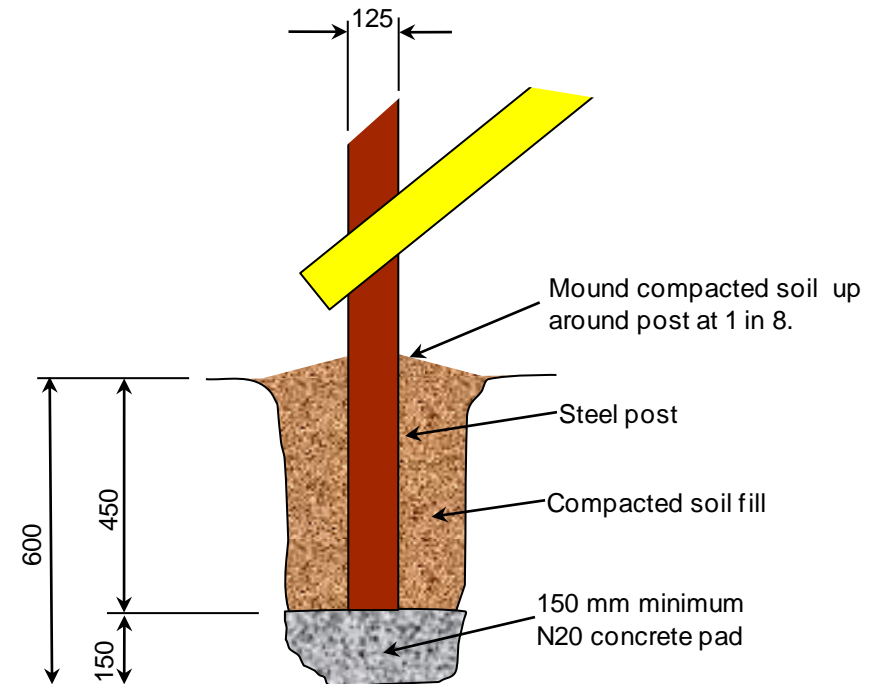
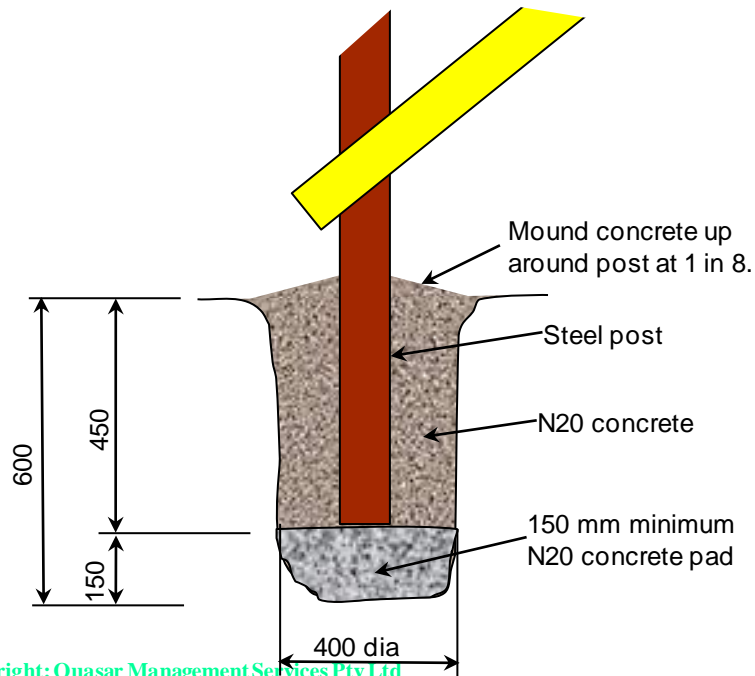
Wind classification up to AS 4055 “cyclonic” C1.

For stronger winds, reduced capacities must be calculated using AS 2870.

Soil classification to AS 2870

- A – sand and rock sites
- S – slightly reactive clay sites
- M – moderately reactive clay sites

Preferred Detail



Unbraced Post

Unbraced Post in Concrete Backfill

Capacity 2.4 kN

Underside of bearers 1.2 m above ground

Capacity 1.7 kN

Underside of bearers 1.8 m above ground

Based on AS 1684.3 Table 8.10. For other diameters, depths and corresponding capacities, refer to the standard.

Application:

Wind classification up to AS 4055 “cyclonic” C1.

For stronger winds, reduced capacities must be calculated using AS 2870.

Soil classification to AS 2870

A – sand and rock sites

S – slightly reactive clay sites

M – moderately reactive clay sites

Unbraced Post in Compacted Soil Backfill

Capacity 0.7 kN

Underside of bearers 1.2 m above ground

Capacity 0.5 kN

Underside of bearers 1.8 m above ground

Based on AS 1684.3 Table 8.#. For other dimensions, depths and corresponding capacities, refer to the standard.

