Design, Estimating, Costing and Quoting

This training package provides information on the design, estimating, costing and quoting for village infrastructure and houses common in South-east Asia and the South Pacific region.

It is based on the use of the Building Design and Construction Workbook, which integrates the Design, Design Check, Construction Monitoring, Material Lists, Cutting Schedule and Bill of Quantities, specific to village houses and similar buildings.

A different approach will be necessary for other applications.



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Design, Estimating, Costing and Quoting – Process

Design

Village infrastructure and houses in South-east Asia and the South Pacific region may be subject to severe cyclonic wind, earthquake and/or tsunami loads (depending on their location), in addition to normal gravity permanent and imposed loads. Their design should be consistent with sound engineering principles and should be carried out by a suitably qualified and experienced structural engineer. Alternatively, it may be acceptable for an experienced builder to apply standard designs that are detailed in software or manuals, which have been developed by a structural engineer. This process includes design, design check and construction monitoring activities.

Estimating, Costing and Quoting

The estimating, costing and quoting method, and its sophistication, should account for the risks associated with the:

- Value of the project,
- Sophistication of the design and detailing,
- Complexity of the contract documentation,
- Type of contract (e.g. lump sum, schedule of rates etc.), and
- Relationships between the builder and the client.

This process involves the preparation of Material Lists, Cutting Schedule and a Bill of Quantities.

Once these have been prepared, prices can be obtained from suppliers and subcontractors and entered onto the Bill of Quantities. This enables a total price to be determined and quoted.

Building Design and Construction Workbook – Overview

The Building Design and Construction Workbook is an Excel workbook that integrates the Design, Design Check, Construction Checklists, Material Lists, Cutting Lists and Bill of Quantities, specific to village houses and similar buildings. The workbook is tailored principally for elevated timber buildings, although it can cater for other buildings as well. A typical page is as follows.



The "Main Data Entry" spreadsheet provides for the input of the data used for the Design, Design Check, Construction Checklists, Material Lists, Cutting Schedule and Bill of Quantities, specific to village houses and similar buildings. Other spreadsheets in the workbook depend on this data for the calculation of their outputs.

Building Design &	& Construction			This	is Worksheet is the place where the project data, dimensions and design paramete e input. They may be overridden in other Worksheets, but this could lead to consistencies in the Workbook.
Designation				Th	e seven parts of the designation are principal inputs, and must be nominated for (
Project	P	P		Ge	Generic, P = Papua New Guinea, S = Solomon Islands, V = Vanuatu, T = Tonga, F = Fiji, N = Non-standar
artner Organisation	V	v		Ge	Generic, V = Vision for Homes (PNG), R = Ranongga Community Association, H = Habitat for Humanity
oordination	P	P		Ge	Generic, P = Partner Housing Australasia (Building) Incorporated
Jesign	Q	Q		Ge	Generic, W = GW Structural, H = Chapman Hutchison Pty Ltd, Q = Quasar Management Services Pty Ltd
)esign Check	W	w.		Ge	Generic, W = GW Structural, H = Chapman Hutchison Pty Ltd, Q = Quasar Management Services Pty Ltd
Builder	٧	V		Ge	Generic, V = Vision for Homes (PNG), R = Ranongga Community Association, H = Habitat for Humanit
Site Inspection	Q	Q		Ge	Generic, W = GW Structural, H = Chapman Hutchison Pty Ltd, Q = Quasar Management Services Pty Ltd
Jae	н	н		G =	Generic, H = house, C = Clinic, S = School
Dimensions, veranda, porcl	8.4 x 8.4 (6.6), 1, 0	8.4 x 8.4 (6.6		Ext	ernal length x external width including verandas. (external width excluding verandas), number of full len
lo of storeys, roof type	1, g			Nu	nber of habitable storeys (1), roof (g = gable, h = hip)
Vo bed rooms, window wi	3, 800, 0, 0			Nur	nber of bedrooms, standard window width, number of wider windows, number of narrower windows
Sub-floor, walls, roof	s, t, t			Sub	floor (s = steel, t = timber, c = concrete slab-on-ground), Walls (t = timber frame, m = concrete masonr
Cyclonic / Non-cyclonic	Non-cyclonic			Cyc	:lonic, Non-cyclonic
wind q., Earthquake z	1.50, 0.10		1.50, 0.10	Wir	id q. (N1, N2 ≤ 1.50 kPa, N3, N4, C1, C2≤ 2.23 kPa), Earthquake hazard factor z (0.1≤ 0.1, 0.4≤ 0.4),
Summary					
Project	Papua New Guinea				
artners	Vision for Homes				
lse	House				
xternal plan	8.4 m x 8.4 m overall 8.4 m x 6.6 m habitable 1 full length veranda 0 porches			Ш	
External elevation	One habitable storey, gable roof				
iternal arrangment	Three bedrooms, 800mm windows, no larger windows, no smaller windows				
ub-floor, walls, roof	Steel posts, anchored timber wall & cladding, anchored timber trusses				

The Main Data Entry Spreadsheet facilitates the design process, design checking and the inspection of construction.



Rapid Selection of Standard Designs

The yellow cells contain default data based on a number of standard designs. The data for these standard designs may be invoked automatically by entering a simple coding into the "Designation" section. The exact format (similar to the examples) must be entered. Alternative design data may be entered manually by the design engineer at the appropriate green cells in "Summary", and (when appropriate) in the other green cells.

Designation				
Project	Р	Р		
Partner Organisation	V	V		
Coordination	Р	Р		
Design	Q	Q		
Design Check	W	W		
Builder	V	V		
Site Inspection	Q	Q		
Use	Н	н		
Dimensions, veranda, porch	8.4 x 8.4 (6.6), 1, 0	8.4 x 8.4 (6.6)	, 8.4 x 8.4 (6.6), 1, (0 8.4 x 8.4 (6.6), 1, 0
No of storeys, roof type	1, g		1, (
No bed rooms, window width	3, 800, 0, 0			
Sub-floor, walls, roof	s, t, t		s, t,	t .
Cyclonic / Non-cyclonic	Non-cyclonic		Non-cyclonic	
Wind q _z , Earthquake z	1.50, 0.10		1.50, 0.10	
Summary				
Project	Papua New Guinea		Papua New Guinea	a Papua New Guinea
Partners	Vision for Homes			
Use	House			
	8.4 m x 8.4 m overall			
	8.4 m x 6.6 m habitable			
External plan	1 full length veranda			

Organisations and Consultants

The yellow cells contain default data for a number of organisations and consultants performing the design, construction and inspection functions. Alternative data may be entered manually at the appropriate green cells.

