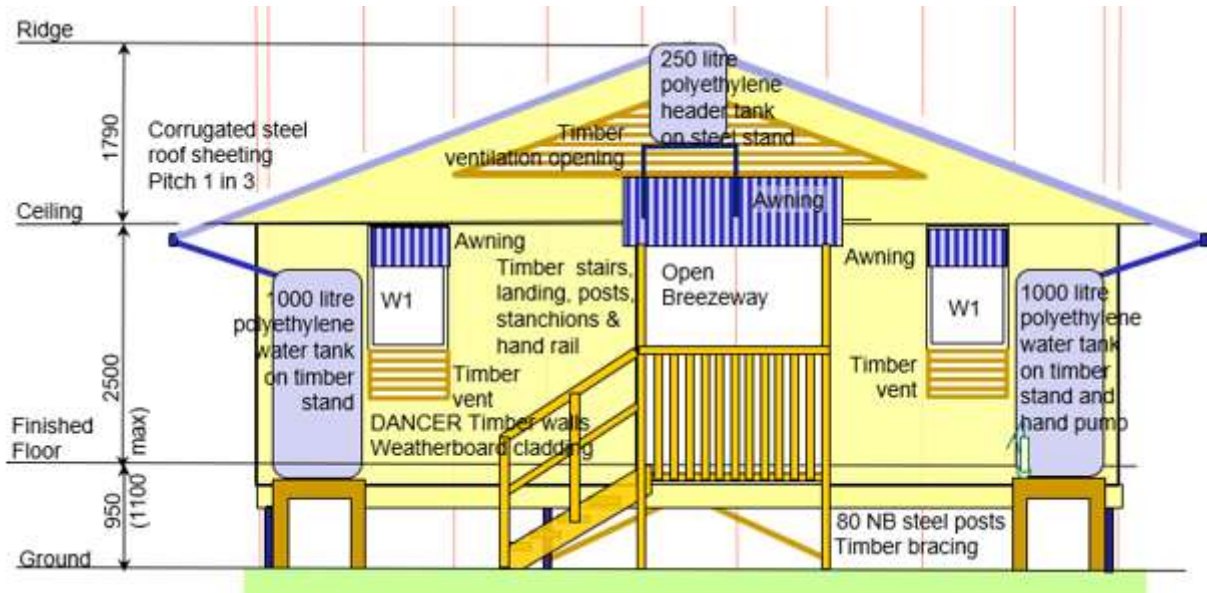


DANCER 8.4 x 5.7 Modular House

Timber roof + Timber superstructure + steel posts



Quasar Management Services Pty Limited

ABN 21 003 954 210

Not-for-profit consulting structural and civil engineer

Subsidiary of Partner Housing Australasia (Building) Incorporated

69 Renwick Street, Redfern NSW 2016, Australia

Phone: +61 432 611 550

Email: RodJohnstonAUS@gmail.com

Quasar Management Services¹ Pty Limited is consulting civil engineer and management consultancy (a wholly owned subsidiary of Partner Housing Australasia), providing pro bono and fee-for-service professional design and governance services, for village-based construction projects in the South Pacific.

¹ Quasar Management Services Pty Limited trading as Quasar Management Services

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Revisions

This document, and its component parts, constitute a working file, which is updated progressively and periodically formalised as work is undertaken. The revision dates represent when the consolidated information herein was activated.

260327(ET)-1 27/3/26 Format update and routine update

Limited Structural Certification



Quasar Management Services Pty Limited
ABN 21 003 954 210 Member of Consult Australia
Not-for-profit consulting structural and civil engineer
69 Renwick Street, Redfern NSW 2016, Australia
Phone: +61 432 611 550
Email: RodJohnstonAUS@gmail.com

1. The purpose and intention of this document are to describe, in **generic** terms, the design and detailing of the DANCER Building System for a **Generic DANCER 8.4 x 5.7 Modular House consisting of Timber roof + timber superstructure + steel posts**).
2. These designs are suitable for adaption for specific sites in the Papua New Guinea (PNG) Highlands and other non-cyclonic regions of PNG.
3. Adaptation of these generic designs for specific sites must be performed by a suitably qualified and experienced structural engineer, with the authority and responsibility to monitor and certify the design and construction.
4. Quasar Management Services, its employees, contractors and sub-consultants do not accept any responsibility for the execution, monitoring or certification of the adaptation process specified herein.
5. This certification is applicable only to the designs described herein, including the stated external dimensions, member sizes, materials, connection details, fixings and internal layout. Any deviation in any way from the designs and specifications herein renders this certification invalid for the particular project.
6. This certification is applicable only to the construction by builders (e.g. Vision for Homes [PNG]) that have been approved and trained by Quasar Management Services. This certification is rendered invalid for construction by all other builders or contractors.
7. The designs herein may not be used for applications that do not comply with the building, locations and designs listed below.

Location: Papua New Guinea Generic

Building: Small detached village building; Presenting a low degree of hazard to life and other property in case of failure;

Single storey; Cladding on elevated braced timber frame complying with the DANCER design principles;

Maximum dimensions: 16.5 x 8.4 m, 2.7 m storey, Maximum eaves height 6.0 m, Maximum ridge height 8.5 m, Maximum pitch 35°

Design: Design life 50 years; Annual probability of exceedance 1 in 500; Probability of exceedance during design life: 0.10

Soil: Based on a rectangular footing 450 mm wide founded 600 mm deep in compacted soil.

Soil Type	AS 2870 Site Classification	Characteristic internal friction angle, degrees	Characteristic cohesion, kPa	Characteristic ultimate bearing capacity, kPa
Sand or rock	A	36°	0 kPa	1060 kPa
Slightly reactive clay	S	30°	3 kPa	670 kPa
Moderately reactive clay	M	27°	6 kPa	640 kPa

Permanent Loads: Elevated timber building, $w = 2.5 \text{ kN/m}^2$ (floor area), Reinforced masonry building $w = 3.5 \text{ kN/m}^2$ (floor area)

Imposed Loads: Floor load 1.5 kPa; Roof load 0.25 kPa

Wind: Most of the country except south-east. (refer also to map for reduced velocities)

Noncyclonic Level I $V_{u\ 500\ (3,10)} = 40 \text{ m/s}$ $k_{p\ 500} = 1.0, k_{p\ 250} = 0.90$

Resulting in wind Classification of N2 or N1 (to AS 4055)

Earthquake: Probability $k_{p\ 500} = 1.0, k_{p\ 250} = 0.75$; Hazard $Z_{500} = \text{As per table below}$; Subsoil = C; Ordinate $C_{h(T1)} = 3.68$; Ductility, $\mu = 2.00$; Performance, $S_p = 0.77$

Location	Hazard Z_{500}
Zone 3 (Moderate Hazard) – Central region of the mainland, Northern Province, D’Entrecasteaux and Trobriand Islands, Northern New Ireland and Admiralty Islands (Includes Mendi, Kerema, Klunga, Wabag, Mt Hagen, Kundiawa, Goroko, Bulolo, Wau, Popondetta, Lombrum, Lorengau, Kaiyeng)	0.24
Zone 4 (Very Low Hazard) – Papuan Peninsula - Louisiade Archipelago and St. Mathias Group (Includes Daru, Port Moresby, Alotau)	0.16

Tsunami: Not applicable. For each site, determine that the combination of distance from high water mark, height of finished floor above mean sea level, distance from high earthquake area ($Z > 0.4$), are such that the Tsunami Risk Factor is zero.

Flood: Not applicable. For each site, determine that the distance to closest water course OR height of finished floor above normal level of water course OR funnelling of catchment runoff past structure are such that the Flooding Risk Factor is 0.

Subject to the conditions above, I certify that the generic building described in this document complies with: principles of structural mechanics for strength, stability and serviceability; and the specific requirements of the relevant Australian Standards.

Buildings outside the scope described above must be designed for the relevant applicable local wind classifications and other relevant factors, using the principles described herein, by a suitably qualified and experienced structural engineer.

This is not a Construction Certificate.



Rod Johnston

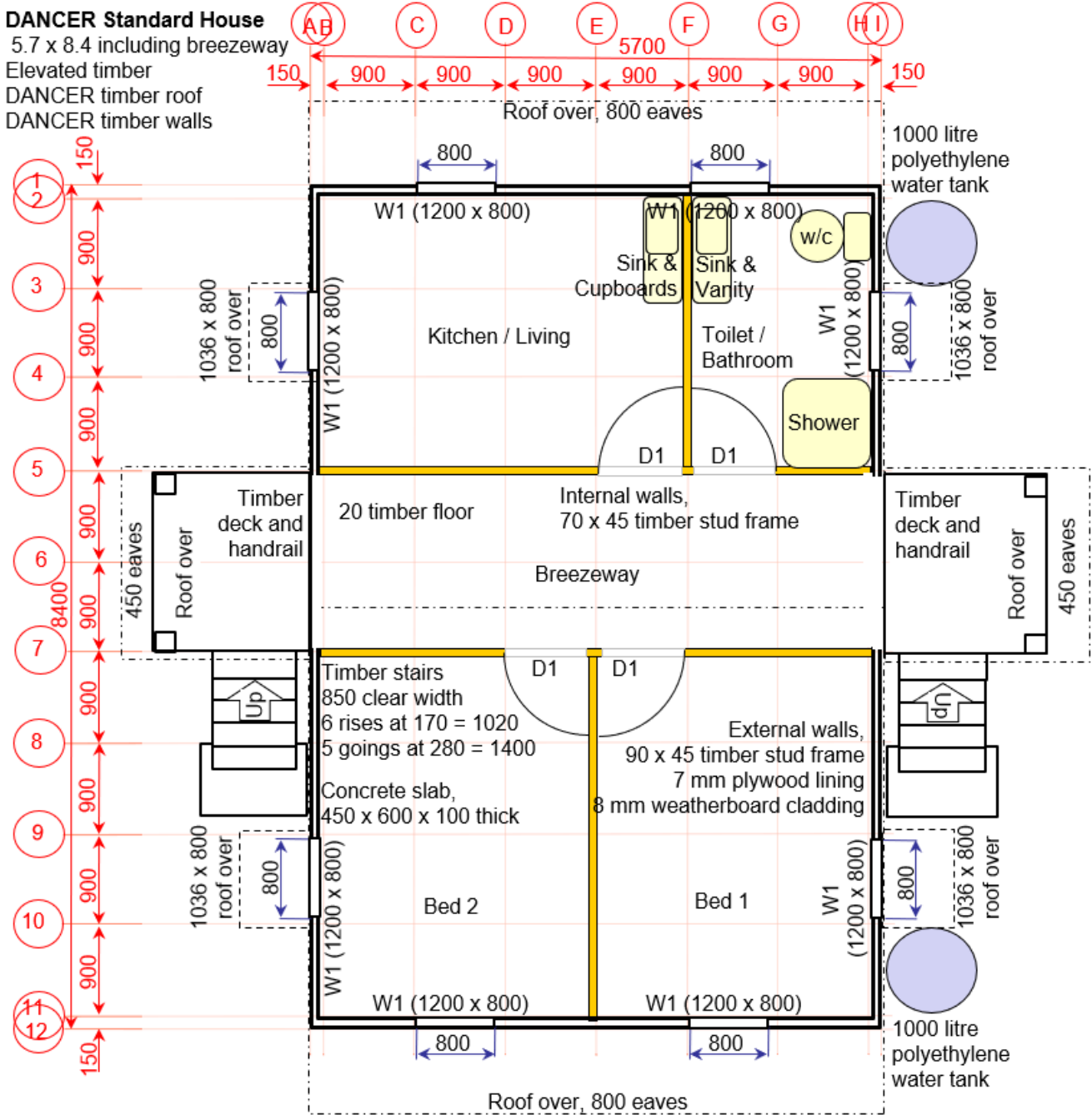
B Tech, M Eng Sc, MICD, MIE Aust, Life-Member Consult Australia
Managing Director – Quasar Management Services Pty Ltd

Part 1 – Planning and Architectural Design

Locality Plan

Site Plan

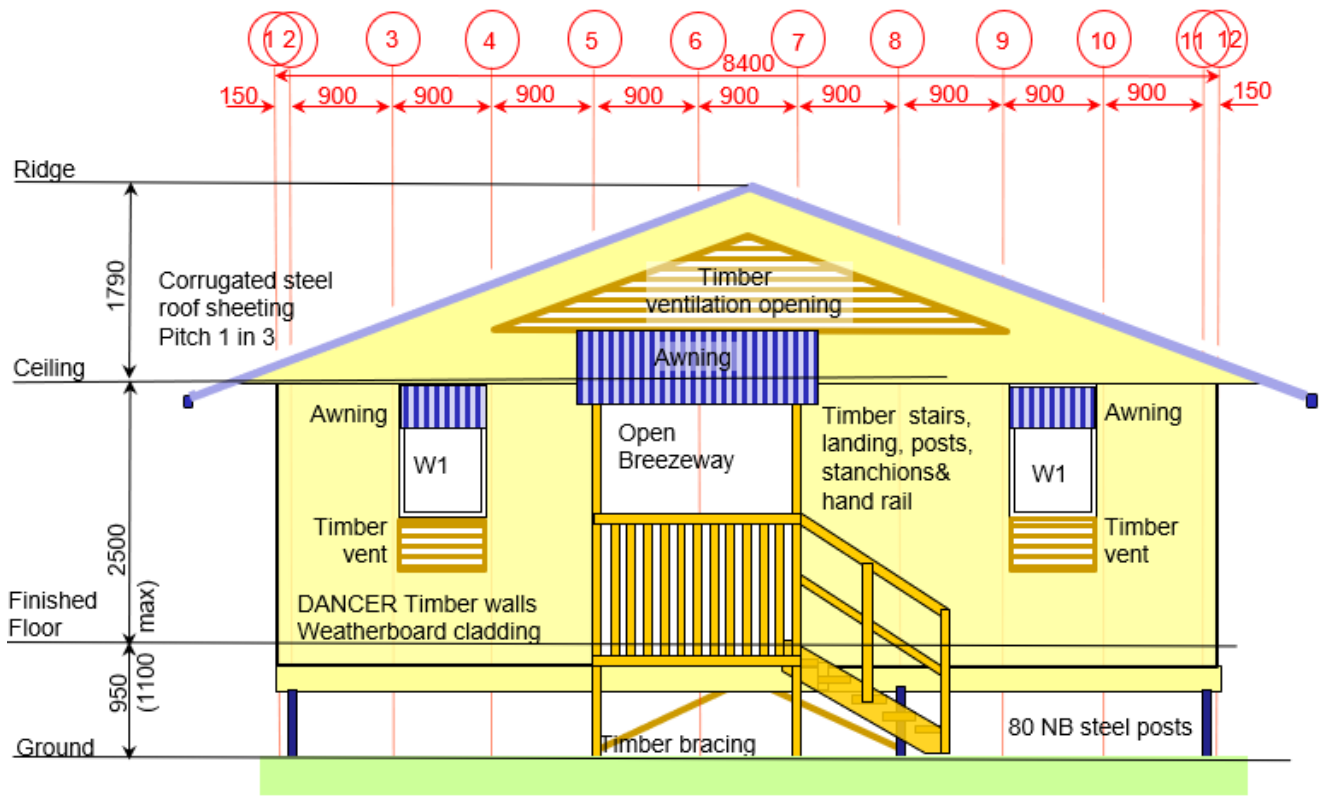
Floor Plan



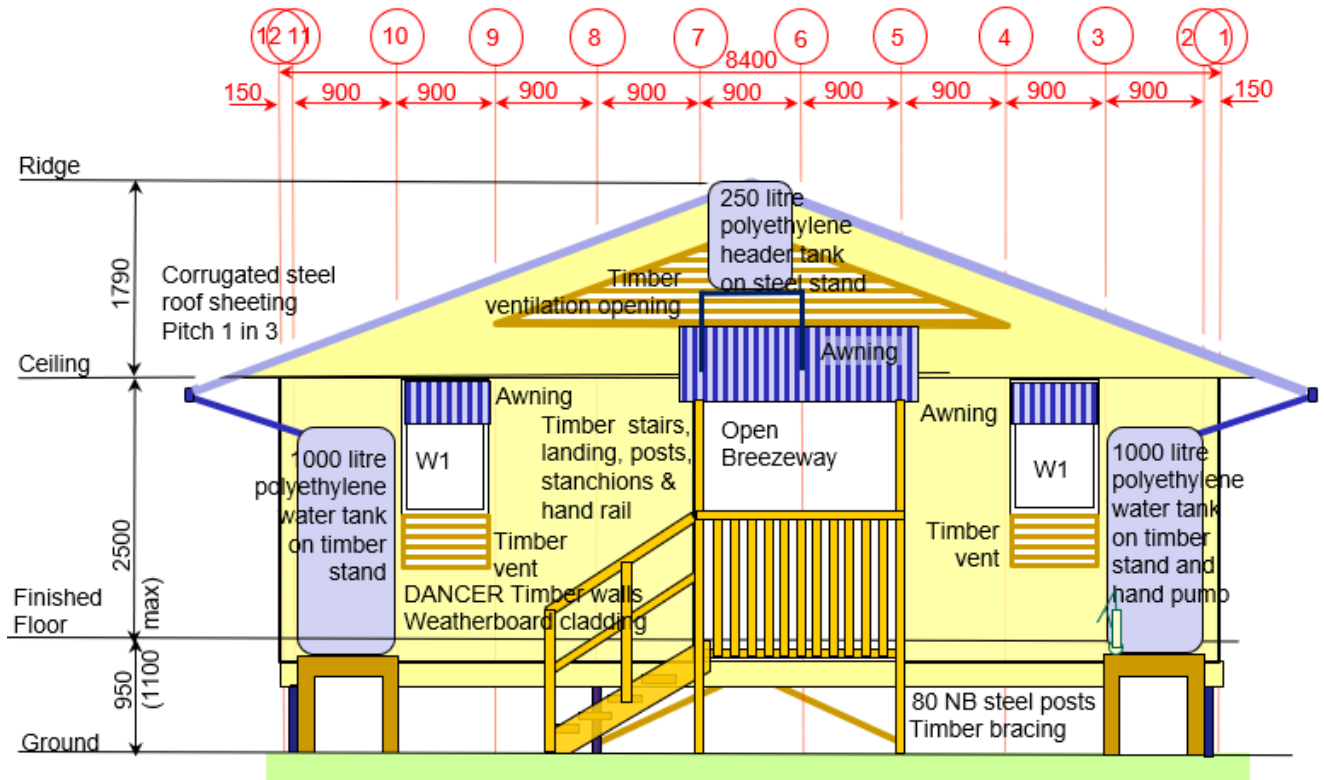
Floor Plan

This house has been designed to meet the dual criteria of cultural sensitivity and structural resistance to cyclonic wind and earthquake. The architectural features include a breezeway, increased roof slope, roof space ventilation, window and breezeway awnings and enlarged window ventilation. The house is capable of accommodating further cultural enhancement by the retrofitted palm leaf roof and palm leaf wall veneers if required.