Application:

Wind classification up to AS 4055 “cyclonic” C1.

For stronger winds, reduced capacities must be calculated using AS 2870.

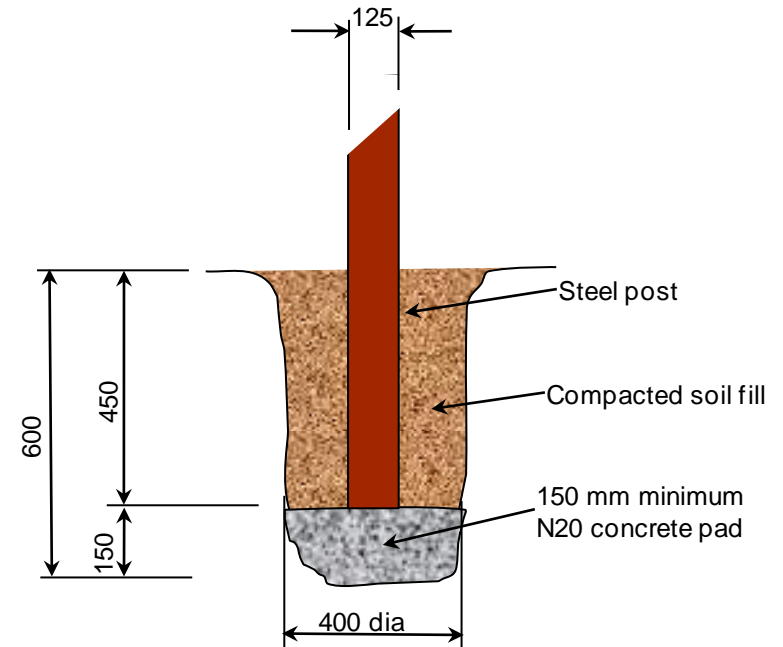
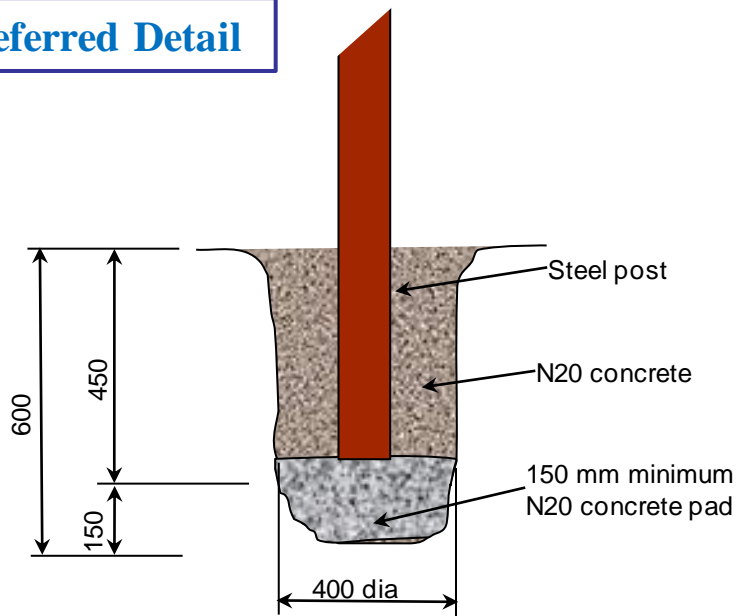
Soil classification to AS 2870

A – sand and rock sites

S – slightly reactive clay sites

M – moderately reactive clay sites

Preferred Detail



Design and Construction Checklist

Site

Activity Timber Framing

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date, Inspector, Comment
<p>Purlin / truss lacing connection</p> <p>Description .</p> <p>Calculated capacity .</p> <p>Required capacity .</p> <p>Suitability .</p>				
<p>Truss lacing / chord connection</p> <p>Description .</p> <p>Calculated capacity .</p> <p>Required capacity .</p> <p>Suitability .</p>				
<p>Truss / anchorage stud connection</p> <p>Description .</p> <p>Calculated capacity .</p> <p>Required capacity .</p> <p>Suitability .</p>				
<p>Anchorage stud / joist or bearer connection</p> <p>Description .</p> <p>Calculated capacity .</p> <p>Required capacity .</p> <p>Suitability .</p>				
<p>Bearer / Anchorage Connection</p> <p>Description .</p> <p>Calculated capacity .</p> <p>Required capacity .</p> <p>Suitability .</p>				

Purlin dimensions and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Truss top chords, bottom chords, lacing dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Anchorage stud. noggings dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Joists dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Bearers dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Posts dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Other principal members dimensions, spacing and arrangement				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Roof sheeting type, BMT and fixing				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				
Cladding and flooring type and fixing				
Description .				
Calculated capacity .				
Required capacity .				
Suitability .				

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Disclaimer

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