- Partner Organisation
- Coordination
- Design
- Design Check
- Builder
- Site Inspection

Partner Organisation				
Organisation	Vision for Homes			
ABN				
Contact	Kelly Kombra-Peng			
Contact Postal Address	PO Box 635 Mt Hagen 281 Western Highlands, PAPUA NEW GUINEA		PO Box 635 Mt Hagen 281 Westem Highlands, PAPUA NEW	PO Box 635 Mt Hagen 281 Western Highlands, PAPUA NEW
Contact Phone	+67 5 7358 1231		+67 5 7358 1231	+67 5 7358 1231
Contact Email	kellykombrap@yahoo.com			
	Refer to MOU		Refer to MOU	Refer to MOU
Coordination				
Organisation	Partner Housing Australasia (Building) Incorporated			
ABN	88 722 057 429			
Contact	Project Manger	Project Mange	Project Manger	Project Manger
Contact Postal Address	Address	Address		

Construction Checklist

The yellow cells of the "Construction Checklist" section contain default data used by inspectors in separate construction checklist spreadsheets. The information input at this point in the workbook is that which is necessary to check the setting out. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Construction Checklist										
Project	Papua New Guinea									
Activity	Construction Inspection									
Item or Product	Required		Acceptance	Hold	Date & Inspector					
Drawing showing: boundary pegs, corner pegs, gridlines,	Latest copy of documents in file		Latest copy of documents in file		Latest copy of documents in file					
Boundary pegs	Correctly located		Correctly located		Correctly located					
Corner pegs	Correctly located		Correctly located		Correctly located					
Gridline pegs	Correctly located		Correctly located		Correctly located					
Benchmark and temporary t	Correctly located		Correctly located		Correctly located					
Profiles	Correctly located		Correctly located		Correctly located					

Building Parameters

The yellow cells of the "Building Parameters" section contain the main default data for defining the loads for which the building is designed (e.g. foundations, tsunami, flooding, earthquake, wind and snow). Gravity loads due to permanent and imposed loads are determined elsewhere in the design spreadsheet. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Foundations					
Foundations	Moderate clay		Moderate clay		Moderate clay
Site classification (A, S, M,	М		M		M
Characteristic internal friction	27	0		0	27
Characteristic cohesion	6	kPa		kPa	
Ultimate bearing capacity	210	kPa	210	kPa	210
Tsunami					
Distance from high water ma	1000.0	km		km	
Height of finished floor above	800.0	m		m	
Distance from high earthqua	100	km		km	
Site specific exposure	1.0		1		1
Tsunami risk factor	0.00				
Flooding					
Distance to closest water co	300	m		m	
Height of finished floor above	3.0	m		m	
Catchment area	30	km ²		km2	
Concentration of catchment	1.0		1		1
Flash flooding risk factor	0.00				
Earthquake					

Structural Design Parameters

Coundation

Bulk Earthworks, Drainage, Foundations and Concrete

The yellow cells of the "Bulk Earthworks, Drainage, Foundations and Concrete" section contain the main default data for defining those building components below ground level. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Bulk Earthworks, Drainage, Foundations and Concrete

Earthworks and Drainage				
Soil class(A, S, M, H, P)	М		Μ	М
Compaction	Site to be compacted		Site to be	Site to be
Drainage	Site to be drained		Site to be drained	Site to be drained
Retaining walls	Batter or retain slopes		Batter or retain	Batter or retain
Termite risk	Low		Low	Low
Are posts embedded in pier	Yes			Yes
Concrete Pad Footings				
Footing depth	100	mm	100 mm	100 mm
Footing width	600	mm	600 mm	600 mm
Footing length	1200	mm	1200 mm	1200 mm
Number of pad footings	1		1	1
Footing reinforcement	3 / N10 x 550 3 / N10 x 950		3 / N10 x 550 3 / N10 x 950	3 / N10 x 550 3 / N10 x 950
Bearing area	0.06	m²	0.06 m2	0.06 m2
Concrete Piers				
Pier depth	600	mm	600 mm	600 mm
Pier diameter	400	mm	400 mm	400 mm
Post embedment or (clearar	450	mm	450 mm	450 mm
Depth of concrete	600	mm	600 mm	600 mm
Number of concrete piers	16		16	16
Bearing area	0.13	m²	0.13 m2	0.13 m2
Reinforcement				

Suspended Concrete Structures

The yellow cells of the "Suspended Concrete Structures" section do not contain default data. This is because such components are not part of the standards designs. If required, data for reinforced concrete columns, beams, slabs and stairs may be entered manually at the appropriate green cells by the design engineer.

Concrete columns			
Туре	mm	mm	mm
Contributory area	m ²	m2	m2
Structures supported			
Length	mm	mm	mm
Width	mm	mm	mm
Depth	mm	mm	mm
Reinforcement			
Reinforcement			
Concrete beams			
Туре	mm	mm	mm
Contributory area	m ²	m2	m2
Structures supported			
Length	mm	mm	mm
Width	mm	mm	mm
Depth	mm	mm	mm
Reinforcement			
Reinforcement			
Concrete slabs			
Туре	mm	mm	mm
Contributory area	m ²	m2	m2
Structures supported			

Suspended Concrete Structures

<u>Timber Framing – General Specification (Part 1)</u>

The yellow cells of the first part of "Timber Framing – General Specification" section contain the main default data defining the type and properties of the timber. The default type is "Radiata Pine". If this is changed to "F11 Hardwood", corresponding defaults will be adopted throughout the workbook. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Timber Framing						
General Specification						
Name (Radiata Pine or Kwila	F11 Hardwood		F11 Hardwood	F11 Hardwood		F11 Hardwood
Seasoned or unseasoned?	Unseasoned			Unseasoned		Unseasoned
Hardwood or softwood?	Hardwood			Hardwood		Hardwood
Controlled stress grading?	No			No		No
Minimum stress grade	F11			F11		F11
Strength group	S2			S2		S2
Joint group	JD2			JD2		JD2
Density	1,150	kg/m³		1,150	kg/m	1,150 kg
Toughness	Medium			Medium		Medium
Tangential shrinkage	2.5%			2.5%		2.5%
Tangential shrinkage	Input			Input		Input
Durability class	2			2		2
Lyctid susceptibility	Susceptible			Susceptible		Susceptible
Termite resistance	Heartwood resistant			Heartwood resistant		Heartwood resistant
Colour	Light to dark red			Light to dark red		Light to dark red
In-ground use	-			-		-
Exposed framing above grou	Commonly used			Commonly used		Commonly used
Protected framing above grou	Commonly used			Commonly used		Commonly used
Decking use	Commonly used			Commonly used		Commonly used
Cladding use	-			-		-
Internal flooring use	-			-		-