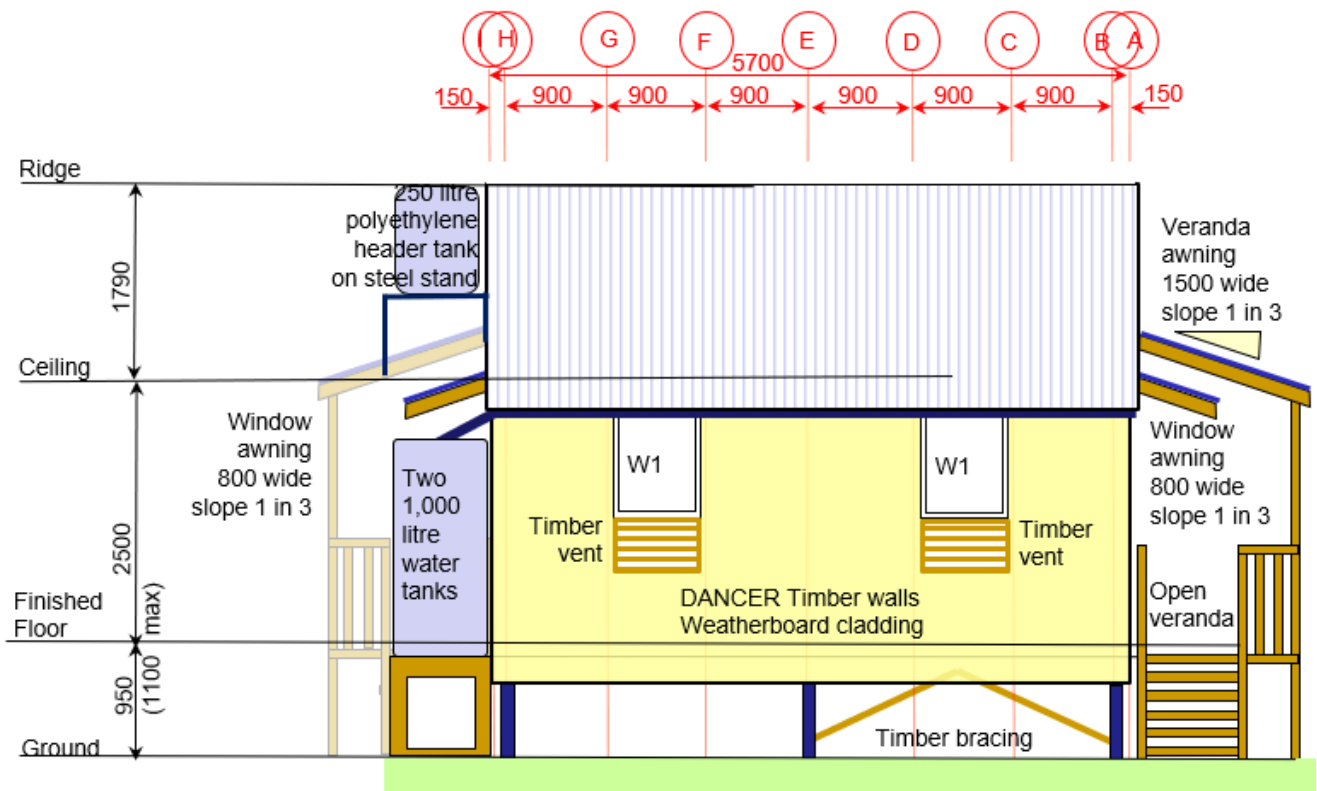
Elevations



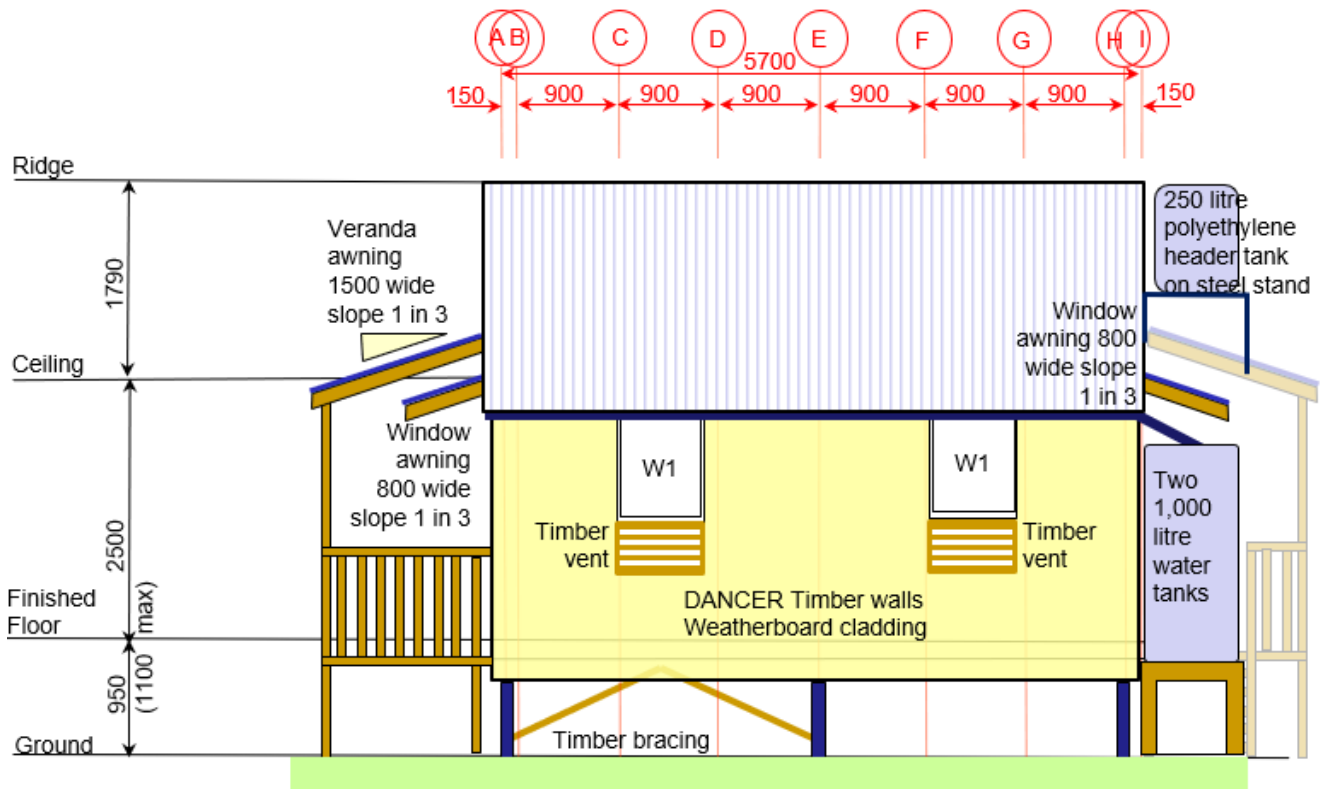
West Elevation



East Elevation

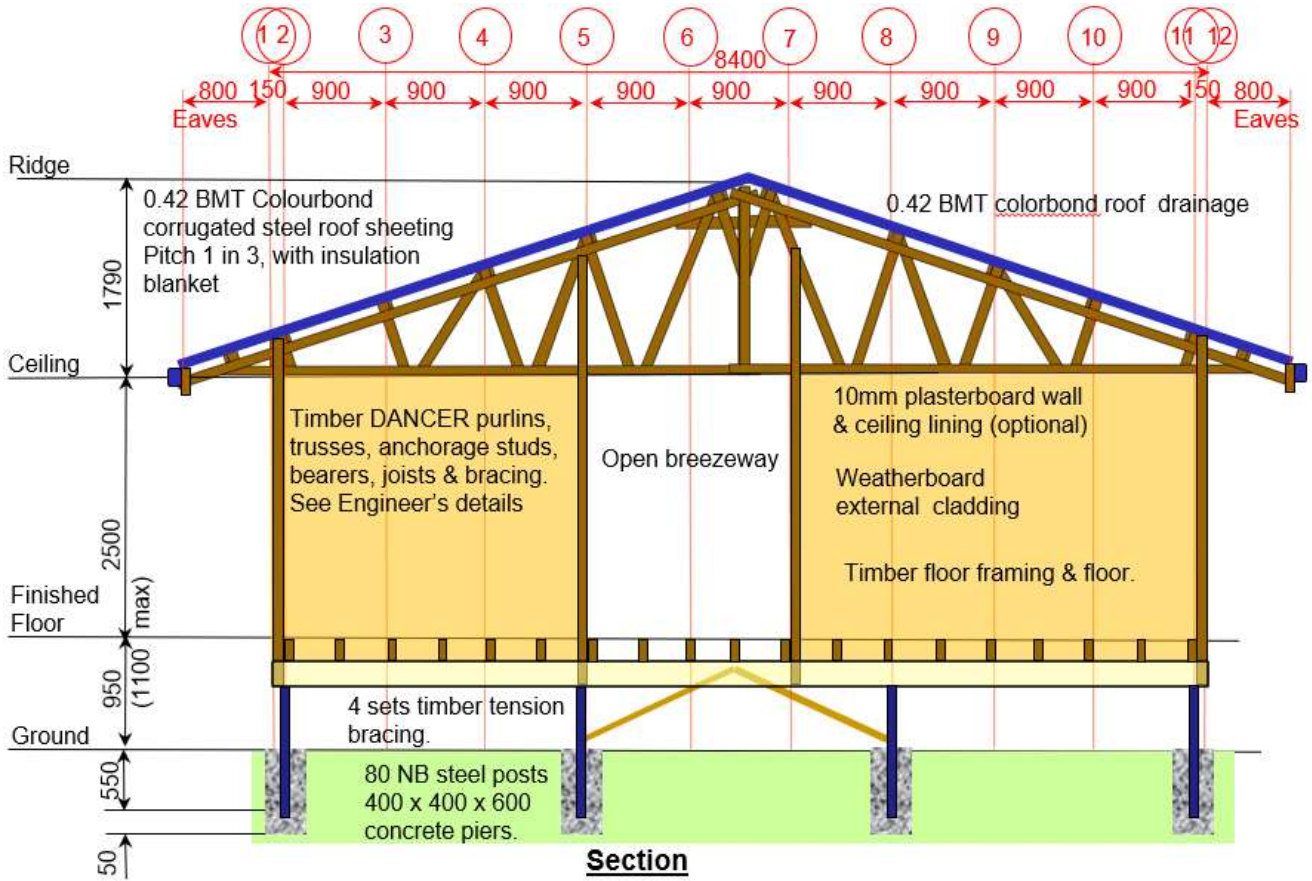


North Elevation

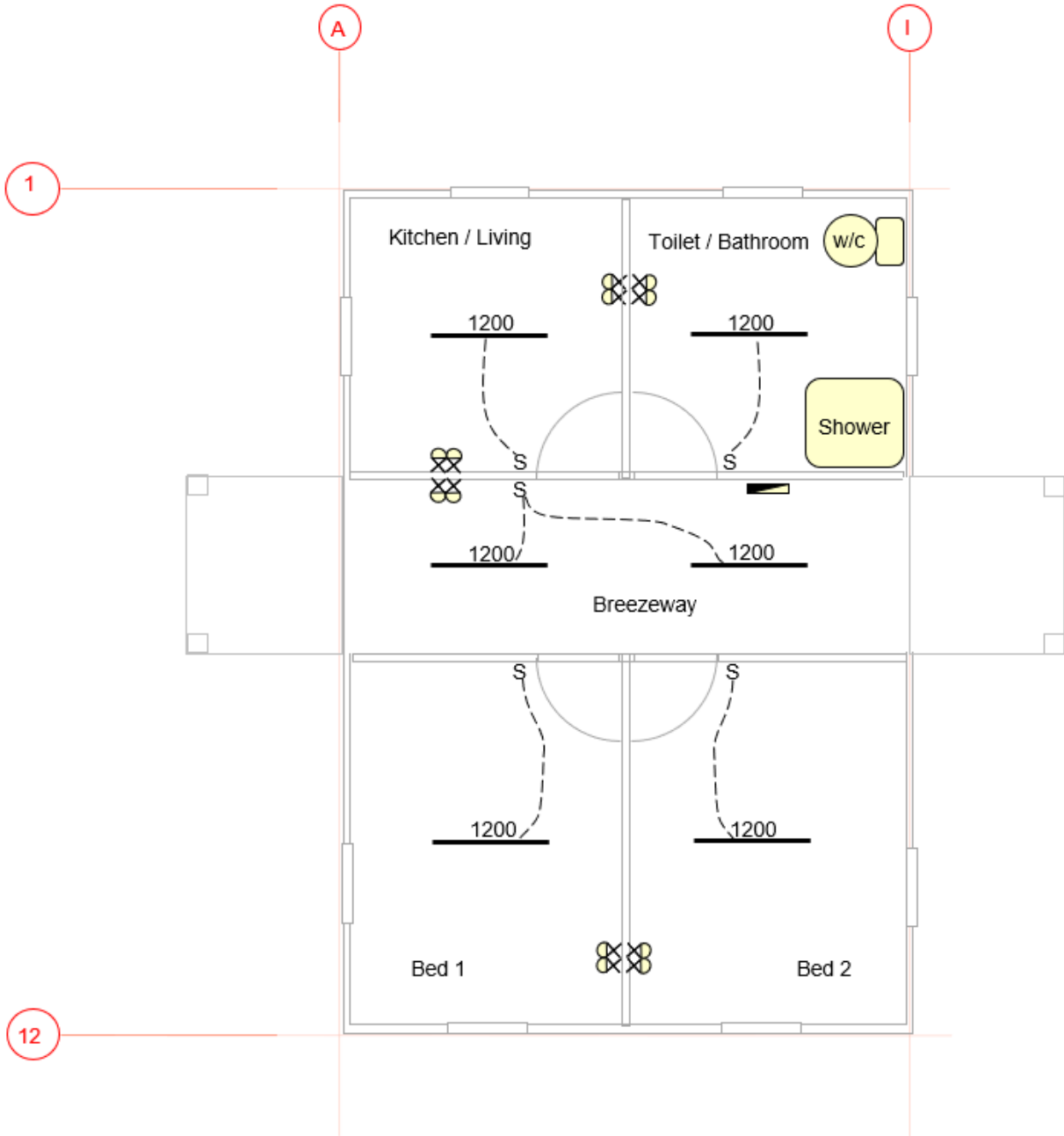


South Elevation

Section



Electrical Services



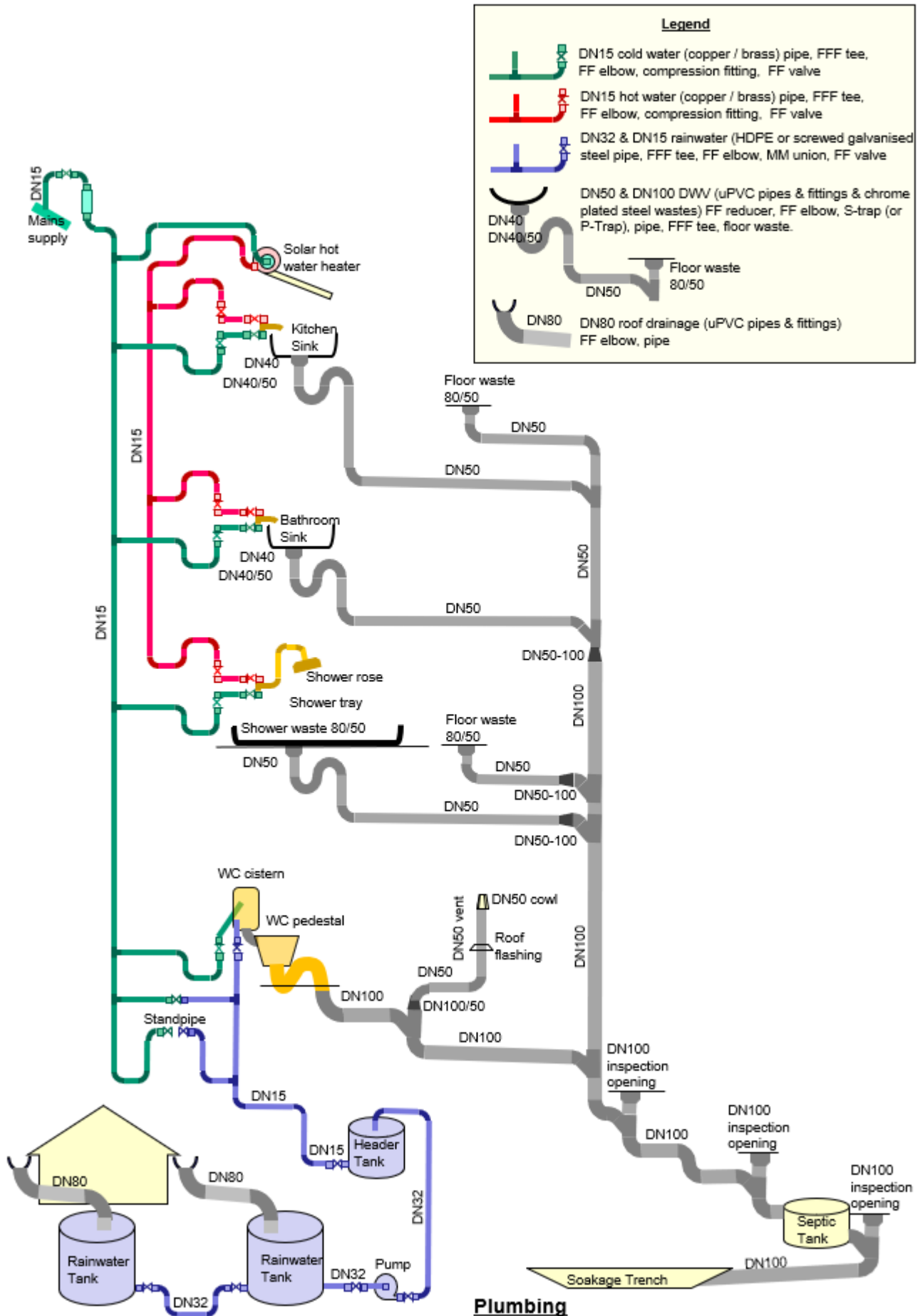
Notes:

1. All electrical installation shall comply with AS 3000 and the Specification, relevant to a 240 volt single-phase supply
2. Mains supply and/or solar power supply to be designed separately.

Electrical Services

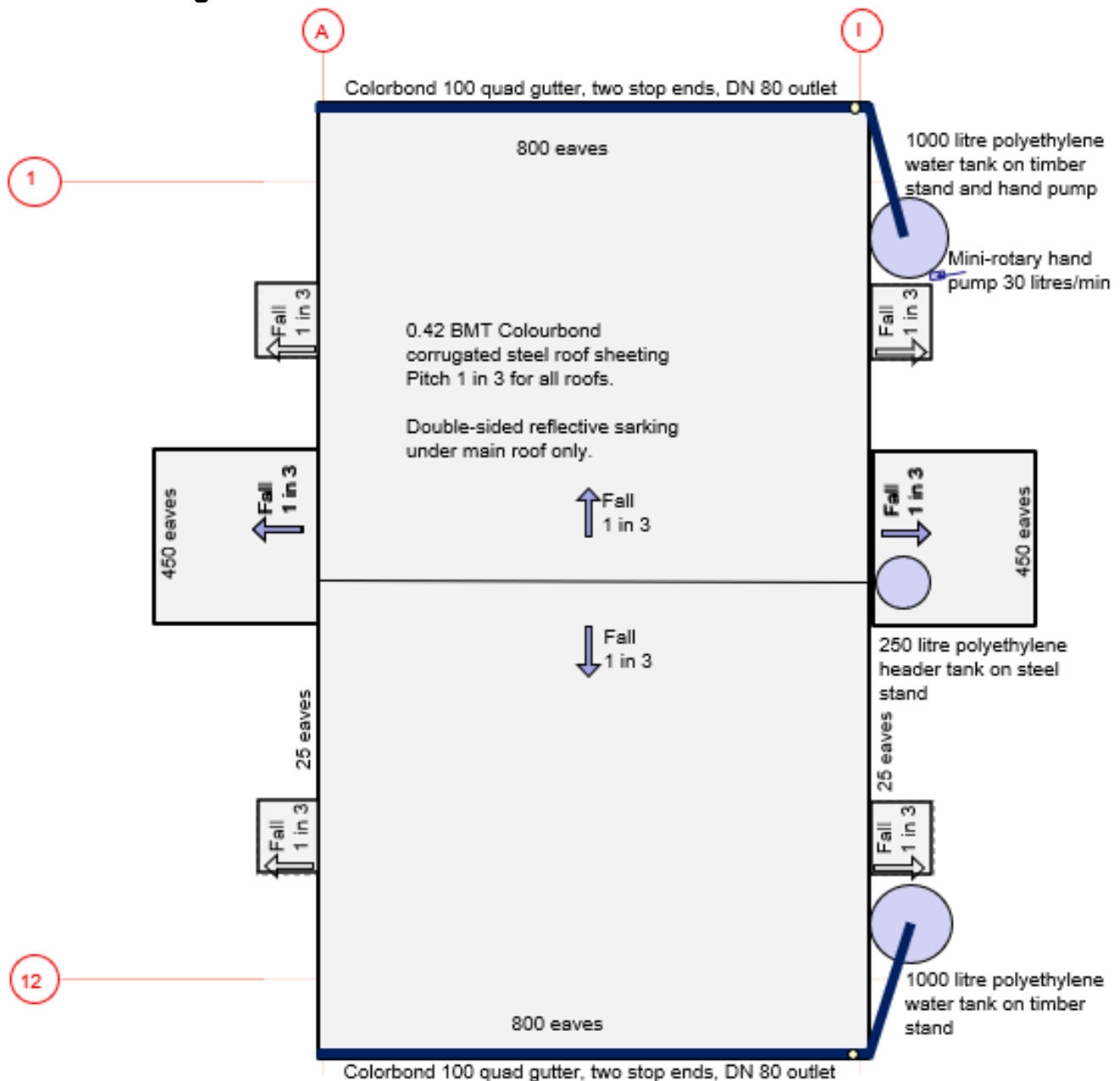
S	Switch, 1200 above floor
⊗	Double GPO, 300 above floor
■	Switch board
— 1200 —	Light, 1 x 36W, 1222 x 26mm bare batten fluorescent tube

Plumbing



Plumbing

Roof Plumbing

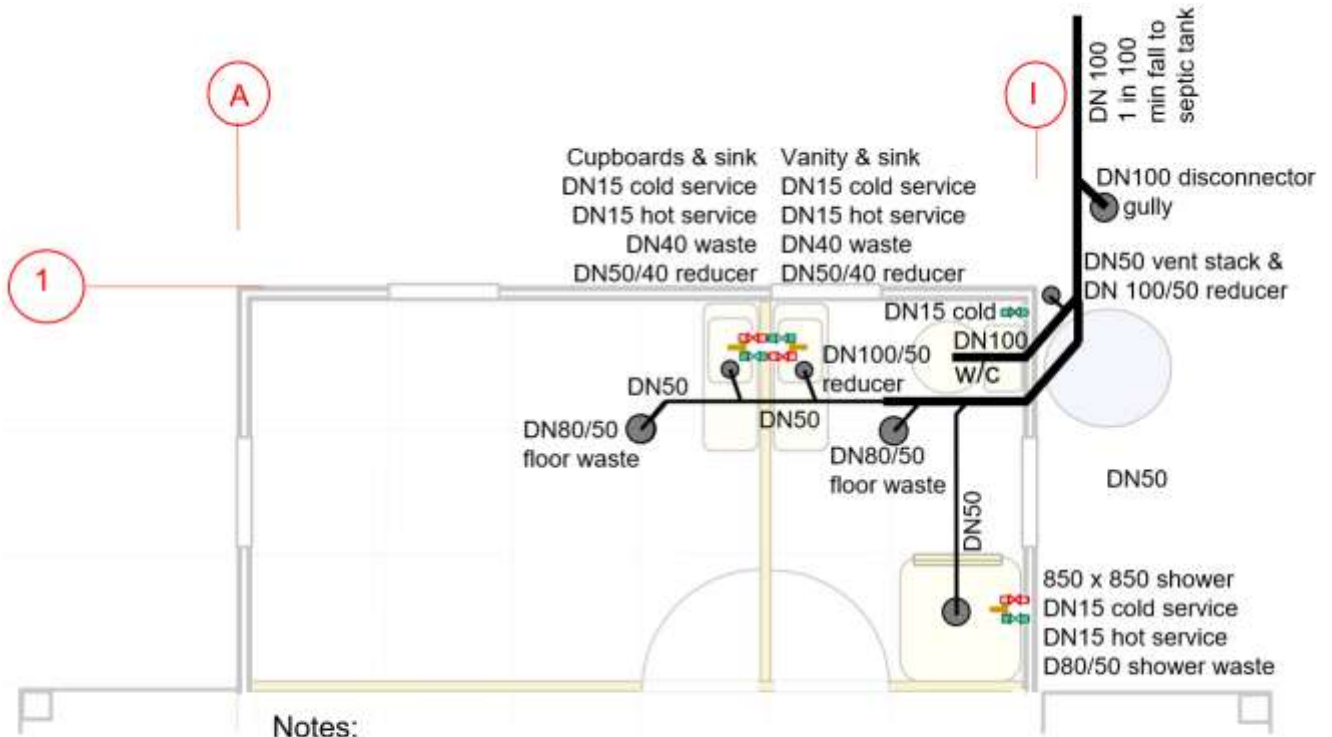


Notes:

1. All roofing – 0.42 BMT Colourbond corrugated steel roof sheeting (pitch 1 in 3), fixed with cyclone washers, 12-14x35 T17 HD/TG HH Class, top-lock hex galv roofing screws & plastic washers, screw spacing (main part of roof including 1.2 m from ends) – 80 mm (at every rib)
2. Sarking (for main roof only) – Double sided reflective insulation placed between roof sheet and timber purlins
Roof Insulation (optional alternative to sarking for main roof only) - R1.8 reflective foil & glass fibre blanket
3. Eaves gutter and rainwater collection - DN80 roof drainage (uPVC pipes, inlet & FF 88 elbows). Refer to plumbing schematic for further details.
4. Colorbond 100 quad eaves gutter, Colorbond 100 quad stop ends, 12-14x35 T17 HD/TG HH Class 3 screws, Colorbond DN80 clip saddles
5. Colorbond steel 200 x 0.8 mm thick ridge flashing, Colorbond steel 0.8 mm thick barge moulds, fixings galv roofing nails 65 x 3.75mm and jolt head nails 125 x 5.6mm fixings for flashing & barge moulds

Roof Plumbing

Hot & Cold Water and Sanitary Plumbing



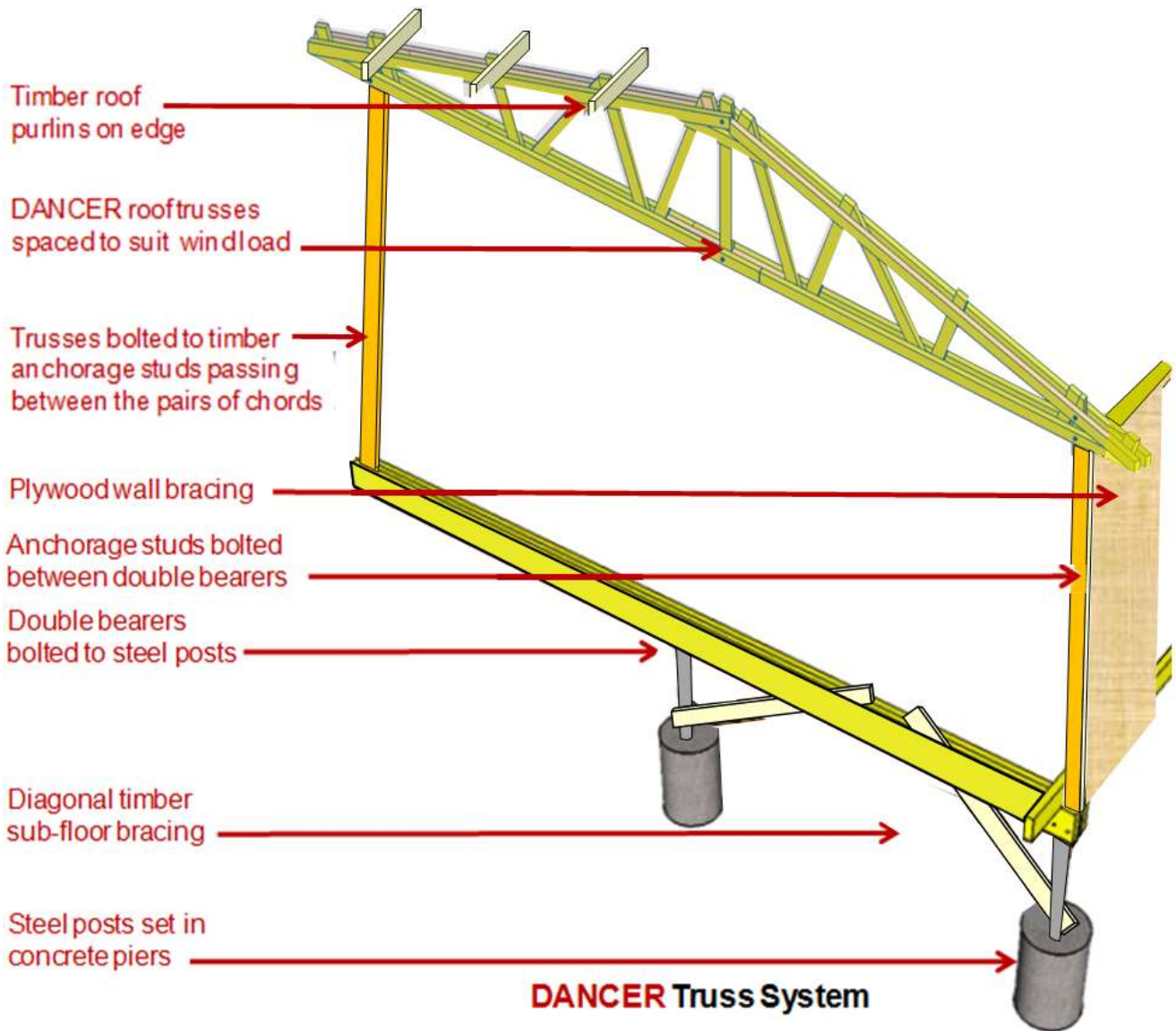
Notes:

1. All plumbing shall comply with AS/NZS 3500.5.

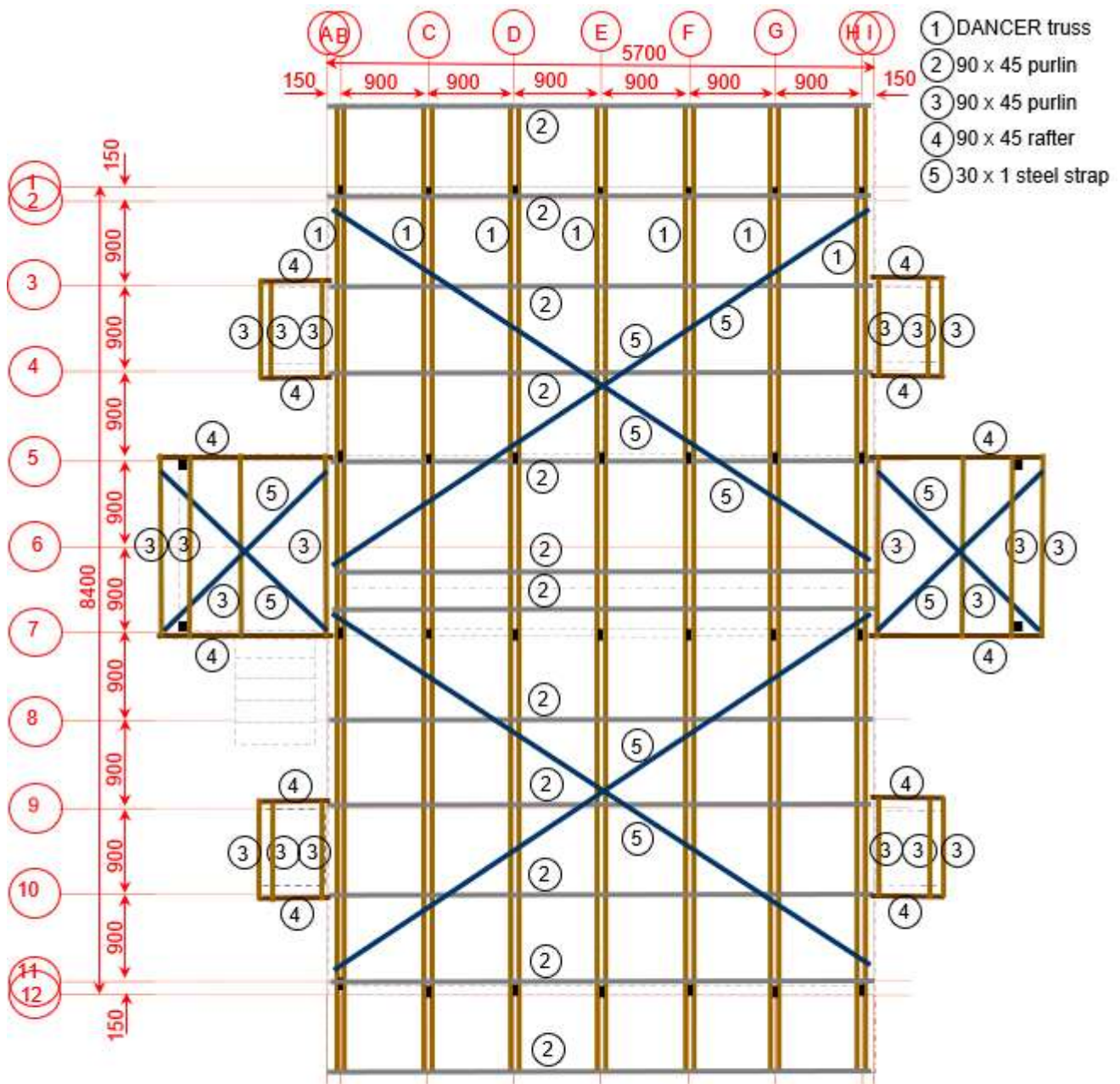
Hot & Cold Water and Sanitary Plumbing

Part 2 – Engineering Design

Dancer Building System



Timber Roof Framing



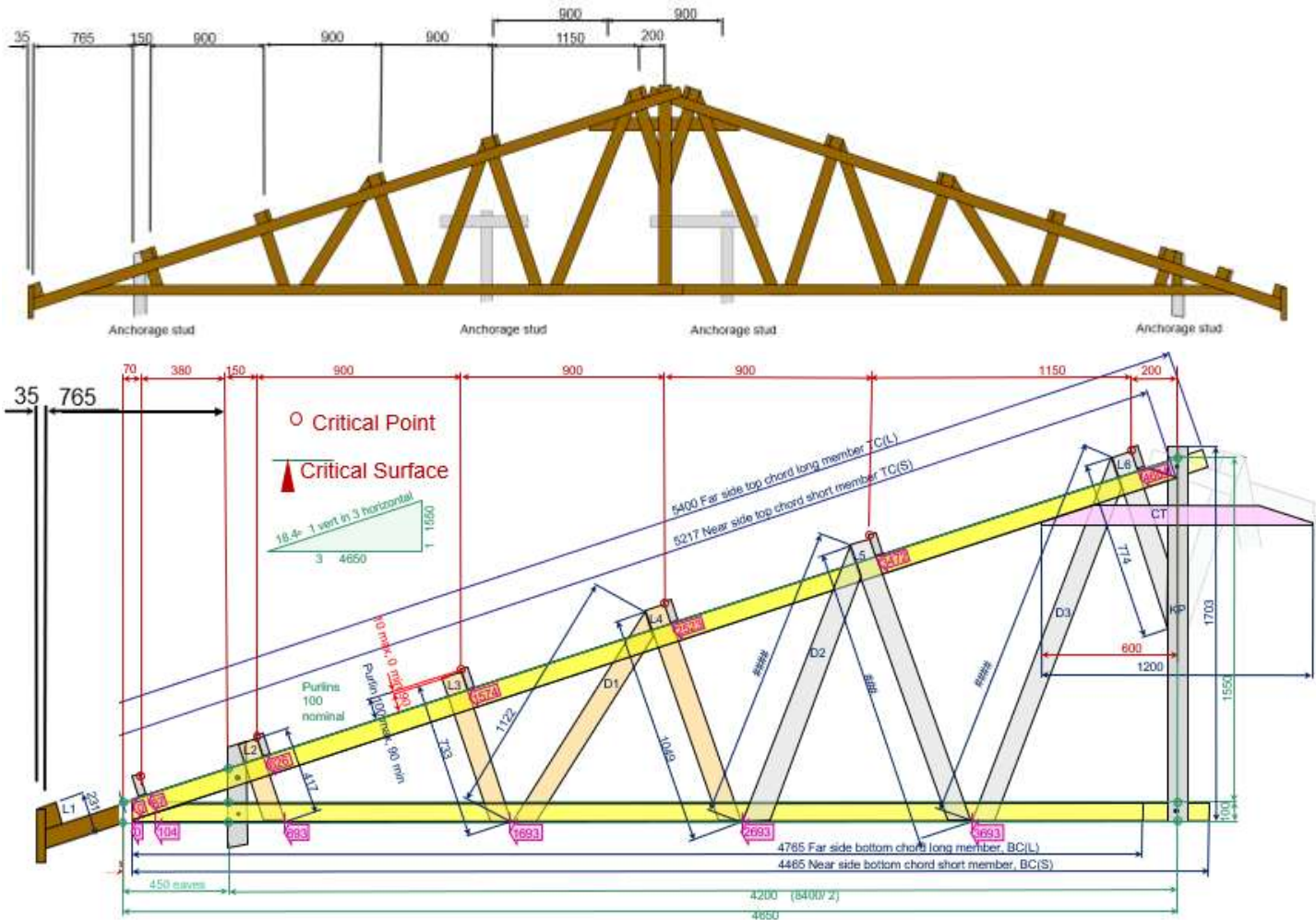
Notes:

1. All timber shall be graded F7, SD6, JD4 or stronger. Australian and New Zealand Seasoned Radiata Pine are deemed to meet this specification.
2. For all other items, substitution of other sizes must be approved by the Engineer.
3. Refer to Engineer's Details for fixings, connections and associated members.