<u>Timber Framing – General Specification (Part 2)</u>

The yellow cells of the second part of the "Timber Framing – General Specification" section contain the main default data for the principal structural timber members and connections. The defaults determined here and elsewhere in the workbook account for the timber type and whether the wind load is cyclonic or non-cyclonic. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Designation of principal fram	USHWD F11			USHWD F11	USHWD F11
Depth of principal framing m	75	mm		75.000 mm	75.000 mm
Width of principal framing m	50	mm		50.000 mm	50.000 mm
	Tension Brace 100 x			Tension Brace 100 x	Tension Brace 100
Subfloor tension braces	50 USHWD F11, 1			50 USHWD F11, 1	x 50 USHWD F11,
	M12 bolt			M12 bolt	1 M12 bolt
Total no of subfloor tension	4			4	4
brace sets					
No components in each	1			1	1
tension brace (1 or 2)					
	7.0 mm F8 plywood,			7.0 mm F8 plywood,	7.0 mm F8
Plywood wall braces	30 x 2.8 flat-head nails			30 x 2.8 flat-head	plywood, 30 x 2.8
	@ 50 mm crs			nails @ 50 mm crs	flat-head nails @ 50
Total no of plywood braces	12			12	12
Single shear parallel bolted	1/M12x125 galv bolts,	<mark>s</mark> ingle shear, pa	arallel	1/M12x125 galv	1/M12x125 galv
Double shear parallel bolted	2/M12x125 galv bolts,	<mark>s</mark> ingle shear, pa	arallel	2/M12x125 galv	2/M12x125 galv
Double shear perp bolted co	1/M12x165 galv bolts,	<mark>d</mark> ouble shear, p	baralle	1/M12x165 galv	1/M12x165 galv
Typical skew nailed connect	2/90x3.15φ galv nails,	shear, side grai	in	2/90x3.15φ galv	2/90x3.15φ galv
Typical skew nailed connect	3/90x3.15φ galv nails,	<mark>s</mark> hear, side grai	in	3/90x3.15φ galv	3/90x3.15φ galv
Typical skew nailed connect	<mark>4/90x3.15φ galv nails</mark> ,	shear, side grai	in	4/90x3.15φ galv	4/90x3.15φ galv
Typical top chord nailed con	<mark>6/90x3.15φ galv nails</mark> ,	shear, side grai	in	6/90x3.15φ galv	6/90x3.15φ galv
Copyright: Quasar Management Services Pty LtdTypical top chord nailed con	6/60x2.8φ galv nails, s	hear, side grain	า	6/60x2.8φ galv nails,	6/60x2.8φ galv

<u>Subfloor</u>

The yellow cells of the "Subfloor" section contain the main default data for defining the subfloor posts and diagonal bracing. The default is based on steel posts with timber bracing, although there are options for solid timber posts and fabricated timber posts. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Steel Post				
Steel post height (ex embed	0.930	m	0.930 m	0.930 m
Steel post spacing (average)	2.700	m	2.700 m	2.700 m
Steel post support average a	7.290	m²	7.290 m2	7.290 m <mark>2</mark>
Steel post type	Steel pipe		Steel pipe	Steel pipe
Steel post diameter	80	mm	80.000 mm	80.000 mm
Anchorage post width	80NB galvanised medium wall pipe, 125 x 75 x 6 L x 130.	mm	80NB galvanised medium wall pipe, 125 x 75 x 6 L x ^{mm}	80NB galvanised medium wall pipe, 125 x 75 x 6 L x ^{mm}
	2 holes 13 dia		130,	130,
No of post components	1		1.000	1.000
Laterally unsupported length, L _{sy}	930	mm	930.000 mm	930.000 mm
Anchorage post bottom fixing	450 mm embedment		450 mm embedment	450 mm embedment
Embedment or clearance (negative)	-20	mm	-20.000 mm	-20.000 mm
Steel Post Timber Bracing	I		0	0
Steel post bracing span	2.825	m	2.825 m	2.825 m
			0.000	0.000
Copyright: Quasar Management Services Pty Ltd Area supported by each pair	23.87	m ²	23.874 m2	23.874 m <mark>2</mark>

Subfloor

<u>Floor</u>

The yellow cells of the "Floor" section contain the main default data for defining bearers, joists, trimmer joists and blocking. The main defaults are based on the Direct Anchorage System (employing double bearers). Alternative data may be entered manually at the appropriate green cells by the design engineer.

Floor Bearer				
Floor bearer span	2.700	m	2.700 m	2.700 m
Floor bearer spacing	2.700	m	2.700 m	2.700 m
Floor bearer supported area	7.29	m²	7.290 m2	7.290 m <mark>2</mark>
Floor bearer type	USHWD F11		USHWD F11	USHWD F11
Floor bearer depth	250	mm	250.000 mm	250.000 mm
Floor bearer width	50	mm	50.000 mm	50.000 mm
No of bearer components	2		2.000	2.000
Laterally unsupported length	450	mm	450.000 mm	450.000 mm
	1/M12x165 galv bolts,		1/M12x165 galv	1/M12x165 galv
Floor bearer fixing	double shear, parallel		bolts, double shear,	bolts, double shear,
Nataa	to grain		parallel to grain	parallel to grain
Notes				
Floor Joist				
Floor joist span	2.700	m	2.700 m	2.700 m
Floor joist spacing	0.450	m	0.450 m	0.450 m
Floor joist supported area	1.215	m²	1.215 m2	1.215 m <mark>2</mark>
Floor joist type	USHWD F11		USHWD F11	USHWD F11
Floor joist depth	150	mm	150.000 mm	150.000 mm
Floor joist width	50	mm	50.000 mm	50.000 mm
No of joist components	1		1.000	1.000
Laterally unsupported length	2700	mm	2700.000 mm	2700.000 mm
	2/90x3.15ø galv nails		2/90x3.15φ galv	2/90x3.15φ galv
td Floor joist fixing	shear, side grain		nails, shear, side	nails, shear, side

Floor Beare

Floor

Copyright: Quasar Management Services PtyLtd Floor joist fixing

<u>Walls</u>

The yellow cells of the "Walls" section contain the main default data for defining timber studs, posts, bottom plates, noggings, top plates lintels and wall bracing. The main defaults are based on the Direct Anchorage System (employing Anchorage Studs and Plywood Bracing), although this can be changed to conventional stud walls. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Walls				
Anchorage Stud				
Minimum anchorage stud h	2.748	m	2.748 m	2.748 m
Anchorage stud spacing	0.900	m	0.900 m	0.900 m
Anchorage stud supported a	1.24	m²	1.236 m2	1.236 m <mark>2</mark>
Anchorage stud type	USHWD F11		USHWD F11	USHWD F11
Anchorage stud depth	75	mm	75.000 mm	75.000 mm
Anchorage stud width	50	mm	50.000 mm	50.000 mm
No of anchorage stud compo	1		1.000	1.000
Laterally unsupported length	1374	mm	1373.750 mm	1373.750 mm
Anchorage stud fixing	1/M12x125 galv bolts, single shear, parallel to grain		1/M12x125 galv bolts, single shear, parallel to grain	1/M12x125 galv bolts, single shear, parallel to grain
Notes				
Common Stud				
Common stud height betwee	2.288	m	2.288 m	2.288 m
Common stud max spacing	0.450	m	0.450 m	0.450 m
Common stud supported are	1.03	m²	1.029 m2	1.029 m <mark>2</mark>
Common stud type	USHWD F11		USHWD F11	USHWD F11
Common stud depth	75	mm	75.000 mm	75.000 mm
Common stud width	50	mm	50.000 mm	50.000 mm
Copyright: Quasar Management Services Pty Ltd No of components in each m	1		1.000	1.000