Timber Roof Framing

Details of **DANCER** Trusses

The following dimensions are for the Standard **DANCER** 8.4 Truss, with eaves overhang of 800 mm. All members shall be 90 x 45 MGP10 Strength group SD5, Joint group JD4 (or better)



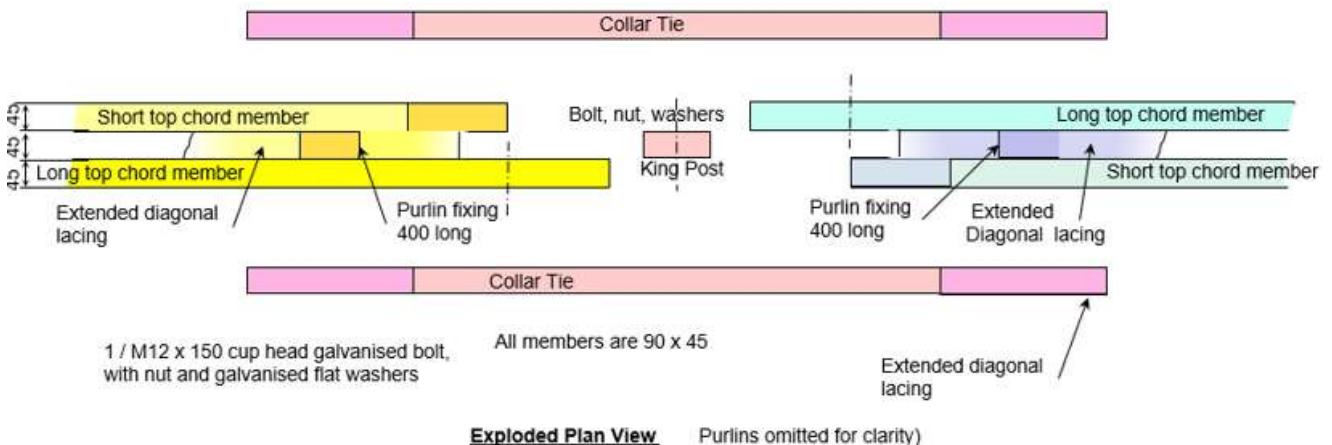
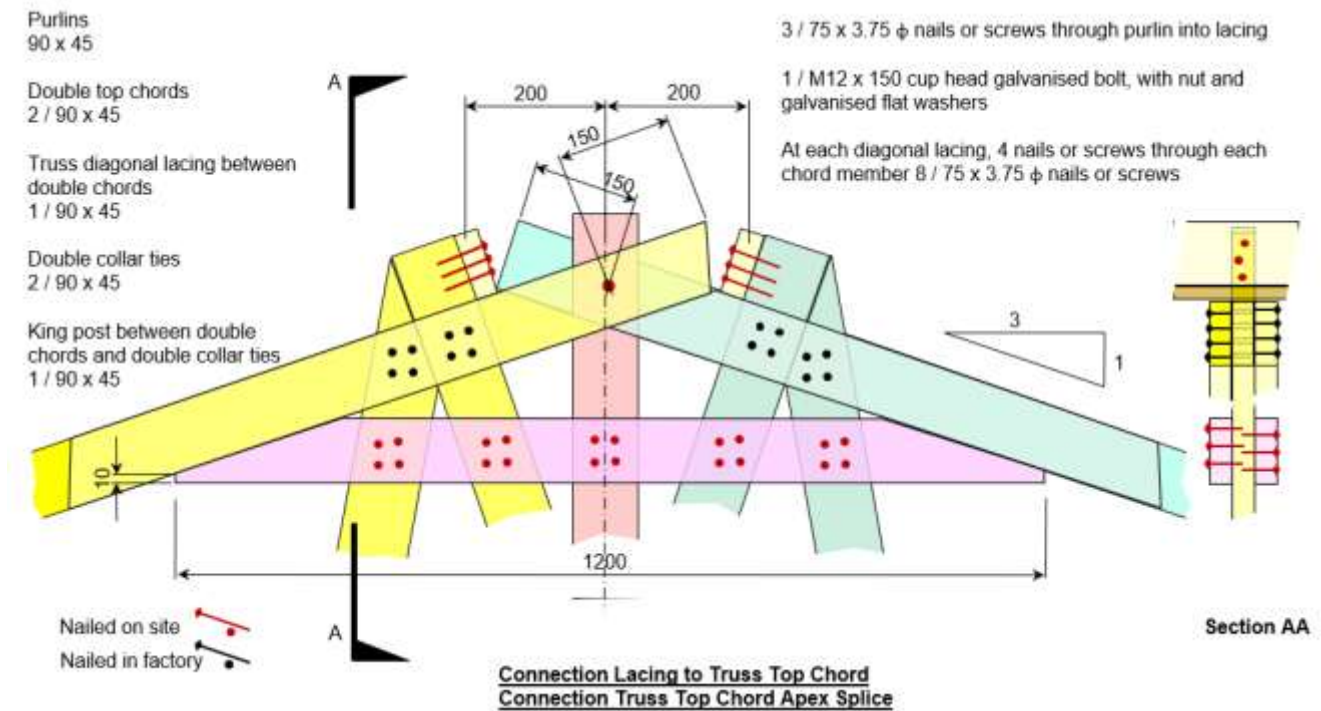
Roof Trusses		8400 span + 800 eaves				
Item	Component	Section			Length mm	
		mm	x	mm		
TC(L)	Truss Top Chord (or R	90	x	45	F7	5,417
TC(S)	Truss Top Chord (or R	90	x	45	F7	5,234
BC(L)	Truss Bottom Chord (a	90	x	45	F7	4,765
BC(S)	Truss Bottom Chord (a	90	x	45	F7	4,455
CT	Collar Tie	90	x	45	F7	1,200
KP	King Post	90	x	45	F7	1,735
L1	Lacing at eaves	90	x	45	F7	232
L2	Lacing at anchorage st	90	x	45	F7	417
L3	Lacing	90	x	45	F7	734
L4	Lacing	90	x	45	F7	1,050
L5	Lacing	90	x	45	F7	1,367
L6	Lacing	90	x	45	F7	760
D1	Diagonal	90	x	45	F7	1,129
D2	Diagonal	90	x	45	F7	1,357
D3	Diagonal	90	x	45	F7	1,777

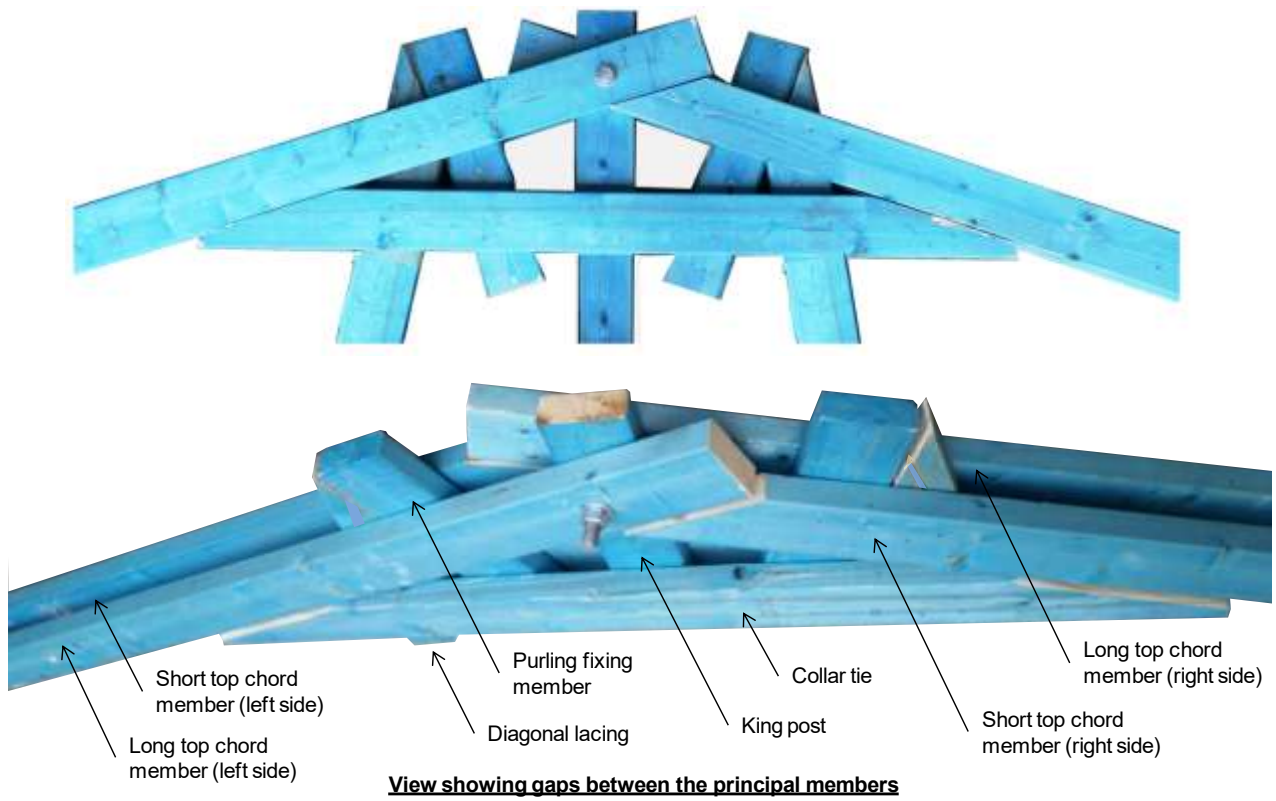
DANCER Truss Bolted Apex Splice

Trusses longer than 3.5 metres cannot be easily transported over significant distances.

They must be fabricated in two sections and joined on site. In this case the top chords must be joined with a bolted connection, and the bottom chords must be joined by a bolted connection.

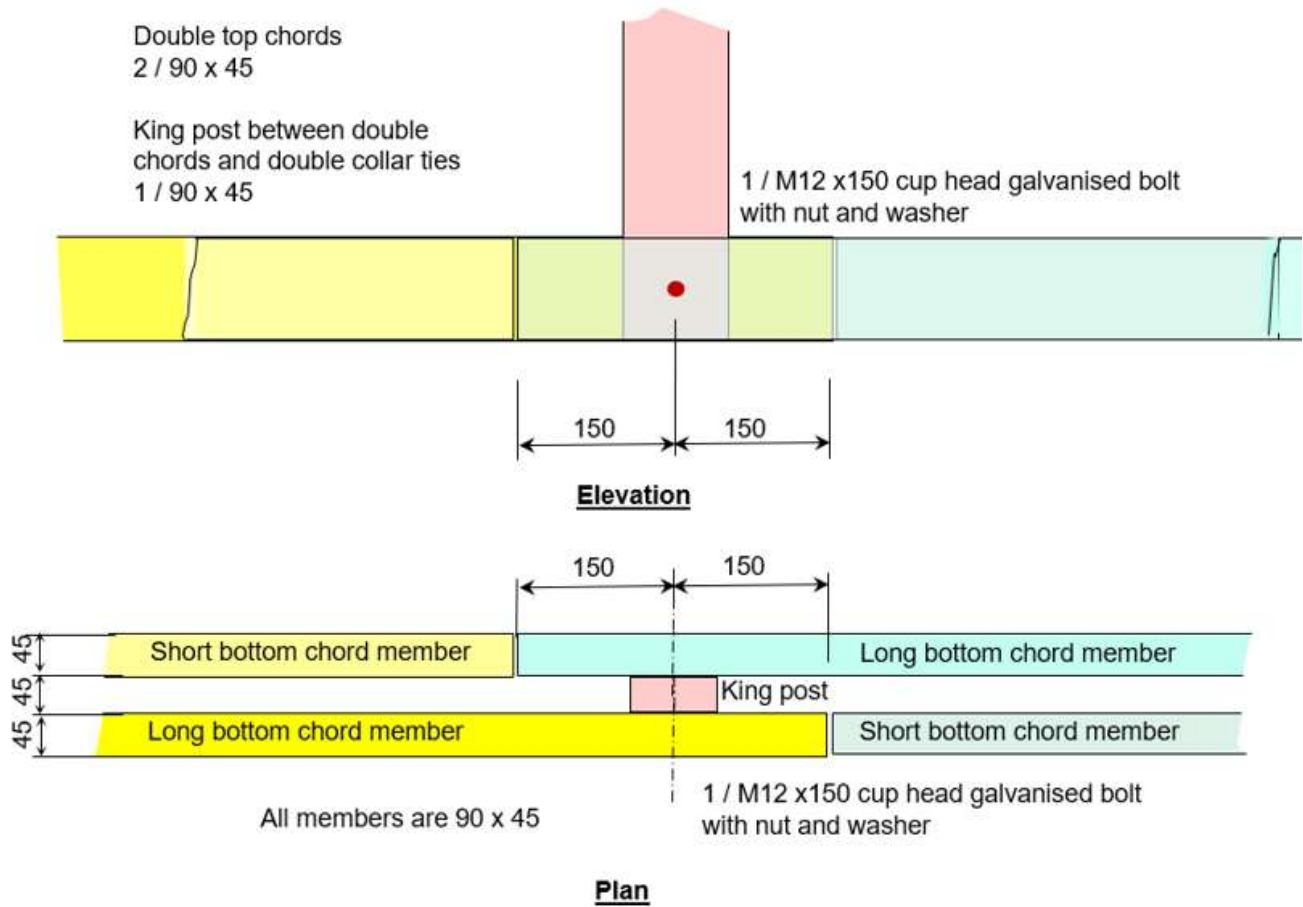
Bolted connections must not incorporate nails, since the premature failure of the nails could disrupt the timber and destroy the bolted connection before it has time to be effective.



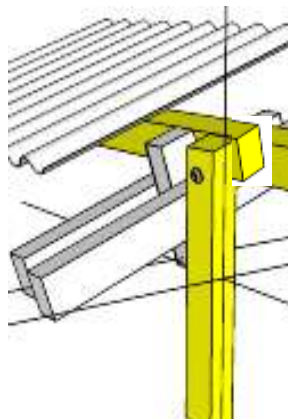
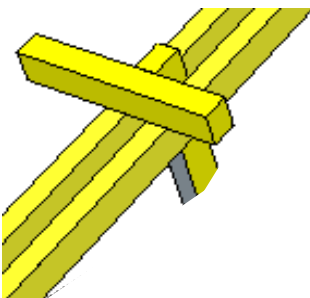


DANCER Truss Bolted Bottom Chord Splice

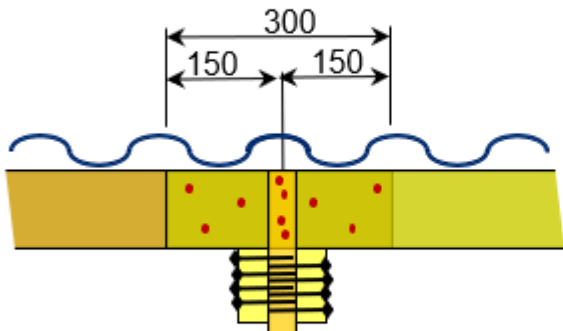
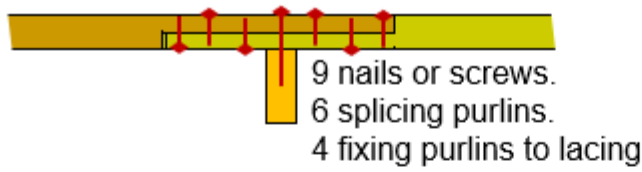
The Bottom Chords shall be spliced in a lapped double chord arrangement (similar to the top chord).



Connection Truss Bottom Chord Splice

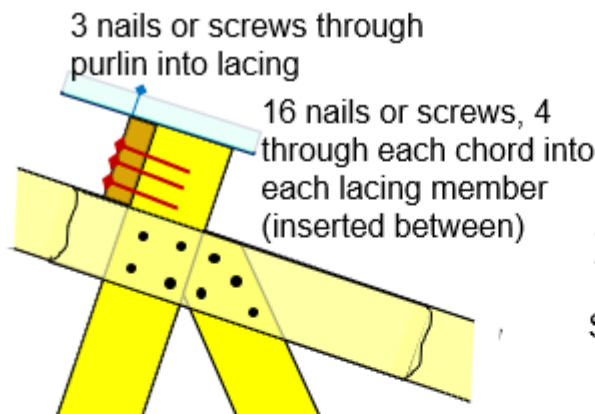


Purlin, Diagonal Lacing and Double Top Chord Connections

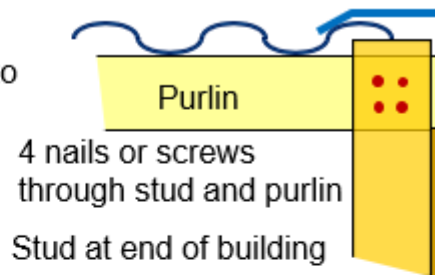


4 nails or screws through each chord into each lacing member (inserted between)



Purlin Splice (Preferred Detail)



**Connection Purlin to Double Top Chord
Connection Lacing to Double Top Chord**



Connection Purlin to End Wall Stud

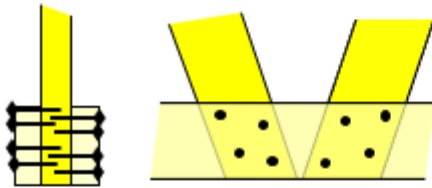
Nailed on site  Purlins, double chords and truss
Nailed in factory  diagonal lacing between double
75 x 3.75 φ nails or screws chords 90 x 45 F7 timber

Top Chord, Lacing, Purlin Fixing and Purlin Splice

Double Bottom Chord, Anchorage Stud and Eaves Connections

75 x 3.75 ϕ nails or screws

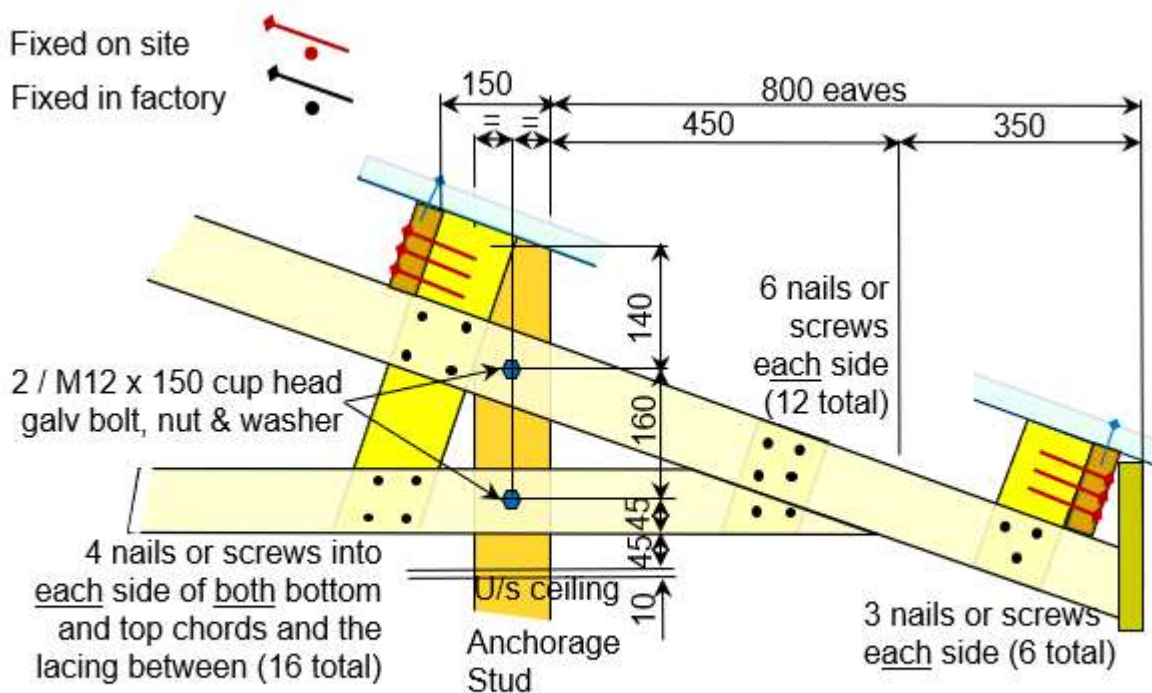
Fixed in factory



Purlins, double chords and truss diagonal lacing between double chords are all 90 x 45 F7

4 nails or screws through each side of both bottom chords into lacing at both lacing (16 total)

Connection of Lacing to Bottom Chords



Top Chord to Bottom Chord
Top Chord to Anchorage Stud

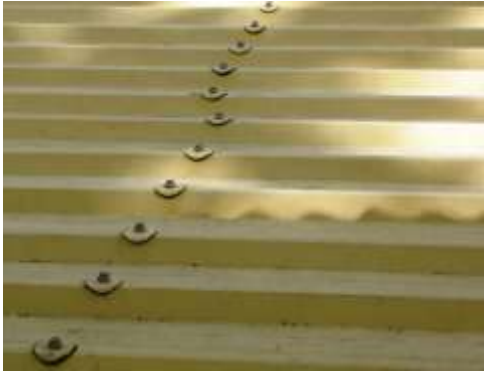
800 Eaves

Roof Fixings and Cyclone Washers

Cyclonic wind can suck roof sheeting (and wall sheeting) off the framing if there is an insufficient number of appropriate roofing screws, or if the screws have been installed without cyclone washers.

Roof sheets should be fixed through the high point of the ribs using long screws, not valley fixed. Roof sheets shall be laid in continuous lengths where practical, with the upper end turned up using the correct tool.

In very high wind areas, turn the sheets down into the eaves gutter at the lower end.



Refer to the Lysaght Design Manual

CUSTOM ORB®/CUSTOM BLUE ORB®

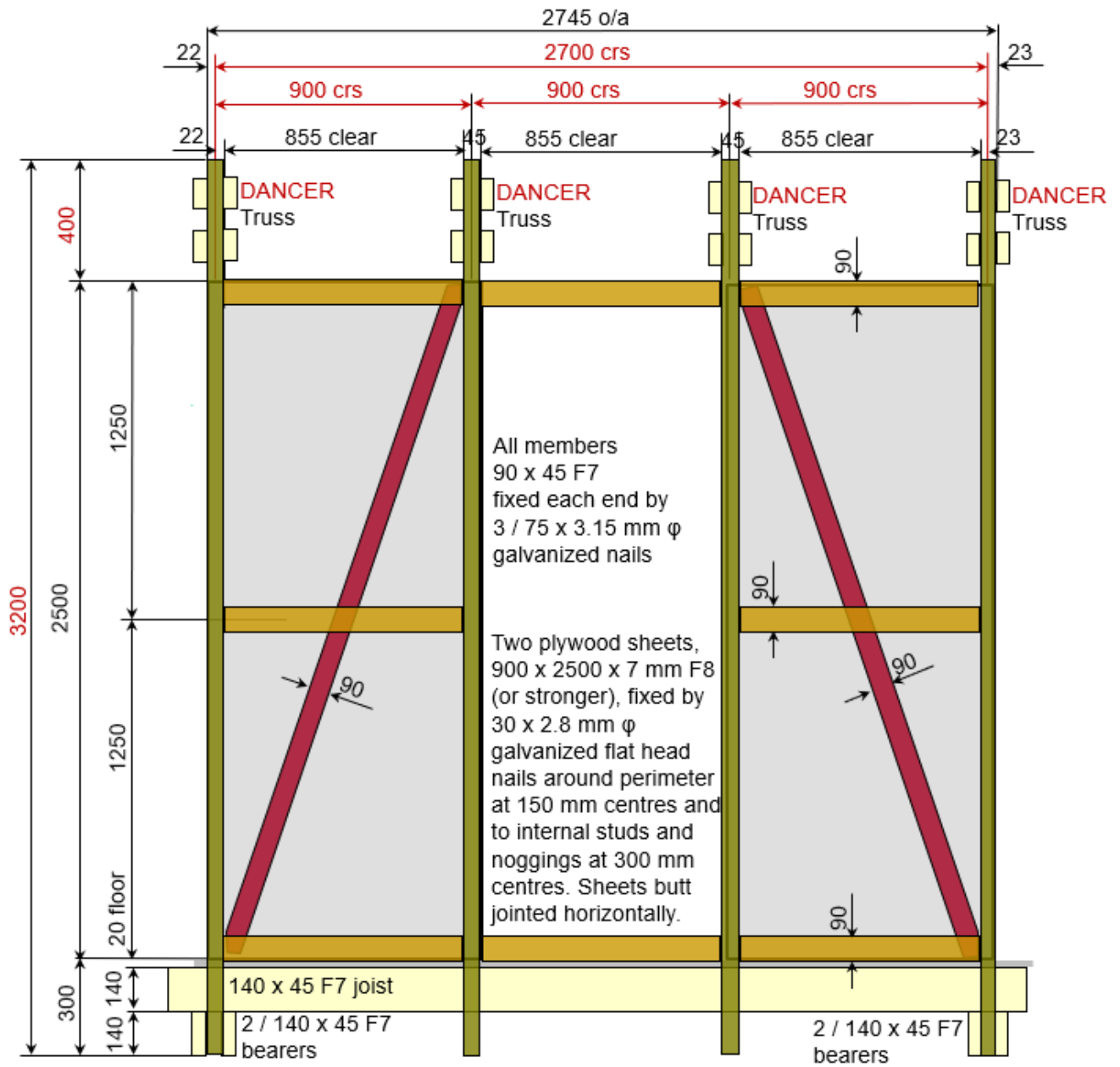


Table 4.2

CUSTOM ORB® 0.42mm BMT.

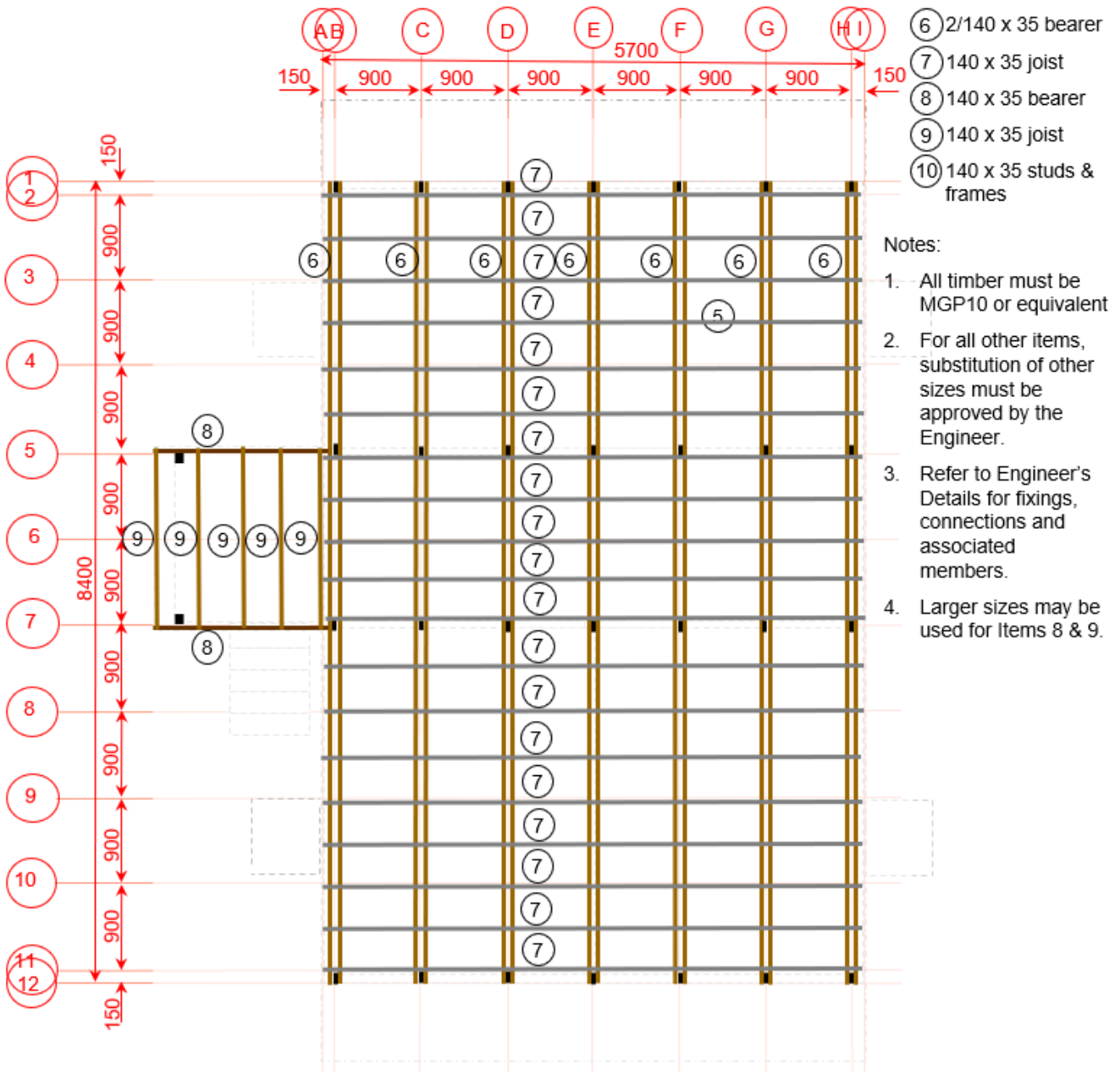
Span (mm)	Roof			
	Crest fixed	With cyclonic washers		
		3.75kPa	5.58kPa	8.21kPa
450	OK	OK	OK	X
600	OK	OK	OK	X
750	OK	OK	OK	X
900	OK	OK	X	X

External DANCER Wall Framing



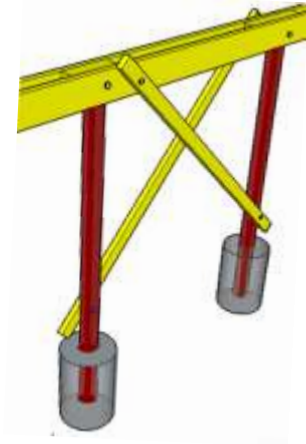
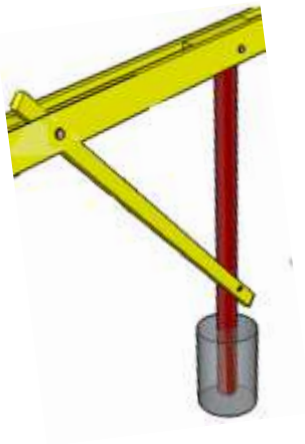
Typical Long Wall Framing, Trusses at 900 mm centres

Timber Floor Framing

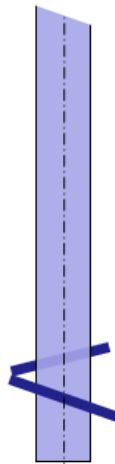
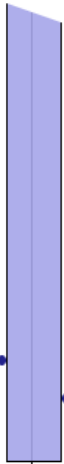
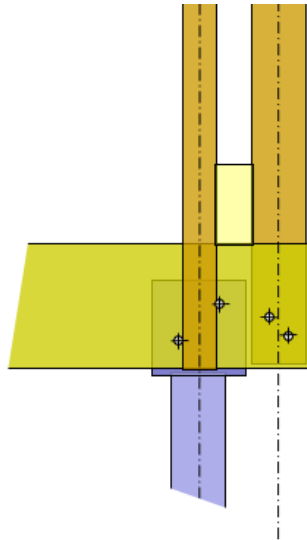
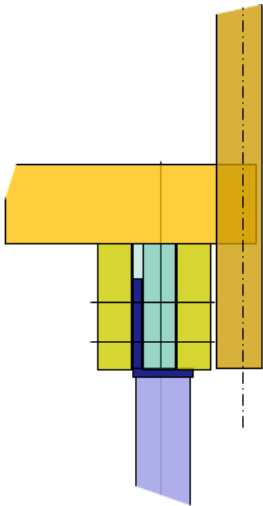


Timber Floor Framing

Diagonal Sub-floor Bracing and Steel Posts

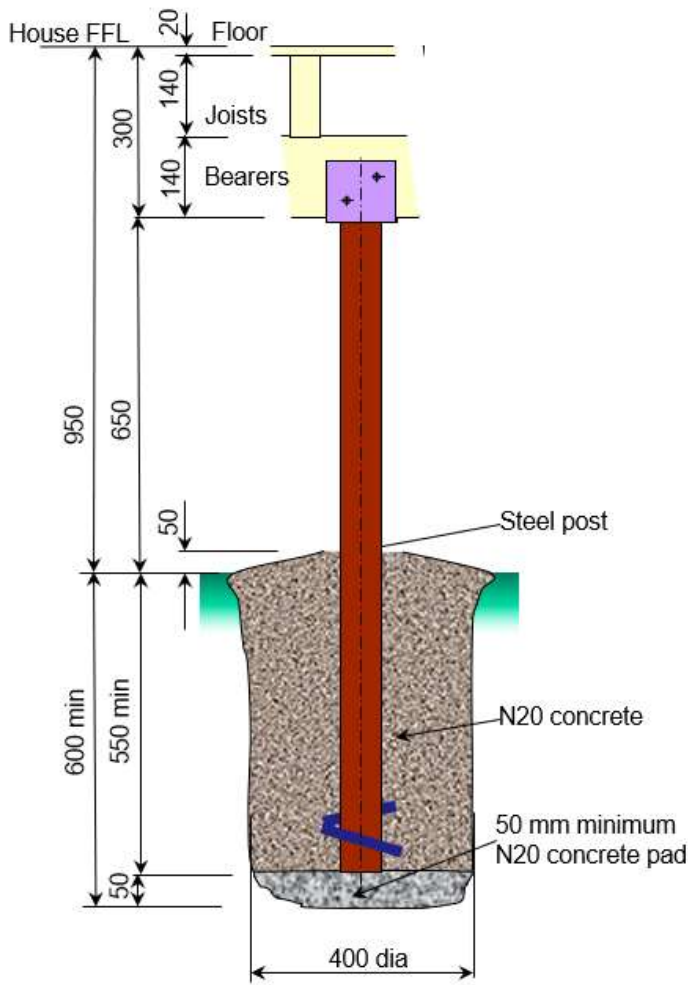


Delete if inappropriate

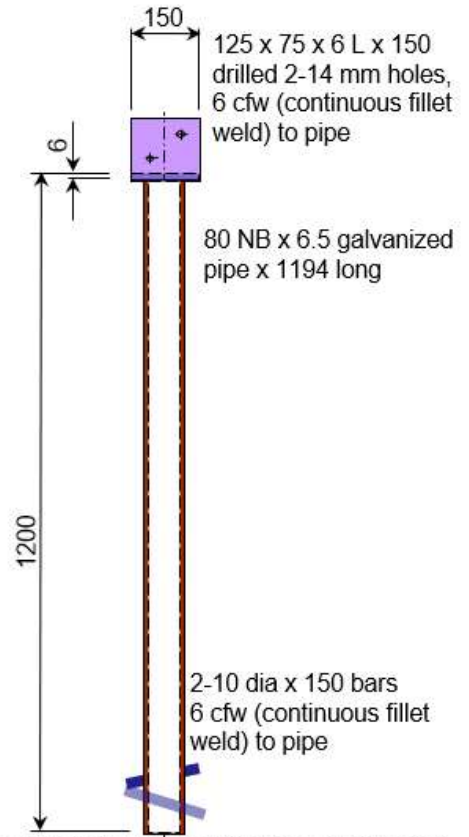


Connections at floor of steel posts with additional cleats

Concrete Piers and Steel Posts



Concrete Pier, Steel Posts and Timber Floor

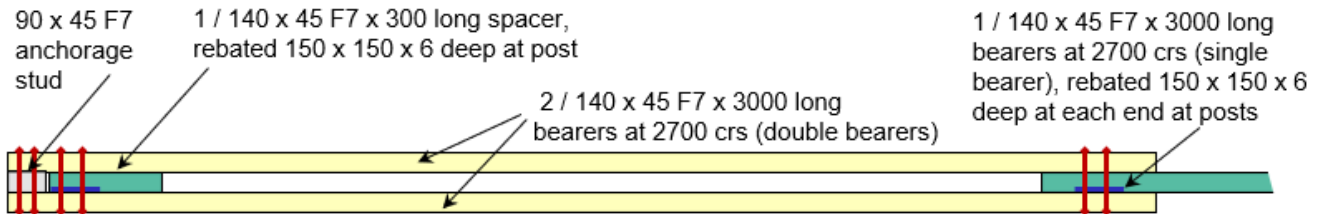


Fabricated posts meeting this specification (or similar) may be available from hardware retailers. If the length of the post is different, the height of the finished floor level and the details of the steps may need to be adjusted.