<u>Roof</u>

The yellow cells of the "Roof" section contain the main default data for defining truss top chords (or rafters), bottom chords (or ceiling joists), ridge ties (or collar ties), truss lacing (or struts), roof purlins (or roofing battens) and roof bracing. There is provision in the workbook for underpurlins, hanging beams and ridge beams, but these are not normally invoked in a Direct Anchorage System. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Roof				
Truss Top Chord (Rafter)				
Top chord span (stud crs)	8.325 m	n	8.325 m	8.325 m
Top chord spacing	n 000.0	n	0.900 m	0.900 m
Top chord supported area	8.37 n	n ²	8.370 m2	8.370 m <mark>2</mark>
Top chord type	USHWD F11		USHWD F11	USHWD F11
Top chord depth	75 m	nm	75.000 mm	75.000 mm
Top chord width	50 m	nm	50.000 mm	50.000 mm
No top chord components in	2		2.000	2.000
Laterally unsupported length	900 n	nm	900.000 mm	900.000 mm
Top chord fixing	1/M12x165 galv bolts, double shear, parallel to grain		1/M12x165 galv bolts, double shear, parallel to grain	1/M12x165 galv bolts, double shear, parallel to grain
Notes	Truss		Truss	Truss
Truss Bottom Chord (Ceili	ng Joist)			
Bottom chord span (stud crs	8.175 n	n	8.175 m	8.175 m
Bottom chord spacing	0.900 m	n	0.900 m	0.900 m
Bottom chord supported are	7.36 m	n ²	7.358 m2	7.358 m <mark>2</mark>
Bottom chord type	USHWD F11		USHWD F11	USHWD F11
Bottom chord depth	75 m	nm	75.000 mm	75.000 mm
Bottom chord width	50 n	nm	50.000 mm	50.000 mm
Copyright: Quasar Management Services Pty Ltd No bottom chord component	1		1.000	1.000

Ceiling, Veranda, Fascias, Barges, Steps, Balustrades and Seats

The yellow cells of the "Ceiling, Veranda, Fascias, Barges, Steps, Balustrades and Seats" section contain the main default data for defining these non-structural timber components, which do not constitute the main structure. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Ceiling, Veranda, Fascias, Barges, Steps, Balustrades and Seats

Cailing Patton			
Cennig Batteri			
Ceiling batten span	0.900 m	0.900 m	0.900 m
Ceiling batten spacing	0.450 m	0.450 m	0.450 m
Ceiling batten supported are	0.41 m ²	0.405 m2	0.405 m <mark>2</mark>
Ceiling batten type	USHWD F11	USHWD F11	USHWD F11
Ceiling batten depth	38 mm	37.500 mm	37.500 mm
Ceiling batten width	<mark>50</mark> mm	50.000 mm	50.000 mm
No of components per meml	1	1.000	1.000
Laterally unsupported length	900 mm	900.000 mm	900.000 mm
	2/90x3.15 ϕ galv nails,	2/90x3.15φ galv	2/90x3.15φ galv
Celling batten fixing	tension, side grain	nails, tension, side	nails, tension, side
Notes			
Veranda Beam			
Veranda beam span	1.800 m	1.800 m	1.800 m
Veranda beam spacing	<mark>1.350</mark> m	1.350 m	1.350 m
Veranda beam supported are	2.43 m ²	2.430 m2	2.430 m <mark>2</mark>
Veranda beam type	USHWD F11	USHWD F11	USHWD F11
Veranda beam depth	225 mm	225.000 mm	225.000 mm
Veranda beam width	<mark>50</mark> mm	50.000 mm	50.000 mm
No of components per meml	1	1.000	1.000
Laterally unsupported length	1,800 mm	1800.000 mm	1800.000 mm
	4/90x3.15φ galv nails,	4/90x3.15φ galv	4/90x3.15φ galv
yLtd veranda beam fixing	tension, side grain	nails, tension, side	nails, tension, side

Copyright: Quasar Management Services Pty Ltd Veranda beam fixing

Flooring, Cladding, Fixed Louvres, Wall and Ceiling Lining, Joinery, Doors & Windows

The yellow cells of the "Flooring, Cladding, Fixed Louvres, Wall and Ceiling Lining, Joinery, Doors & Windows" section contain the main default data for defining these non-structural timber components, which do not constitute the main structure. Alternative data may be entered manually at the appropriate green cells by the design engineer.



Flooring, Cladding, Fixed Louvres, Wall and Ceiling Lining, Joinery, Doors & Windows

Building Design and Construction Workbook – Construction Checklist

The "Construction Checklist" spreadsheet may be used as a record of the inspections to determine whether the construction complies with the design.

Two versions of the "Construction Checklist" are available in the workbook:

- The Long Checklist reproduces <u>all of the data</u> in the "Main Data Entry" spreadsheet, thus facilitating the checking of <u>all components</u> that have been designed and specified.
- The Short Checklist reproduces from the "Main Data Entry" spreadsheet <u>only the</u> <u>principal data</u> necessary to give confidence that the structure meets the design.

It may be convenient to print a hard copy of the checklist, mark it up manually on site and then transfer the comments onto the workbook on retuning to the office.

raject	Papua Now Guinea						
letivity	Construction I		tion				
tøm ar Praduct	Required			Acceptance	Ho	Date & Inspector	
ancroto Piors							
ior dopth	600	mm			w		
ior diamotor	400	mm			W		
artembedmentar(clearan-	450	mm			W		
epth of concrete	600	mm			w		
umber of concrete piers	16				w		
iteel Part							
toolparttypo	Stool pipo				w		
ncharage part uidth	80NB galvanized m	odiumu	all pipe, 125 x		W		
a of part components	. 1				w		
ncharage part bottom fixin-	450 mm embedmen	e l			w		
iteel Part Timber Bra	cis•						
teel part bracina type	USHWDF11				w		
tool part bracing depth	100	mm			w		
tool part bracing width	50				w		
a components in each half a	1				W		
tool part bracina fixina	Tension Brace 100 >	50 USI	HWD F11, 1 M12		w		
atal na afstool part bracoso	4				W		
laar Beerer							
loor be arer type	USHWD F11				W		
loor bearer depth	250	mm			W		
loor bearer width	50	mm			W		
a of bearer components	2				W		
laar boaror fixing	1/M12×165 galv bal	er, daub	loshoar, para		w		
laar Jairt							
loor joirtspacing	0.450	m			w		
loor joirt type	USHWD F11				w		
loor joirt depth	150	mm			w		
loor joirt uidth	50	mm			w		
a of joirt components	1				w		

Inputif difforont

_ong)

Building Design and Construction Workbook – Construction Checklist

2. When an inspection is performed, the inspector enters the date and initials (using "copy and paste"). This causes the Acceptance to be read from 3. If the observed property the "Main Data Entry" spreadsheet. differs from the Required value, the inspector enters the observed value in the green 1. The requirements are cell and it will be read into the read from the "Main **Construction Checklist** Data Entry" spreadsheet. Acceptance cell. Project Papua New Cuinea Unnecessary rows are Activity Construction Inspection suppressed. Hol Date & Input Item or Product different Required Acceptance Inspector **Concrete Piers** 600 mm 600 W RJ 6/11/16 Pier depth 400 W RJ 6/11/16 Pier diameter 400 mm 300 Problem W RJ 6/11/16 300 Proble Post embedment or (clearanc 450 mm Depth of concrete 600 mm W Number of concrete piers 16 W Steel Post W Steel post type Steel pipe 80NB galvanised medium wall pipe,125 x W Anchorage post width No of post components W 1 Anchorage post bottom fixing 450 mm embedment W Steel Post Timber Bracing Steel post bracing type USHWD F11 W

100 mm

50 mm

75 Problem W

W

RJ 6/11/16

75 Problen

Steel post bracing depth

Steel post bracing width

The "Timber Design and Materials" spreadsheet is used to check the design capacity of each timber component for the prescribed loads. If redesign is required, the design engineer may input data into the green cells of this spreadsheet and check the resulting capacity. If satisfactory, the new data is then input into the green cells of the Main Data Entry spreadsheet.