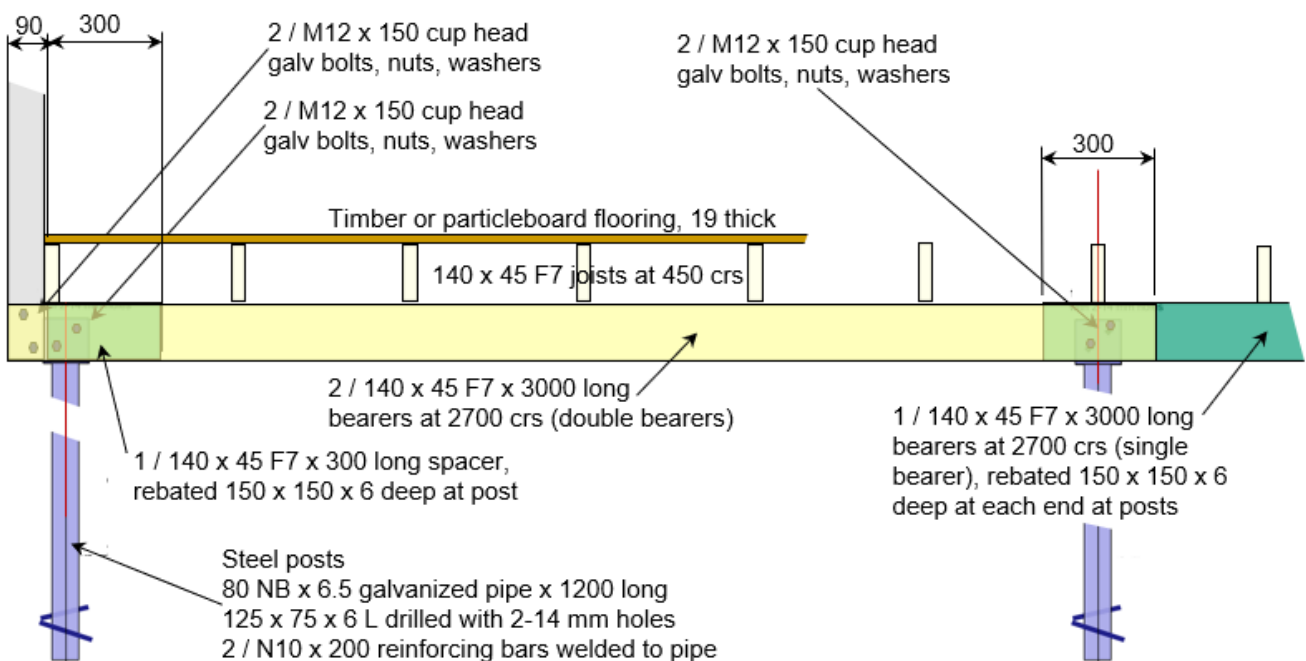
Steel Posts

Elevation Showing Bearers, Joists, Floor, Posts and Stud

For standards buildings on a 2.700 x 2.700 grid with 0.150 overhangs, the bearer timbers will all be 3,000 long. At an external wall, the bearer is square ended and at internal ends it is tapered.



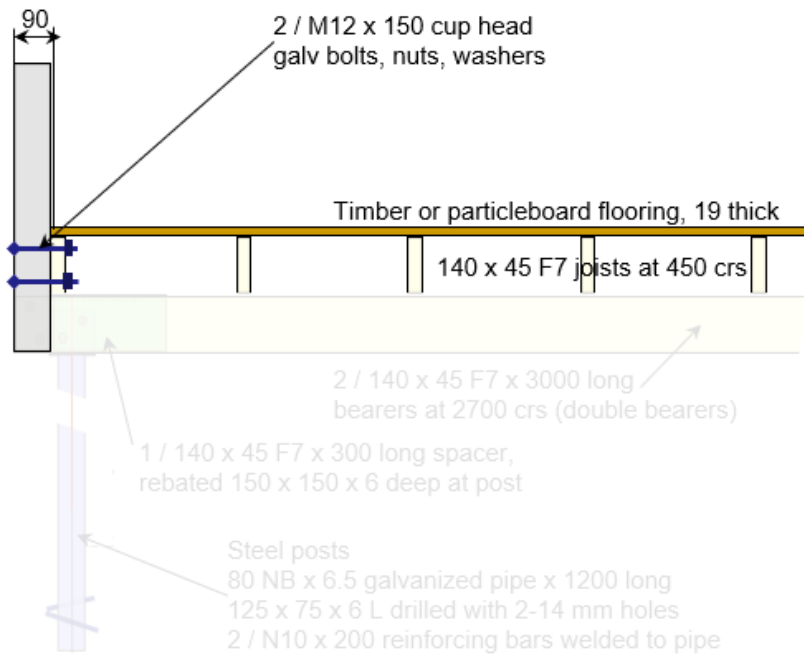
Plan Showing Anchorage Studs, Double & Single Bearers



Bearers in external bays are double bearers, bearers in internal bays are single bearers.

Except where specified otherwise in these drawings or specifications, all details shall comply with AS 1684.3

Section Showing Anchorage Studs, Joists, Double & Single Bearers and Posts



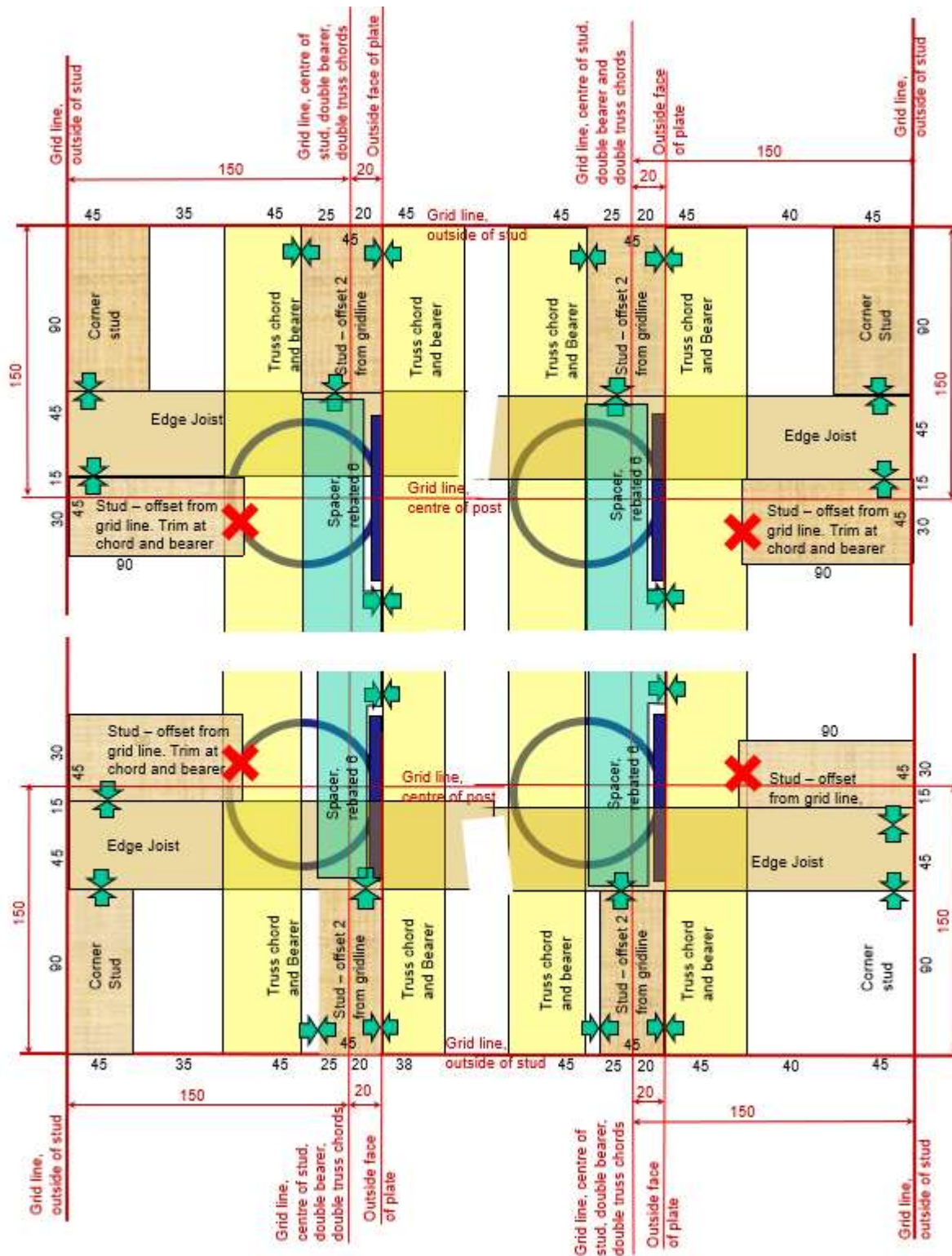
Bearers in external bays are double bearers, bearers in internal bays are single bearers.

Except where specified otherwise in these drawings or specifications, all details shall comply with AS 1684.3

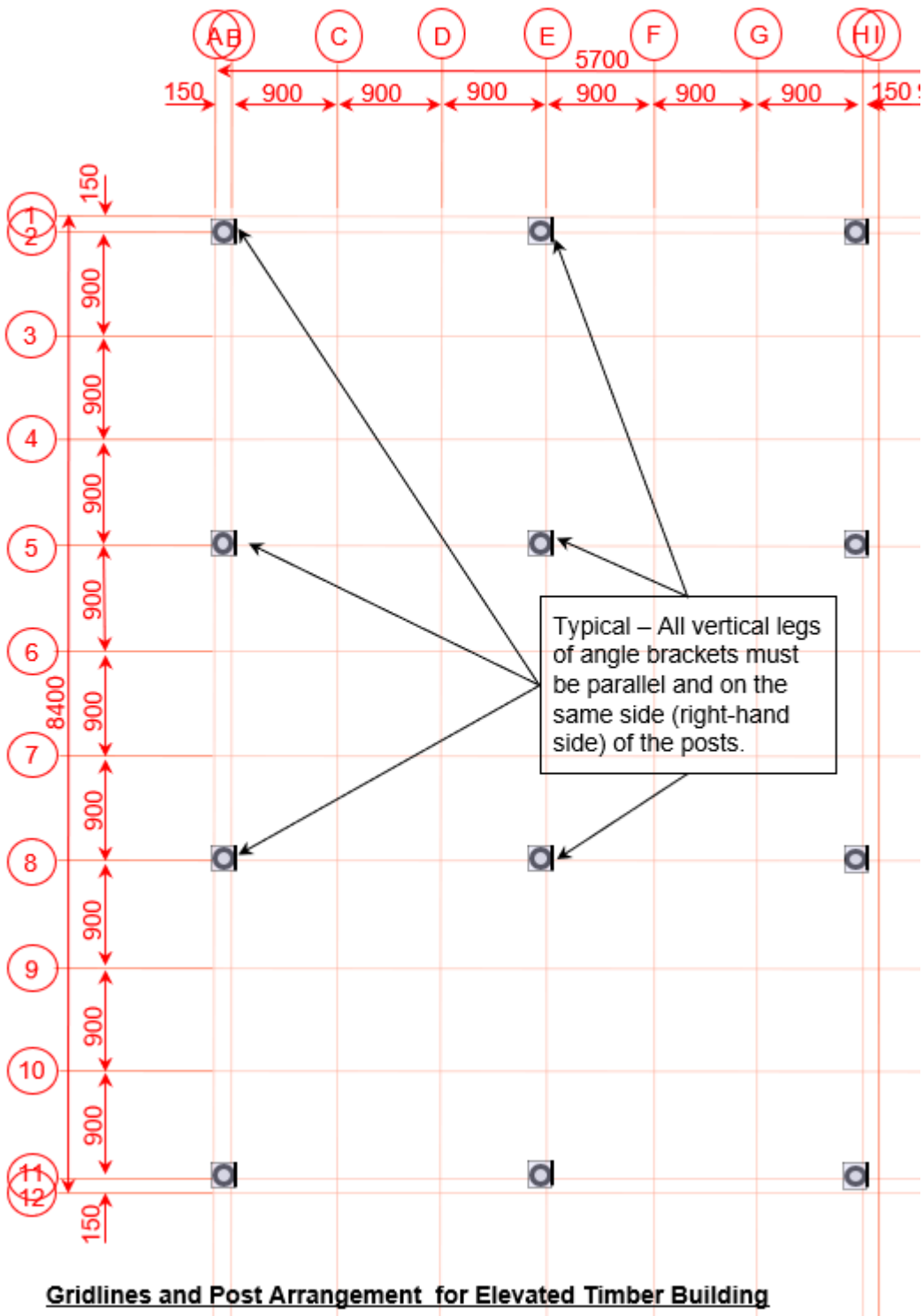
Section Showing Anchorage Studs and Joists where there are no Bearers or Posts

Plan of Corner Showing Bearer, Joist, Post and Studs

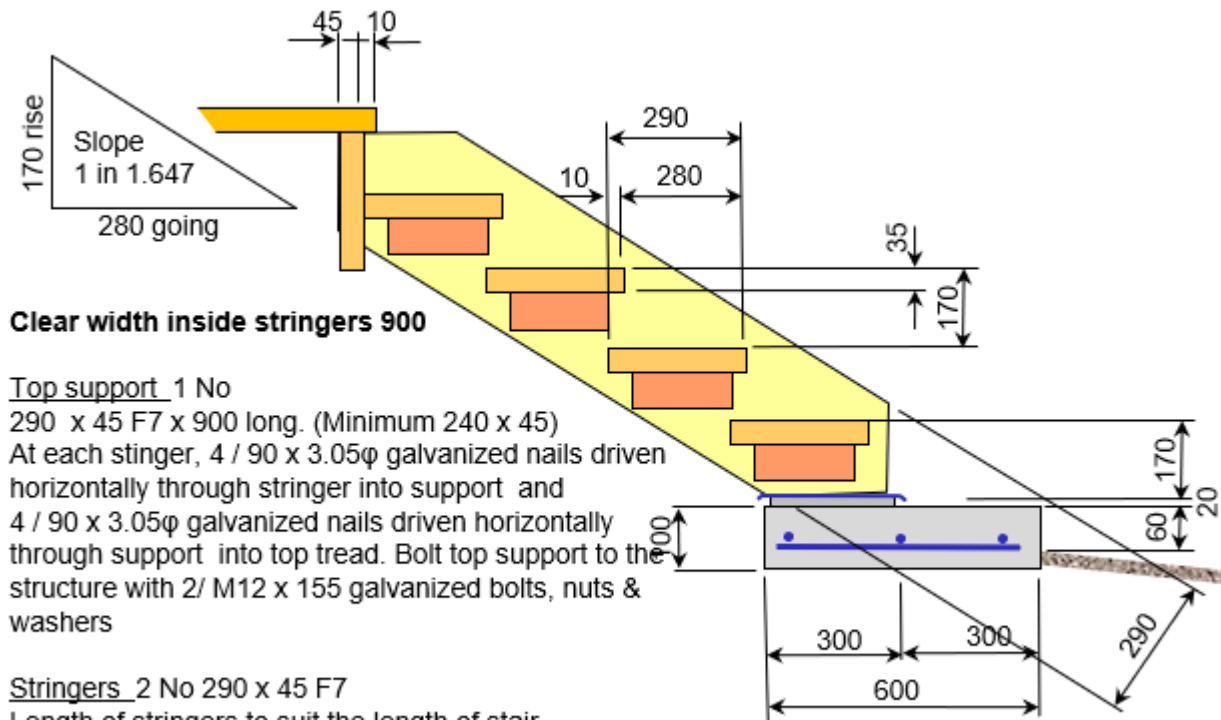
The following plan views show the relative positions of the double bearer (including the spacer), edge joist, steel post, anchorage stud and corner stud. The outside vertical face of the steel angle must be offset 20 mm from the gridline and **must be on the same side for every post**. If this is not done, prefabricated wall framing will not fit properly. The spacer timbers at the posts (shown in green) must be rebated 6 mm for a 150 mm length, to fit past the steel section. The plan (for 90 x 35 dressed timber) below is typical of the arrangement.