The "Timber Design and Materials" spreadsheet is also used to prepare a Material List and a Cutting Schedule.

	Timber Design and Materials	Materials			
	Design	Bui	<u>lding</u>		
			Subfloor	Material List	
	· ·	Ite	n Component	Section Ma	aterial D
		'		mm x mm	>
		SF	1 Steel Posts SEE STEEL SECTIONS		
		SE	1 Bracing for Steel Posts	100 x 50 U	SHWD F11 >
		FF	1 Fabricated Timber Anchorage Posts		
		FF	1 Fabricated Timber Anchorage Post Spacers		
		FE	1 Bracing for fabricated timber anchorage post	:	
		TF	1 Solid Timber Posts		
		TE	1 Bracing for Solid Timber Posts		
			Floor	Material List	
		Ite	m Component	Section Ma	aterial Q
		lte	n Component	Section Ma mm x mm	aterial ລ >
		FI	m Component 3 Floor Bearer	Section Ma mm x mm 250 x 50 US	aterial Q SHWD F11 >
		F	m Component 3 Floor Bearer	Section Ma mm x mm 250 x 50 US	aterial D > SHWD F11 >
		Fi Fi	m Component 3 Floor Bearer 1 Floor Joist	Section Mail mm x mm 250 x 50 US 150 x 50 US	aterial 2 > SHWD F11 > SHWD F11 >
		Fi	m Component 3 Floor Bearer 4 Floor Joist	Section Mi mm x mm 250 x 50 US 150 x 50 US	aterial 2 > SHWD F11 > SHWD F11 >
		Fi Fi	m Component B Floor Bearer Floor Joist Floor Trimmer Joist	Section Mail mm x mm 250 x 50 US 150 x 50 US 150 x 50 US	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 >
		Fi Fi Fi Fi	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking	Section Mail mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 0 x 50 US	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > SHWD F11 >
		Fi Fi F	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking	Section Mail mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 0 x 50 US	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > SHWD F11 >
		Fi Fi F	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking	Section Main mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 0 x 50 US	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > SHWD F11 >
		F F F	M Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking Walls	Section Material List	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > SHWD F11 >
		ite Fi F F T tte	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking Walls m Component	Section Main mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 150 x 50 US 0 x 0 0	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > > aterial 2
		ite Fi F F	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking Walls m Component	Section Mail mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 150 x 50 US 0 x 0 0	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > > aterial 2 aterial 2
		Ite Fi F T T te 1 AS	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking Walls Malls Component Anchorage Stud	Section Mail mm x mm 250 x 50 US 150 x 50 US 150 x 50 US 150 x 50 US 0 x 0 0 Material List Section Mail Mail 75 x 50 US 75 x 50 US	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > > SHWD F11 > > SHWD F11 >
Converiants Ouncor Management Services Ptv		Ite F F T T te 2 AS	m Component Floor Bearer Floor Joist Floor Trimmer Joist Floor Joist Blocking Walls Malls Component Anchorage Stud Anchorage Stud	Section Mail mm x mm 250 x 50 05 150 x 50 05 150 x 50 05 150 x 50 05 0 x 0 0 Material List Section Mail Mail 75 x 50 05 75 x 50 05	aterial 2 SHWD F11 > SHWD F11 > SHWD F11 > > SHWD F11 > SHWD F11 > SHWD F11 >

Geometric Requirements

The yellow cells of the "Geometric Requirements" section, and of the previous section, reproduce default information necessary to check the designs. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Geometric Requirements

Number of lines of bearers supporting joists

Transverse gridline spacing for posts	2,700 mm
Transverse end distance in line of bearers	150 mm
Longitudinal gridline spacing for posts	2,700 mm
Longitudinal end distance in line of bearers	150 mm
Concrete Piers	
Number of concrete piers	
Depth of concrete piers	16
Diameter of concrete piers	600
	400
Posts_	
Number of lines of posts supporting bearers	4

4

General Specification, Timber Design Factors and Joint Capacities

The yellow cells of the "General Specification", "Timber Design Factors" and "Joint Capacities" sections reproduce default information necessary to check the designs. Alternative data may be entered manually at the appropriate green cells by the design engineer.

Characteristic beam shear strength, f_s 2.8 MPaCharacteristic compression strength parallel to grain, f_c 22.0 MPaCharacteristic tension strength parallel to grain, f_t 15.0 MPaCharacteristic bearing strength perpendicular to grain, f_p 13.0 MPaCharacteristic bearing strength parallel to grain, f_1 40.0 MPa
Characteristic compression strength parallel to grain, f_c 22.0 MPaCharacteristic tension strength parallel to grain, f_t 15.0 MPaCharacteristic bearing strength perpendicular to grain, f_p 13.0 MPaCharacteristic bearing strength parallel to grain, f_1 40.0 MPa
Characteristic tension strength parallel to grain, f_t 15.0 MPaCharacteristic bearing strength perpendicular to grain, f_p 13.0 MPaCharacteristic bearing strength parallel to grain, f_1 40.0 MPa
Characteristic bearing strength perpendicular to grain, fp13.0 MPaCharacteristic bearing strength parallel to grain, fp40.0 MPa
Characteristic bearing strength parallel to grain, f ₁ 40.0 MPa
Characteristic shear strength at joint, f _{sj} 5.4 MPa
Characteristic tensile strength perpendicular to grain, f _{tp} 0.8 MPa
Short duration modulus of elasticity, E 10,500 MPa
Short duration modulus of rigidity, G 700 MPa
Permissible span / deflection 250 -

Timber Design Factors

	Application	Houses		
	Category	1		
	Timber type	awn or round timber		
	Capacity reduction factors			
	Capacity reduction factor (timber members), ϕ	0.90		AS ²
	Capacity reduction factor (bolts over M16), ϕ	0.75		AS ²
	Capacity reduction factor (nails, screws, bolts up to M16), d	0.85		AS ²
	Durations reduction factors			
	Load duration on gravity loaded members, k_1	0.80		AS ?
Copyright: Quas	ar Management Services Pty Ltd Load duration on wind/earthquake/tsunami loaded members	1.00		AS '

AS 1720.1 Clause 2.3 Table 2.1 AS 1720.1 Clause 2.3 Table 2.2 AS 1720.1 Clause 2.3 Table 2.2

AS 1720.1 Clause 2.4.1, Table 2.3, 5 AS 1720.1 Clause 2.4.1, Table 2.3. 5

Member Design

The yellow cells of the "Member Design" section reproduce default information and include formulae necessary to check the designs to the appropriate Australian Standards (AS 1720.1 or AS 4100). Alternative data may be entered manually at the appropriate green cells by the design engineer.