Arrangement at the Corner of Building for 90 x 45 studs and 140 x 45 bearers



Stairs



Treads – Number of treads to suit length of stair
290 x 45 F7 x 920 long. Slot the treads into rebates, 10 mm deep in the stringers to give 900 clear width.
At each stinger, 2 / 90 x 3.05φ galvanized nails driven horizontally through stringer into tread and 2 / 90 x 3.05φ galvanized nails driven vertically through stringer into support

Tread supports –
2 per tread. 90 x 45 F7 x 260 long
3 / 90 x 3.05φ galvanized nails driven horizontally through support into stringer

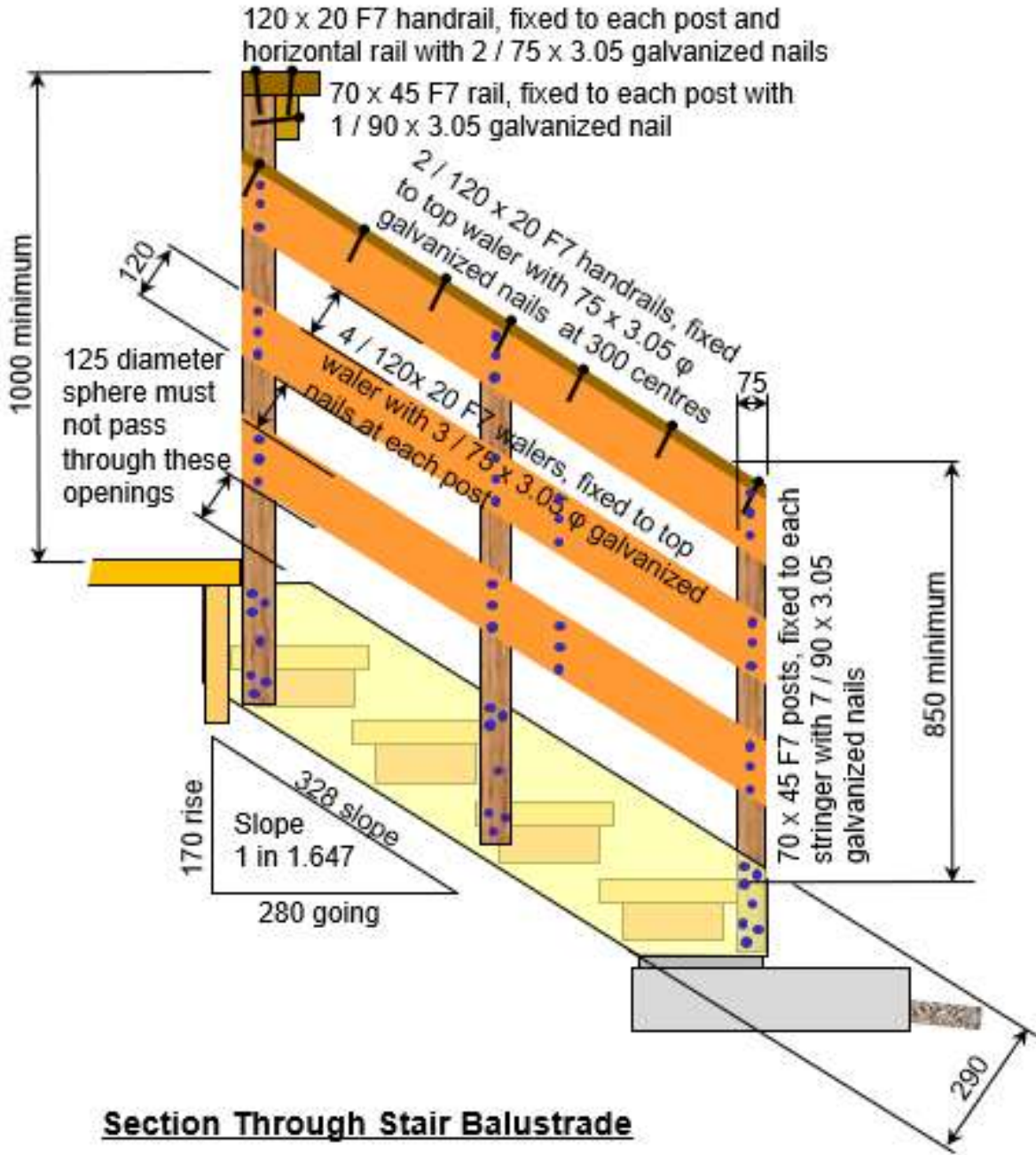
Termite shield – 2 / 100 x 3 x 350 galvanized steel strips, folded down 20 mm around edges, nailed to the underside of the stair stringer and kept clear of debris.

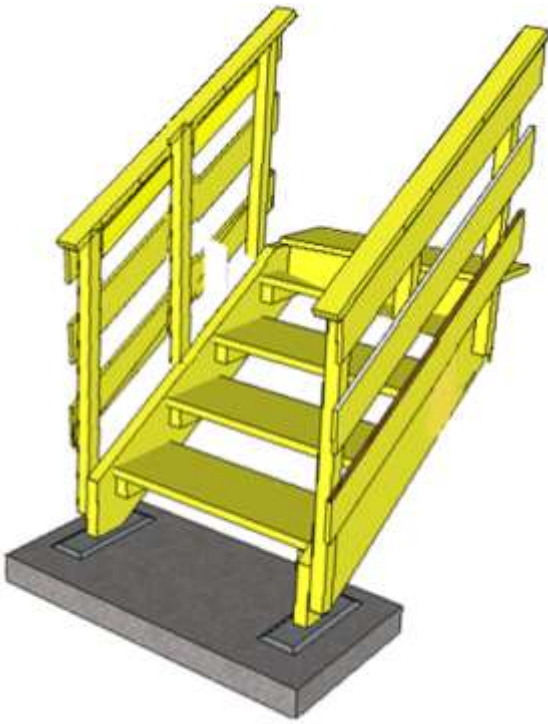
Concrete Pad – 1,200 x 600 x 100 mm thick
5 / N10 x 550 reinforcing bars and
3 / N10 x 1150 reinforcing bars
Top surface of slab nominally 60 mm above ground level. If the slab surface is low, grout (up to a maximum thickness of 20 mm) under both stringers to make up required height. If the slab surface is high, trim the bottom surface of the stringers.

Stair Dimensions				
Stair going	280	mm		
Stair rise	170	mm		
Grout thickness	0	mm		
Height of slab above ground	80	mm		
No of Rises	No of Goings	Stair Rise	Stair Going	Veranda Height
5	4	850	1120	930

Section Through Timber Stairs

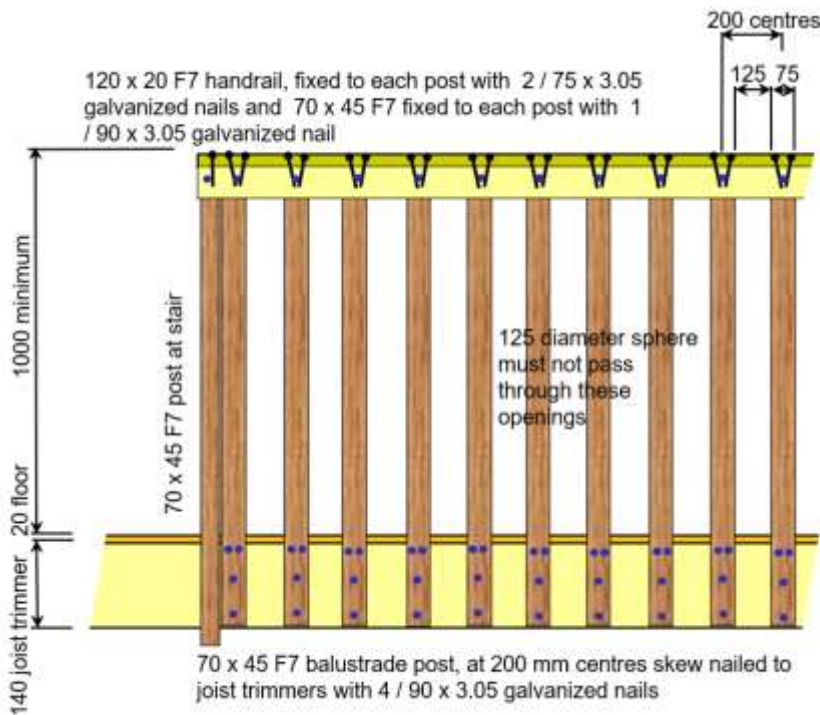
Stair Balustrades



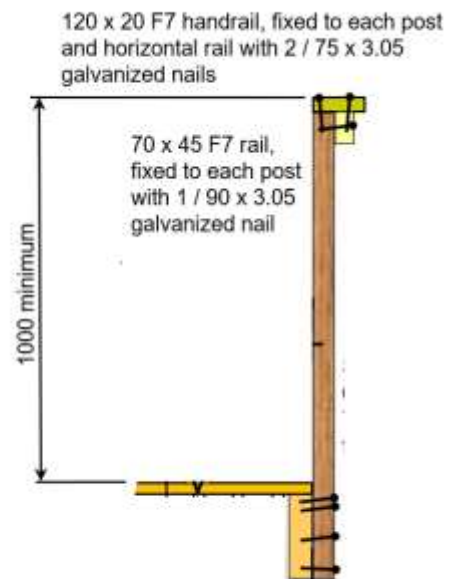


Typical Timber Stairs – 5 Risers

Veranda Balustrades



Elevation of typical Veranda Balustrade

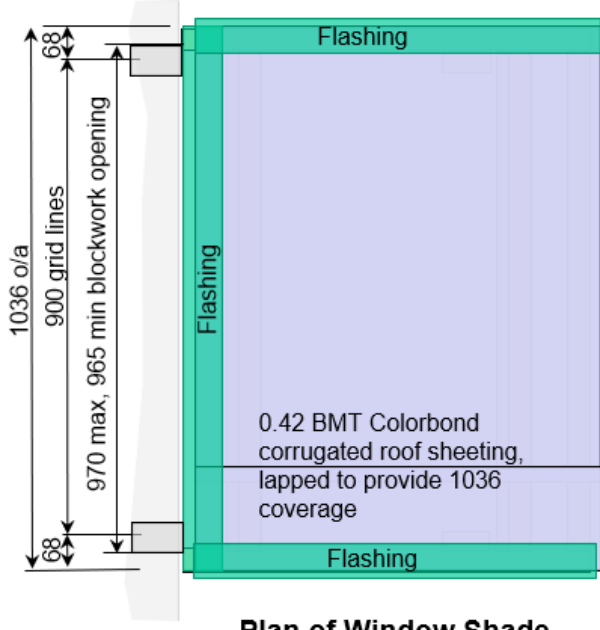


Section through Veranda Balustrade

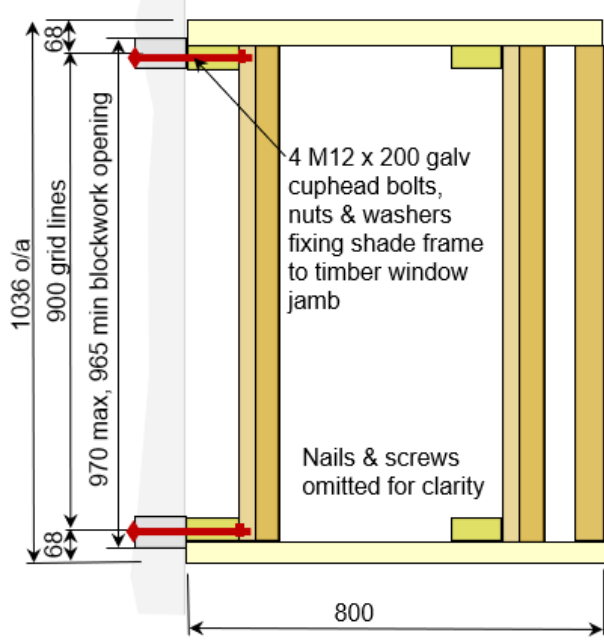
Window Shades

All timber members 90 x 45 F7,
 fixed at each end by –
 4 / 90 x 3.45 φ screws, or
 4 / 90 x 3.75 φ nails

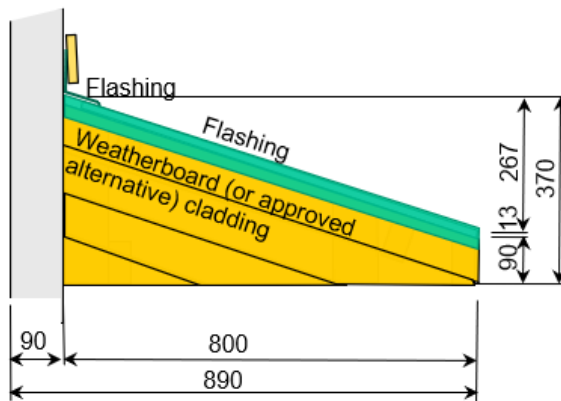
Nailed or screwed on site
 Nailed or screwed in factory



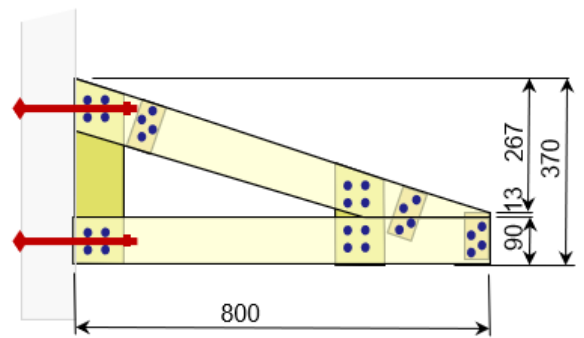
Plan of Window Shade



Plan of Window Shade Frame



Elevation of Window Shade



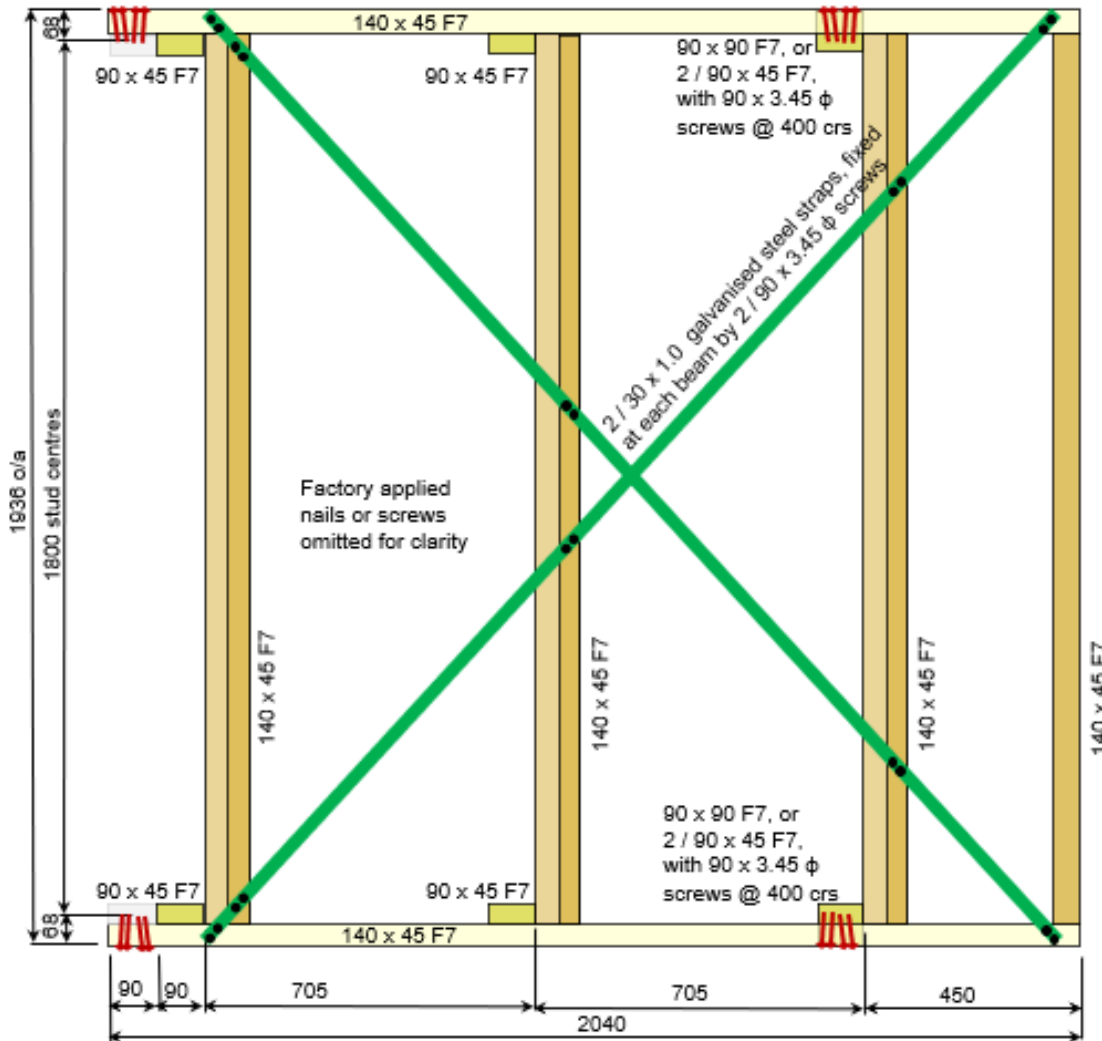
Elevation of Window Shade Frame

Awning

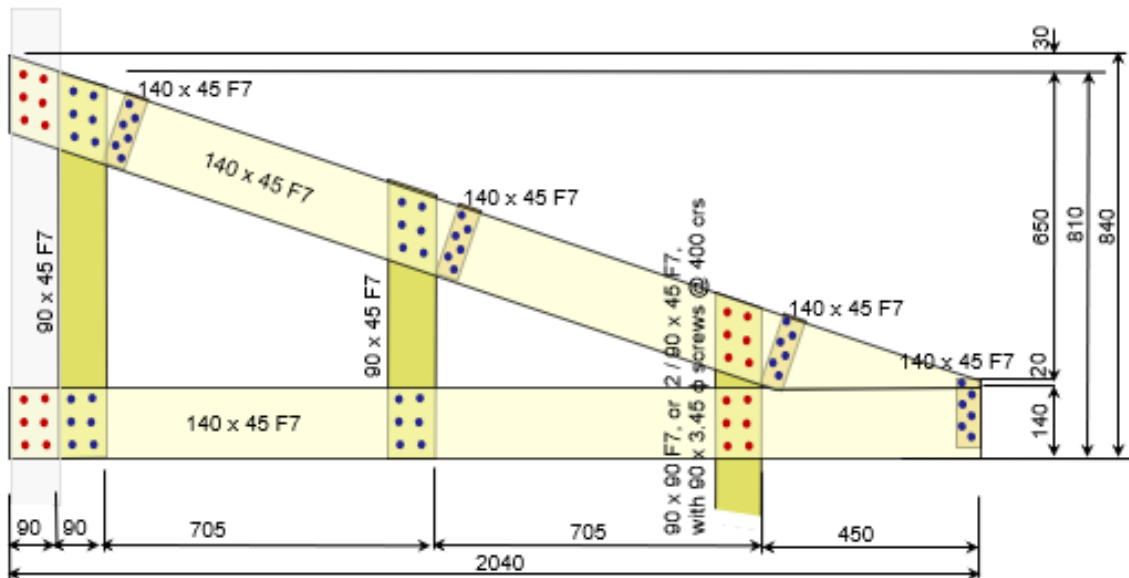
All timber members shall be fixed at each end by –
 6 / 90 x 3.45 φ screws. If screws cannot be used,
 substitute 6 / 90 x 3.75 φ nails