Member Design						
Steel Post						
Steel post height (ex embedment)		0.930	m			
Steel post spacing (average)	(average in two	2.700	m			
Steel post support average area	(average on each po	7.29	m2			
Steel post type		Steel pipe				
Steel post diameter		80	mm			
Anchorage post width		80NB galvanised me	dium v	wall pipe,12	5 x 75	x 6 L x
No of post components		1				
Laterally unsupported length, Lsy		930	mm		8	
Anchorage post bottom fixing		450 mm embedment				
Embedment or clearance (negative)		-20	mm			
<u>Loads</u>						
Net factored ultimate transverse line loa	ad	0.0	kN			
Net factored ultimate transverse point lo	bad	1.7	kN			
Net factored ultimate axial point load		18.1	kN			
Net unfactored working transverse line	load	13.6	kN			
Net unfactored working transverse point	t load	1.4	kN			
Permissible span / deflection		250	-			
Factors						
Capacity reduction factor (steel membe	ers), φ	0.90	-			AS 410
Capacity reduction factor (bollted conne	ections in steel mem	0.90	-			AS 410
Steel properties						
External diameter		88.9	mm			Tubelir
Wall thickness		4.0	mm			Tubelir
Internal diameter		80.9	mm			

Material List & Cutting Schedule

The yellow cells of the "Cutting Schedule" give default values for the cut lengths of individual timber sections that comprise the framing, without allowance for wastage. They are calculated automatically from the "Member Design" section. The carpenter should determine the exact cutting lengths by other means (such as calculation from the drawings and measurements of the partly fabricated framing) and only use the "Cutting Schedule" as a means of checking these calculations and measurements. Alternative data may be entered manually at the appropriate green cells by the materials scheduler.

The yellow cells of the "Material List" give default values for the total length of members and other components required to fabricate the framing. These include an allowance for wastage. The values listed in the "Materials List" are used to compile the "Bill of Quantities", for determining and controlling the cost of the project. The default values are calculated automatically from the "Cutting Schedule". The default wastage is 10% (in most cases). Alternative data may be entered manually at the appropriate green cells by the materials scheduler.

	Materia	uls	Li	st					Cu	tti	ng Sc	heo	dule							Data Er	itry					
	Floor	Material	List				Floor			Cut	ting Schedule			Expec	ted Off-	Cuts	Inclus	ion in tota	al length	Length Check & Volume	Input for P	imary N	embers			
ltem	Component	Section		Material	Quantity	Unit	Item	Section	Material	N	o @ Length	No	@ Length	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No (Length	No	@	Length
		mm x	mm		x m			mm x	mm		mm		mm			mm	mm	mm	%		m ³		mm	n		mm
FB	Floor Bearer	250 x	50	USHWD F11	x 77.2	m	FB	250 x	50 USHWD F1	1 23	3 @ 3,050	0	@ 0	23	@	305	5,000	200	10%	OK	0.001	(9		@	
FJ	Floor Joist	150 x	50	USHWD F11	x 198.0) m	FJ	150 x	50 USHWD F1	1 60	0 @ 3,000	0	@ 0	60	@	300	5,000	300	10%	ок	0.001	(0		@	
FJ	Floor Trimmer Joist	150 x	50	USHWD F11	x 18.5	m	FJ	150 x	50 USHWD F1	1 4	@ 4,200	0	@ 0	4	@	420	5,000	200	10%	ОК	0.000	(2		@	
FT	Floor Joist Blocking	0 x	0	0	x 0.0	m	FT	0 x	0 0	0	@ 0	0	@ 0	0	@	0	5,000	0	10%	OK	0.000		2		@	
					18.5	m				4									10%						-	

	Walls	Material	List				Walls				Cuttin	g Schedule				Expecte	ed Off-0	Cuts	Inclusi	on in tota	al length	Length Check & Volume	Input for Pr	rimary Me	mbers			
Item	Component	Section		Material	Quanti	ty Unit	Item	Section	ion M	/laterial	No	@ Length	No	@ Le	ngth	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No @	Length	No	@	Length
		mm x	mm		x	m		mm	x mm			mm		n	nm			mm	mm	mm	%		m ³		mm			mm
AS1	Anchorage Stud	75 x	50	USHWD F11	x 2	:3.7 m	AS1	75	x 50 L	USHWD F11	8	@ 2,695	0	@	0	8	@	270			10%							
AS2	Anchorage Stud	75 x	50	USHWD F11	x	5.9 m	AS2	75	x 50 L	USHWD F11	2	@ 2,695	0	@	0	2	@	270			10%							
AS3	Anchorage Stud	75 x	50	USHWD F11	x 1	32.2 m	AS3	75	x 50 L	USHWD F11	28	@ 4,293	0	@	0	28	@	429			10%							

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Refer to the next three slides for more detail

Inclusio	n in tota	l length	Length Check & Volume	Input for P	rimary	Mem	bers			
Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No	@	Length	No	@	Length
mm	mm	%		m ³			mm			mm
5,000	200	10%	OK	0.001		@			@	
						-			-	
5,000	300	10%	OK	0.001		@			@	
						~			~	
5,000	200	10%	ОК	0.000		@			@	
5,000	0	10%	OK	0.000		@			@	
		10%								

Alternative Data Entry for Material List & Cutting Schedule

Inclusio	n in tota	l length	Length Check & Volume	Input for P	rimary	Mem	nbers			
Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No	@	Length	No	@	Length
mm	mm	%		m ³			mm			mm
		10%								
		10%								
		10%								

	Materia	als	Li	st						Cut	ting	g Sc	heo	lule							Data Er	ntry						
	Floor	Material	l List				Floor				Cutting	Schedule			Exp	ected C	Off-Cuts	Inclusi	on in tota	l length	Length Check & Volume	Input for P	rimary I	Membe	ers			
ltem	Component	Section		Material	Quanti	ty Unit	Item	Section	n	Material	No @	Length	No	② Lengt	n No	。 @	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No	@	Length	No	@	Length
		mm x	(mm		х	m		mm	x mm			mm		mm			mm	mm	mm	%		m ³			mm			mm
FB	Floor Bearer	250 x	c 50	USHWD F11	x 7	7.2 m	FB	250	x 50	USHWD F11	23 @	3,050	0	@ 0	23	3 @	305	5,000	200	10%	OK	0.001		@			@	
FJ	Floor Joist	150 x	c 50	USHWD F11	x <mark>1</mark>	98.0 m	FJ	150	x 50	USHWD F11	<mark>60</mark> @	3,000	0	@ 0	60) @	300	5,000	300	10%	ок	0.001		@			@	
FJ	Floor Trimmer Joist	150 x	c 50	USHWD F11	x 1	18.5 m	FJ	150	x 50	USHWD F11	4 @	4,200	0	@ 0	4	. @	420	5,000	200	10%	ОК	0.000		@			@	
FT	Floor Joist Blocking	0 x	¢ 0	0	x (<mark>0.0 m</mark> 18.5 m	FT	0	x 0	0	0@	0	0	@ 0	0	@	0	5,000	0	10% 10%	ок	0.000		@			@	
							-						-								ļ				_			