Nailed or screwed on site

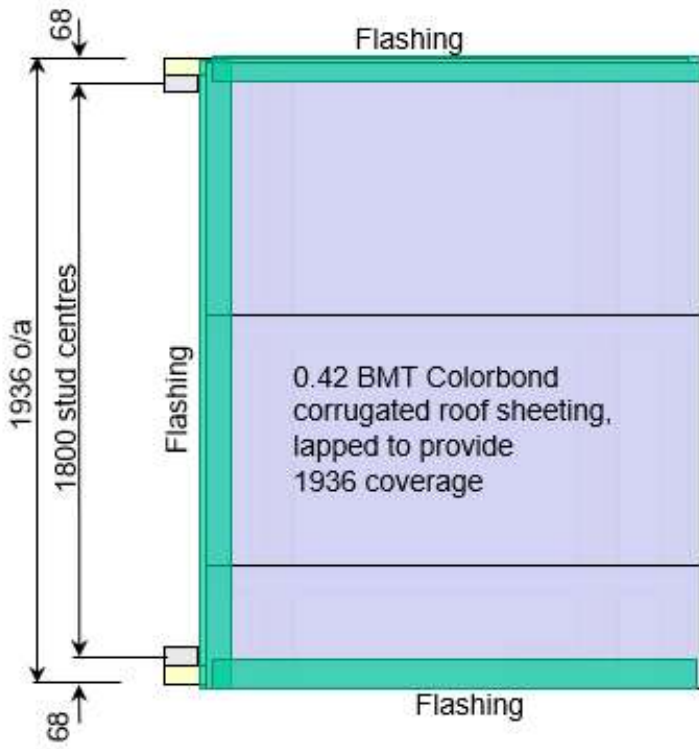
Nailed or screwed in factory



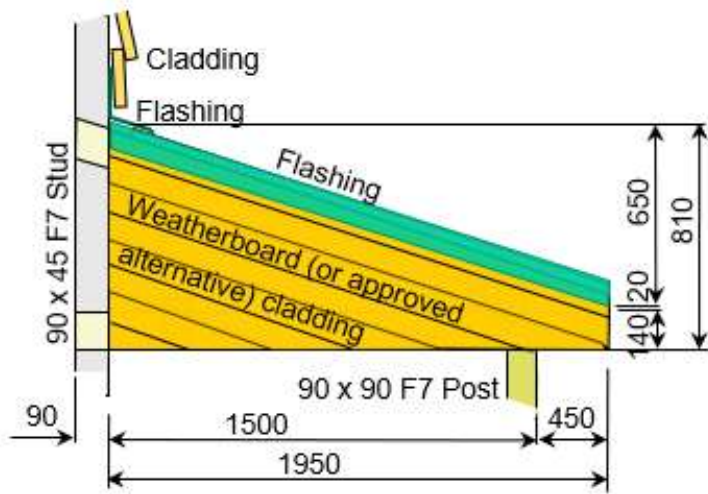
Plan of Awning Frame



Elevation of Awning Frame



Plan of Awning




Elevation of Awning


Concrete Mix for Piers and Footings

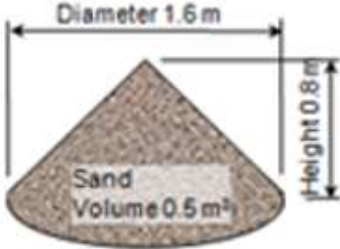
20 MPa mix (by volume) 1 : 2 : 4		
Volume of concrete	m ³	1.0
Wastage included	%	
GP or GB cement	40 kg bags	8
Clean sharp sand	m ³	0.5
20 mm rock aggregate	m ³	1.0

**For 1 cubic metre (1 m³)
of 20 MPa concrete**




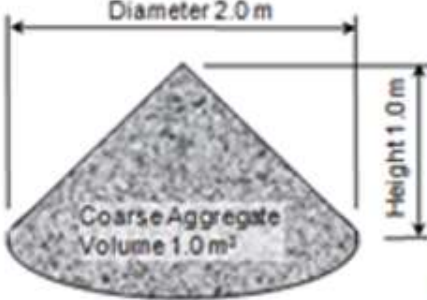
Cement 8 – 40 kg bags







Sand
Volume 0.5 m³






Coarse Aggregate
Volume 1.0 m³





Water 11 – 20 litre buckets



Part 3 – Specifications

All construction shall comply with the comprehensive project specifications are published in a separate document. The following is a summary of some key parts of that specification.

Timber

Scope

This section covers timber framing, such as columns, posts, beams, battens, rafters, trusses and the like, consisting of sawn timber and plywood.

Relevant Standards

AS 1684.1 Residential Timber Framed Construction – Design Criteria

AS 1684.3 Residential Timber Framed Construction – Cyclonic areas

AS 1720.1 Timber structures - Part 1 Design methods

AS 1604 Timber – Preservative treated – Sawn and round

AS 2082 Visually stress-graded hardwood for structural purposes

AS 2858 Visually stress-graded softwood for structural purposes

AS 2878 Timbers – Classification into strength groups

AS 3519 Timber – Machine proof grading

Levels, Dimensions, Square and Setting Out

The structure upon which the framing is to be constructed shall be within the specified tolerances, with particular attention given to levels, dimensions, square and setting out.

Bracing

All buildings shall be adequately supported against lateral wind loads, as specified in the relevant Standard (AS 1170.2 or AS 4055). In some cases, lateral earthquake loads may be a design criterion. The bracing requirements shall be determined for the appropriate Region, Terrain Category, Topography and Shielding and recorded on the drawings by the design engineer.

Tie Down

All buildings shall be adequately tied down to resist overturning due to wind loads, as specified in the relevant Standard (AS 1170.2 or AS 4055). The tie-down requirements should be determined for the appropriate Region, Terrain Category, Topography and Shielding and recorded on the drawings by the design engineer. Ensure that all tie-down systems are continuous to the footings or to the specified location on the structure.

Timber Shrinkage

Provision shall be made for timber shrinkage. Gaps that result from timber splitting shall be repaired, filled with wood filler and sanded smooth before completion.

Preservatives

Timber in exposed applications shall be treated with pyrethroid-and metal-based light organic solvent preservatives (LOSPs) to minimize fungal decay and attack by insects.

Health Warnings and Precautions

Precautions shall be in accordance with the requirements of the relevant Regulations and, where applicable, the recommendations of the following reference *RIC Good Wood Project & the Good Wood Advisory Centre, Victoria, Preservatives*.

Light Organic Solvent Preservative (LOSP)

- LOSP is a solvent-based treatment, which inhibits fungal invasion of timber. It contains copper naphthenate, zinc naphthenate, tri-butyl tin oxide (TBTO) or pentachlorophenol (PCP), with resin or wax to improve its retention and to increase its ability to repel water.
- LOSP will release, to the atmosphere, 30-40 litres of hydrocarbon solvent per cubic metre of treated timber.
- LOSP is suitable for above-ground applications where dimensional-stability is important, is used principally in external applications (e.g. fences, decks and outdoor furniture).
- LOSP is not suitable for in-ground applications because it does not chemically fix in the wood and will leach into the soil.
- LOSP must not be used for food storage, except where LOSP formulation is of very low toxicity.
- Where LOSP treated timber is exposed, cut or drilled, the exposed surface should be coated with a post-protection treatment.

Although previously in use, the following timber preservatives shall not be used.

- (a) *Creosote*: Creosote gives off a vapour that irritates the eyes and skin; and is therefore not recommended.
- (b) *Pigment Emulsified Creosote (PEC)*: PEC is a combination of coal tar, with a heavy metal pigment used to stabilize it. PEC is not suitable for normal building applications.
- (c) *Pentachlorophenol (PCP)*: PCP (derived from sodium pentachlorophenate) is an organochlorine family, of the same chemical group as DDT and Agent Orange. PCP can cause fatigue, fever, weight loss and nausea. PCP dioxins can also cause birth defects, allergies or cancer. PCPs can be passed on to successive generations through sperm and breast milk. PCP must be disposed of without special technology and facilities. It is recommended that PCPs should not be used.
- (d) *Copper Chrome Arsenate (CCA)*: CCA consists of heavy metals, copper, chromium and arsenic, which may leach from the timber and pose a health risk. CCA shall not be used; and when timber treatment is required, one of the alternatives listed above may be used.

If CCA-treated timber is already in use, the following precautions should be taken:

- Wear protective equipment when handling CCA treated timber.
- Wash hands thoroughly after handling CCA treated timber.
- Do not allow food to come into contact with CCA treated timber.

- Do not burn CCA treated timber in open fires, stoves, fireplaces or the like.
- (e) Ammoniacal copper quaternary (ACQ)
- (f) Copper azole
- (g) Boron

Design and Construction

Timber structures shall comply with the Drawings, Building Regulations and relevant Standard (AS 1684 [residential applications], AS 1720 [general applications]).

Minimum Strength Grade

Timber used for structural framing purposes shall have a strength grade not less than MGP10 (or F11 if applicable).

Timber Type, Properties, Preservation and Application

Timber and timber products shall comply with the Drawings, Building Regulations and relevant Standard (AS 1684 [residential applications], AS 1720 [non-residential applications]), and shall be of the nominated stress grade (or strength group), durability class, and (where appropriate) lyctid susceptibility, shrinkage and ignitability.

1. The following tables are based on AS 1684.2 & 3 Table H1. For additional properties and definitions refer to source document.
2. Preservative requirement: P = Should be preservative treated, S = Should be seasoned ,O = Commonly used untreated
3. Availability: R = Readily available, L = Limited Availability
4. Durability Class: 1 = Highest natural durability to 4 = Lowest natural durability.
5. Where required to achieve particular resistance to termite and/or borer attack, the species listed herein shall be treated to achieve the hazard levels listed in AS 1684.2 & 3 Table C1.
6. Lyctid Susceptible: S = Susceptible, N = Not susceptible, R = Rarely susceptible

Timber and Timber Products for Use Below Found Level

Timber and timber products shall not be used in direct contact with the ground.

If timber is required to be embedded below ground level, it shall be painted with high-build latex paint to a height 100 mm above the concrete surface and fully encased in Grade N20 concrete (20 MPa) of sufficient thickness to provide not less than 50 mm cover to all parts of the timber.

Concrete

Scope

This section covers the construction of the following concrete members for small to medium sized buildings - Concrete footings and concrete piers.

Building Regulations and Standards

All materials and construction shall comply with the most recent version of:

- the relevant parts of the Building Regulations;
- the Standards referred to therein;
- other Standards nominated in this specification; and
- other relevant Regulations.

Relevant Standards

AS 3600 Concrete Structures

AS 3610 Formwork for concrete

AS 2870 Residential slabs and footings - Construction

AS 3799 Liquid membrane-forming curing compounds for concrete

AS/NZS 4671 Steel reinforcing materials

Definitions

Site Classifications (based on AS 2870)

Class M – Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes

Class H – Highly reactive clay sites, which can experience high ground movement from moisture

Reinforcement

Reinforcement shall be placed in accordance with the drawings such that the following laps and cover are achieved. Three N12 corner bars 2.0-metre long shall be placed at all re-entrant corners.

Reinforcement	Minimum Required Laps
Bars	500 mm

Bar chairs shall be placed at one metre centres both ways. Bar chairs shall incorporate wide bases and be placed on metal bases that do not puncture the vapour barrier. Where fabric with 7 mm bars at 200 mm centres (SL72), or lighter, is used, the bar chair spacing shall be reduced to 800 mm. Bar chairs shall be placed to give the following clear cover.

- 40 mm in concrete in contact with unprotected ground

Placing Concrete

Trenches and footing excavations shall be dewatered and cleaned prior to concrete placement so that no softened or loosened material remains.

All concrete shall be compacted.

Reinforcement Cover - The lapping of welded fabric reinforcement in the top face of a slab will significantly increase the thickness of reinforcement and reduce the cover. The slab thickness shall be such as to provide both sufficient cover and sufficient effective depth.

Part 4 – Cutting Lists

Floor		Material List						Cutting Schedule		
Item	Component	Section			Material	Quantity		No	@	Length mm
		mm	x	mm		x	m			
FB	Floor Bearer	140	x	45	F7	x	99.0	30	@	3,000
FBS	Floor Bearer Spacer	140	x	45	F7	x	6.6	20	@	300
FJ	Floor Joist	140	x	45	F7	x	264.0	80	@	3,000

Roof Trusses		Material List						Cutting Schedule		
Roof Trusses								6.600		
Item	Component	Section			Material	Quantity		No	@	Length mm
		mm	x	mm		x	m			
TC(L)	Truss Top Chord (or R	90	x	45	F7	x	81.2	18	@	4,100
TC(S)	Truss Top Chord (or R	90	x	45	F7	x	77.5	18	@	3,916
BC(L)	Truss Bottom Chord (a	90	x	45	F7	x	76.5	18	@	3,865
BC(S)	Truss Bottom Chord (a	90	x	45	F7	x	70.4	18	@	3,555
CT	Collar Tie	90	x	45	F7	x	23.8	18	@	1,200
KP	King Post	90	x	45	F7	x	28.4	18	@	1,435
L1	Lacing at eaves	90	x	45	F7	x	4.6	18	@	232
L2	Lacing at anchorage st	90	x	45	F7	x	8.3	18	@	417
L3	Lacing	90	x	45	F7	x	14.5	18	@	734
L4	Lacing	90	x	45	F7	x	20.8	18	@	1,050
L5	Lacing	90	x	45	F7	x	0.0	0	@	0
L6	Lacing	90	x	45	F7	x	15.1	18	@	760
D1	Diagonal	90	x	45	F7	x	22.1	18	@	1,118
D2	Diagonal	90	x	45	F7	x	27.4	18	@	1,385
D3	Diagonal	90	x	45	F7	x	0.0	0	@	0

Purlins, Veranda, Fascias, Barge Boards		Material List						Cutting Schedule		
Item	Component	Section			Material	Quantity		No	@	Length mm
		mm	x	mm		x	m			
CJ	Ceiling Joist (additional	45	x	90	F7	x	41.3	9	@	3,300
CBa	Ceiling Batten	45	x	90	F7	x	172.8	64	@	2,700
VRa	Veranda Rafter	90	x	45	F7	x	18.4	9	@	1,862
VBe	Veranda Beam	0	x	0		x	17.2	4	@	3,900
RDB	Roof Bracing	90	x	45	F7	x	24.3	4	@	5,532
FaB	Fascia Board	230	x	45	F7	x	24.4	6	@	3,700
BaB	Barge Board	230	x	45	F7	x	21.8	4	@	4,954
RPu	Roof Purlin (or Roofing	90	x	45	F7	x	165.1	45	@	3,300

Walls		Material List						Cutting Schedule		
Item	Component	Section			Material	Quantity		No	@	Length mm
		mm	x	mm		x	m			
External Anchorage Walls										
AS1	Anchorage Stud	90	x	45	F7	x	35.2	10	@	3,200
AS2	Anchorage Stud	90	x	45	F7	x	26.9	8	@	3,060
AS3	Anchorage Stud	90	x	45	F7	x	68.9	26	@	2,410
AN1	Anchorage Nogging	90	x	45	F7	x	38.8	28	@	1,260
AN2	Anchorage Nogging	90	x	45	F7	x	5.7	4	@	1,305
AN3	Anchorage Nogging	90	x	45	F7	x	9.3	14	@	607
AN4	Anchorage Nogging	90	x	45	F7	x	16.9	18	@	855
AN5	Anchorage Nogging	90	x	45	F7	x	2.8	7	@	360
AN6	Anchorage Nogging	90	x	45	F7	x	0.9	2	@	405
WB1	Wall Brace	90	x	45	F7	x	36.7	24	@	1,390
External End Walls										
ES1	End Stud	90	x	45	F7	x	13.5	4	@	3,060
ES2	End Stud	90	x	45	F7	x	14.3	4	@	3,260
ES3	End Stud	90	x	45	F7	x	15.0	4	@	3,410
ES4	End Stud	90	x	45	F7	x	15.7	4	@	3,560
ES5	End Stud	90	x	45	F7	x	16.3	4	@	3,710
ES6	End Stud	90	x	45	F7	x	17.0	4	@	3,860
ES7	End Stud	90	x	45	F7	x	17.6	4	@	4,010
ES8	End Stud	90	x	45	F7	x	9.2	2	@	4,160
ES9		0		0			0.0	0		4,310
ES10		0		0			0.0	0		4,460
EN1	End Nogging	90	x	45	F7	x	23.8	60	@	360
EN2	End Nogging	90	x	45	F7	x	8.2	12	@	622
EN3	End Nogging	90	x	45	F7	x	6.5	12	@	496
EP1	End Packer	90	x	45	F7	x	26.4	6	@	4,000
VP	Veranda Post	90	x	45	F7	x	25.6	9	@	2,583
Internal Walls										
CS 2	Common Stud	90	x	45	F7	x	146.0	55	@	2,410
BP	Wall Bottom Plate	45	x	90	F7	x	77.9	14	@	5,400
TP	Wall Top Plate	45	x	90	F7	x	155.8	29	@	5,400
NG	Wall Nogging	90	x	45	F7	x	77.9	14	@	5,400
DB	Additional Diagonal Wa	30	x	1	Steel	x	13.8	8	@	1,570
LI	Lintel	90	x	45	F7	x	15.0	3	@	5,400
	Studs, Plates, Nogging	90	x	45	F7	x	937.7	393	@	
WB	Wall Bracing (First Sto	Input	mm		External plywood			Plywood		2,500

Stairs, Balustrade								Cutting Schedule		
Item	Component	Section			Material	Quantity		No	@	Length mm
		mm	x	mm		x	m			
SSt	Stair Stringer	290	x	45	F7	x	3.5	2	@	1,586
STr	Stair Tread	340	x	45	F7	x	4.0	4	@	920
STS	Tread support	75	x	50	F7		2.3	8	@	260
SSS	Stair stringer support	340	x	45	F7		1.0	1	@	920
SPo	Stair post	90	x	45	F7		6.4	6	@	975
SMR	Stair walers	125	x	25	F7		10.5	6	@	1,586
SHR	Stair hand rail	125	x	25	F7		3.5	2	@	1,586
VBP	Veranda Balustrade Po	90	x	45	F7	x	87.1	71	@	1,115
FVB	Front Veranda Balustrade	125	x	25	F7	x	4.0	2	@	1,800
FVB	Front Veranda Balustrade	125	x	25	F7	x	11.2	3	@	3,400
BVB	Back Veranda Balustrade	125	x	25	F7	x	0.0	0	@	0
BVB	Back Veranda Balustrade	125	x	25	F7	x	0.0	0	@	0
	Veranda Balustrades	125	x	25	F7	x	15.2	5		