	Walls	Material List				Walls		С	utting S	chedule			E	Expecte	d Off-C	Cuts	Inclusio	n in total	length	Length Check & Volume	Input for Pr	rimary N	1embers		
ltem	Component	Section	Material	Quantity	Unit	Item	Section Materia	l I	No @	Length	No	@ Leng	gth	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No	@ Length	No @	Length
		mm x mm		x m			mm x mm			mm		mr	n			mm	mm	mm	%		m ³		mm		mm
AS1	Anchorage Stud	75 x 50	USHWD F11	1 x 23.7	m	AS1	75 x 50 USHW	D F11	8 @	2,695	0	@ 0		8	@	270			10%						
AS2	Anchorage Stud	75 x 50	USHWD F11	1 x 5.9	m	AS2	75 x 50 USHW	D F11	2 @	2,695	0	@ 0		2	@	270			10%						
AS3	Anchorage Stud	75 x 50	USHWD F11	1 x 132.2	m	AS3	75 x 50 USHW	D F11	28 @	4,293	0	@ 0		28	@	429			10%						
COL	byright: Quasar Management	Services F	'ty Lta																						

Cutting Schedule

Floor					Cuttin	ig So	chedule				Expect	ed Off-	Cuts
ltem	Sectio	on		Material	No	@	Length	No	@	Length	No	@	Off-cut
	mm	х	mm				mm			mm			mm
FB	250	х	50	USHWD F11	23	@	3,050	0	@	0	23	@	305
FJ	150	x	50	USHWD F11	60	@	3,000	0	@	0	60	@	300
FJ	150	х	50	USHWD F11	4	@	4,200	0	@	0	4	@	420
FT	0	х	0	0	0	@	0	0	@	0	0	@	0
					4								

Walls					Cuttin	ig So	chedule				Expect	ed Off	Cuts
ltem	Section	on		Material	No	@	Length	No	@	Length	No	@	Off-cut
	mm	х	mm				mm			mm			mm
AS1	75	Х	50	USHWD F11	8	@	2,695	0	@	0	8	@	270
AS2	75	х	50	USHWD F11	2	@	2,695	0	@	0	2	@	270
AS3	75	х	50	USHWD F11	28	@	4,293	0	@	0	28	@	429

	Materia	uls	Li	st					Cut	tin	g Sc	heo	<u>dule</u>							Data Er	ntry					
	Floor	Materia	l List				Floor			Cutting	Schedule			Expe	cted Off	-Cuts	Inclusio	on in tota	length	Length Check & Volume	Input for P	rimary Me	mbers			
Item	Component	Section		Material	Quantity	y Unit	Item	Section	Material	No (Length	No	@ Length	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No @	Length	No	@	Length
		mm x	(mm		x n	m		mm x m	nm		mm		mm			mm	mm	mm	%		m ³		mm	4		mr
FB	Floor Bearer	250 ×	c 50	USHWD F11	x 77	7.2 m	FB	250 x	50 USHWD F11	23 (3,050	0	@ 0	23	@	305	5,000	200	10%	OK	0.001	a			@	
FJ	Floor Joist	150 ×	c 50	USHWD F11	x 19	8.0 m	FJ	150 x	50 USHWD F11	60 (▣ 3,000	0	@ 0	60	@	300	5,000	300	10%	OK	0.001	a			@	
FJ	Floor Trimmer Joist	150 ×	c 50	USHWD F11	x 18	8.5 m	FJ	150 x	50 USHWD F11	4 (9 4,200	0	@ 0	4	@	420	5,000	200	10%	OK	0.000	a			@	
FT	Floor Joist Blocking	0 ×	(O	0	x 0.	.0 m	FT	0 x	0 0	0 (⊉ 0	0	@ 0	0	@	0	5,000	0	10%	ОК	0.000	a			@	
					18	B.5 m				4									10%							

																				-								
	Walls	Material L	ist					Walls				Cutting	g Schedule				Expecte	ed Off-C	Cuts	Inclusio	n in total	length	Length Check & Volume	Input for Pr	imary Merr	bers		
ltem	Component	Section	1	Material	Qua	Intity	Unit	Item	Section	n Ma	aterial	No	@ Length	No	@ L	ength	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No @	Length	No @	Length
		mm x	mm		х	m			mm	x mm			mm			mm			mm	mm	mm	%		m ³		mm		mm
AS1	Anchorage Stud	75 x	50	USHWD F	11 x	23.7	m	AS1	75	x 50 U	SHWD F11	8	@ 2,695	0	@	0	8	@	270			10%						
AS2	Anchorage Stud	75 x	50	USHWD F	11 x	5.9	m	AS2	75	x 50 U	SHWD F11	2	@ 2,695	0	@	0	2	@	270			10%						
AS3	Anchorage Stud	75 x	50	USHWD F	11 x	132.2	m	AS3	75	x 50 U	SHWD F11	28	@ 4,293	0	@	0	28	@	429			10%						
CUI	by right: Quasar management	Service	сягі	y Liu																								

Material List

	Floor	Materi	al I	List				
ltem	Component	Section	า		Material	Qua	antity	Unit
		mm	х	mm		х	m	
FB	Floor Bearer	250	х	50	USHWD F11	х	77.2	m
FJ	Floor Joist	150	х	50	USHWD F11	х	198.0	m
FJ	Floor Trimmer Joist	150	х	50	USHWD F11	х	18.5	m
FT	Floor Joist Blocking	0	х	0	0	х	0.0	m
							18.5	m

	Walls	Mater	ial	List				
Item	Component	Sectio	n		Material	Qua	antity	Unit
		mm	х	mm		х	m	
AS1	Anchorage Stud	75	х	50	USHWD F11	Х	23.7	m
AS2	Anchorage Stud	75	х	50	USHWD F11	х	5.9	m
AS3	Anchorage Stud	75	х	50	USHWD F11	х	132.2	m

	Materia	als	Li	st							Cut	tin	g Sc	he	dı	ile							Data Er	ntry						
	Floor	Materi	al List					Floor				Cutting	Schedule				Expec	ted Off-	Cuts	Inclu	sion in tota	al length	Length Check & Volume	Input for P	rimary N	embers	6			
Item	Component	Section	1	Material	Qua	ntity	Unit	Item	Section	Mate	erial	No @	Length	No	@	Length	No	@	Off-cut	Max stoc	k Laps	Off-cuts	Is length < stock length?	Volume	No (@ Le	ength	No @	@ I	Length
		mm	x mm		х	m			mm x	mm			mm			mm			mm	mm	mm	%		m ³			mm			mr
FB	Floor Bearer	250	x 50	USHWD F	11 x	77.2	m	FB	250 x	50 USH	HWD F11	23 @	3,050	0	@	0	23	@	305	5,000	200	10%	OK	0.001	(<u>0</u>		(0	
FJ	Floor Joist	150	x 50	USHWD F	11 x	198.0	m	FJ	150 x	50 USH	HWD F11	60 @	3,000	0	@	0	60	@	300	5,000	300	10%	ОК	0.001		0		(0	
FJ	Floor Trimmer Joist	150	x 50	USHWD F	11 x	18.5	m	FJ	150 x	50 USH	HWD F11	4 @	€ 4,200	0	@	0	4	@	420	5,000	200	10%	ОК	0.000		0		(0	
FT	Floor Joist Blocking	0	x 0	0	х	0.0	m	FT	0 x	0	0	0 @	⊉ 0	0	@	0	0	@	0	5,000	0	10%	OK	0.000	0	0		(0	
						18.5	m					4										10%								

	Walls	Material List					Walls				Cuttin	g Schedul	5		E	Expecte	ed Off-C	Cuts	Inclusio	n in total	length	Length Check & Volume	Input for Pr	imary Men	nbers		
ltem	Component	Section	Material	Quar	ntity	Unit	Item	Section	n M	laterial	No	@ Lengti	No	@ L	ength	No	@	Off-cut	Max stock	Laps	Off-cuts	Is length < stock length?	Volume	No @	Length	No @	Length
		mm x mn	n	x	m			mm b	x mm			mm			mm			mm	mm	mm	%		m ³		mm		mm
AS1	Anchorage Stud	75 x 50	USHWD F1	11 x	23.7	m	AS1	75 3	x 50 l	JSHWD F11	8	@ 2,695	0	@	0	8	@	270			10%						
AS2	Anchorage Stud	75 x 50	USHWD F1	11 x	5.9	m	AS2	75 3	x 50 l	JSHWD F11	2	@ 2,695	0	@	0	2	@	270			10%						
AS3	Anchorage Stud	75 x 50	USHWD F1	11 x	132.2	m	AS3	75 3	x 50 l	JSHWD F11	28	@ 4,293	0	@	0	28	@	429			10%						
01	byright: Quasar Management	Services	PTVLTO																								

Building Design and Construction Workbook – Bill of Quantities

The "Bill of Quantities" is compiled automatically and is used for determining and controlling the cost of the project. Additional and alternative values may be input if required.

Bill of Quantities

Project	Papua Now Guinoa
Partners	Vision for Homes
Uro	Howa
	8.4 m x 8.4 m overall
Future el el en	8.4 m x 6.6 m habitable
External plan	1 full length veranda
	0 parches
External elevation	One habitablestorey,
Internal arrangment	Three bodrooms,
	Stool partr,
	Non-cyclonic wind and low earthquake hazard
Deteilr	
Building derignation	Small dotachod villago houro
Building description	Baric
Comments	Elovatod
Roof (rkillion/gable/hip)	4
Roofpitch	18.4
Shapo(R-Roctanglo)	R
No of habitable store ys	1
Longth (OfA oxt walls)	8.400 m
Width (O/A ext walls)	6.600 m
Total width incl vorandar	8.400 m
Thickness of extualls	0.070 m
Thickness of int walls	0.070 m
Area (incuallr, excluera	55.44 m2
Area of habitable rooms	52.08 m2
Totaloxtwallhoight	2.400 m
Tapstorey height FFL to ceiling	2.400 m
Bottomstorey height FFL to ceiling	0.000 m
Minimumsub-floor FFL	1.100 m
Eaves overhang (length)	0.450 m
Eaver overhang (width)	0.450 m
Doer roof extend over verandar?	Yar
Plan longth of roof	9.300 m
Plan width of roof	9.300 m
Roof height from ceiling	1.59% m
External wall height	3.500 m
Tatal height ta ridge	5.098 m
Height U/S ceiling to FFL above	0.000 m
Front veranda length (incl portr)	8.400 m
Front voranda width (incl portr)	1.800 m

USE THIS SHEET

Construction Checklist (Short)

Construction Checklist (Long)

BOQ - Timber Building

Building Design and Construction Workbook – Bill of Quantities

Bill of Quantities

The "Bill of Quantities" gives default values for the materials required for the project. The default values are calculated automatically from the Timber Design and Materials and Main Data Entry spreadsheets. Alternative data may be entered manually at the appropriate green cells by the estimator.

Bill of Quantities

	NO OT items	Depth x Width x Length Length Wasteage	item:
	No of		
Posts and brackets cosisti	na of:		
Steel Post Specification	16 No	80NB galvanised medium wall pipe,125 x 75 x 6 L x 130, 2 holes 13 dia	1
Steel Posts	_		
Building description		Basic	
Building designation		Small detached village house	
Details			
		Non-cyclonic wind and low earthquake hazard	_
		Steel posts,	
Internal arrangment		Three bedrooms,	
External elevation		One habitable storey,	
External plan		1 full length veranda 0 porches	
Endowed allow		8.4 m x 8.4 m overall 8.4 m x 6.6 m habitable	
Use		House	
Partners		Vision for Homes	
Project		Papua New Guinea	

16	16 80NB g	<mark>∉80NB</mark> g	al
lo of ems	Depth		
No	mm		
16	16 80 NB	80 NB	ç
10	40 405 - 4	405	

Building Design and Construction Workbook – Other Engineering Design

The workbook includes several other spreadsheets that can assist the engineering design process. These include "Loads", "Wind Pressures", "Structural Ratings", "Plywood Wall Bracing", "Timber Subfloor Bracing", "Tie Ropes", "Steel Anchor Brackets", "Ramset", "Epoxy Steel or Concrete Fixings" and many other spreadsheets dealing with the structural capacities of several specialised components. In addition to the structural spreadsheets, the workbook also includes spreadsheets dealing with water and sanitation.

Permanent, Imposed, Earthquake, Wind and Tsunami Loads and Bracing Design

Design Input

aildin a	Dimensions

Roof (rkillion/gable/hip)	Roof Type	4		
Roofpitch	a	18.43	•	
Shapo(R-Roctanglo)	Shape	B		
No of habitablestoreys	н.	1		
Longth (OfA oxt walls)	L	8.40	m	
Width (Of A ext walle)	W	6.60	m	
Total width incl vorandar		8.40	m	
Thickness of ext walls		0.07	m	
Thickness of int walls		0.07	m	
Ārea (incuallr, excluera		55.4	m2	
Area of habitable rooms		52.1	m2	

Summary of Racking Loads due to Tsunami or Flood Earthquake and Vind

0.0	kN		
16.2	kN		
19.0	kN		
19.0	kN		
0.0	kN		
16.2	kN		
11.2	kN		
16.2	kN		8 free dispertity speed balance or west angle fraces
			(a) Stream Carlos and Annual Annua
0.0	kN		
33.6	kN		i mit state the state of the st
26.4	kN		
33.6	kN		
0.0	kN		
33.6	kN		
25.9	kN		Proved spill or spinled spille being to 12 and 7 private Private spiller spinler Private spiller
33.6	kN		
			Fig. Technology Conference on
			Reference (and the structure of the stru
			Construction for Fourier
7.0 mm F8			
plymood, 30 x 2			The definition of a particular of the matter for a set of the definition of the defi
flathoad nailr	e		The second secon
50 mm crz			MARADAMA UN A D'ADALAMA VI MARADA VI
4.20	kN/m		
	0.0 16.2 19.0 19.0 16.2 11.2 16.2 11.2 16.2 11.2 16.2 13.6 26.4 33.6 26.4 33.6 25.9 33.6 25.9 33.6 25.9 33.6	0.0 kN 16.2 kN 19.0 kN 19.0 kN 19.0 kN 16.2 kN 11.2 kN 16.2 kN 11.2 kN 16.2 kN 33.6 kN 26.4 kN 33.6 kN 25.9 kN 33.6 kN 25.9 kN 33.6 kN 25.9 kN 33.6 kN	0.0 kN 16.2 kM 19.0 kN 19.0 kN 19.0 kN 16.2 kN 16.2 kN 16.2 kN 16.2 kN 33.6 kN 26.4 kN 25.9 kN 33.6 kN 25.9 kN 33.6 kN 25.9 kN 33.6 kN

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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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