

Pole Shed App Ver 01 2022

Job No.: Connect Homes - 1 **Address:** 5 River Gardens Lane, Ngaruawahia, New Zealand **Date:** 08/04/2025
Latitude: -37.62609 **Longitude:** 175.174465 **Elevation:** 15.5 m

General Input

Roof Live Load	0.25 KPa	Roof Dead Load	0.25 KPa	Roof Live Point Load	1.1 Kn
Snow Zone	N0	Ground Snow Load	0 KPa	Roof Snow Load	0 KPa
Earthquake Zone	1	Subsoil Category	D	Exposure Zone	B
Importance Level	1	Ultimate wind & Earthquake ARI	100 Years	Max Height	3.6 m
Wind Region	NZ1	Terrain Category	2.0	Design Wind Speed	38.22 m/s
Wind Pressure	0.88 KPa	Lee Zone	NO	Ultimate Snow ARI	50 Years
Wind Category	High	Earthquake ARI	100		

Note: Wind lateral loads are governing over Earthquake loads, So only wind loads are considered in calculations

Pressure Coefficients and Pressures

Shed Type = Mono Enclosed

For roof $C_{p,i} = -0.3$

For roof $C_{p,e}$ from 0 m To 3.3 m $C_{p,e} = -0.9$ $p_e = -0.71$ KPa $p_{net} = -0.71$ KPa

For roof $C_{p,e}$ from 3.30 m To 6.6 m $C_{p,e} = -0.5$ $p_e = -0.39$ KPa $p_{net} = -0.39$ KPa

For wall Windward $C_{p,i} = -0.3$ side Wall $C_{p,i} = -0.3$

For wall Windward and Leeward $C_{p,e}$ from 0 m To 7 m $C_{p,e} = 0.7$ $p_e = 0.55$ KPa $p_{net} = 0.81$ KPa

For side wall $C_{p,e}$ from 0 m To 3.30 m $C_{p,e} =$ $p_e = -0.51$ KPa $p_{net} = -0.51$ KPa

Maximum Upward pressure used in roof member Design = 0.71 KPa

Maximum Downward pressure used in roof member Design = 0.42 KPa

Maximum Wall pressure used in Design = 0.81 KPa

Maximum Racking pressure used in Design = 0.94 KPa

Design Summary

Rafter Design Internal

Internal Rafter Load Width = 3800 mm	Internal Rafter Span = 5849.982857191836 mm	Try Rafter 2x300x50 SG8 Dry
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Moisture Condition = Dry (Moisture in timber is less than 16% and timber does not remain in continuous wet

condition after installation)

K1 Short term = 1 K1 Medium term = 0.8 K1 Long term = 0.6 K4 = 1 K5 = 1 K8 Downward = 1.00

K8 Upward = 1.00 S1 Downward = 6.81 S1 Upward = 6.81

Shear Capacity of timber = 3 MPa Bending Capacity of timber = 14 MPa NZS3603 Amt 4, table 2.3

Capacity Checks

M _{1.35D}	5.49 Kn-m	Capacity	10.08 Kn-m	Passing Percentage	183.61 %
M _{1.2D+1.5L 1.2D+S_n 1.2D+W_nD_n}	11.70 Kn-m	Capacity	13.44 Kn-m	Passing Percentage	114.87 %
M _{0.9D-W_nUp}	-7.88 Kn-m	Capacity	-16.8 Kn-m	Passing Percentage	213.20 %
V _{1.35D}	3.75 Kn	Capacity	28.94 Kn	Passing Percentage	771.73 %
V _{1.2D+1.5L 1.2D+S_n 1.2D+W_nD_n}	8.00 Kn	Capacity	38.6 Kn	Passing Percentage	482.50 %
V _{0.9D-W_nUp}	-5.39 Kn	Capacity	-48.24 Kn	Passing Percentage	894.99 %

Deflections

Modulus of Elasticity = 5400 MPa NZS3603 Amt 4, Table 2.3

k₂ for Long Term Loads = 2

Deflection under Dead and Live Load = 14.25 mm Limit by Woolcock et al, 1999 Span/240 = 25.00 mm

Deflection under Dead and Service Wind = 18.735 mm Limit by Woolcock et al, 1999 Span/100 = 60.00 mm

Reactions

Maximum downward = 8.00 kn Maximum upward = -5.39 kn

Rafter to Pole Connection check

Bolt Size = M12 Number of Bolts = 2

Calculations as per NZS 3603:1993 Amend 2005 clause 4.4

Joint Group for Rafters = J5 Joint Group for Pole = J5

Minimum Bolt edge, end and spacing for Load perpendicular to grains = 60 mm

Factor of Safety = 0.7

For Perpendicular to grain loading

K₁₁ = 14.9 f_{pj} = 12.9 Mpa for Rafter with effective thickness = 100 mm

For Parallel to grain loading

K₁₁ = 2.0 f_{cj} = 36.1 Mpa for Pole with effective thickness = 100 mm

Capacity under short term loads = 21.67 Kn > -5.39 Kn

Girt Design Front and Back

Girt's Spacing = 1300 mm

Girt's Span = 3800 mm

Try Girt 150x50 SG8 Dry

Moisture Condition = Dry (Moisture in timber is less than 16% and does not remain in continuous wet condition after installation)

K1 Short term = 1 K4 =1 K5 =1 K8 Downward =1.00

K8 Upward =0.68 S1 Downward =9.63 S1 Upward =19.79

Shear Capacity of timber =3 MPa Bending Capacity of timber =14 MPa NZS3603 Amt 4, table 2.3

Capacity Checks

M _{Wind+Snow}	1.90 Kn-m	Capacity	1.43 Kn-m	Passing Percentage	75.26 %
V _{0.9D-WnUp}	2.00 Kn	Capacity	12.06 Kn	Passing Percentage	603.00 %

Deflections

Modulus of Elasticity = 6700 MPa NZS3603 Amt 4, Table 2.3

Deflection under Snow and Service Wind = 30.34 mm Limit by Woolcock et al, 1999 Span/100 = 38.00 mm

Sag during installation = 12.64 mm

Reactions

Maximum = 2.00 kn

Girt Design Sides

Girt's Spacing = 900 mm

Girt's Span = 3500 mm

Try Girt 150x50 SG8 Dry

Moisture Condition = Dry (Moisture in timber is less than 16% and does not remain in continuous wet condition after installation)

K1 Short term = 1 K4 =1 K5 =1 K8 Downward =1.00

K8 Upward =0.95 S1 Downward =9.63 S1 Upward =13.43

Shear Capacity of timber =3 MPa Bending Capacity of timber =14 MPa NZS3603 Amt 4, table 2.3

Capacity Checks

M _{Wind+Snow}	1.12 Kn-m	Capacity	2.00 Kn-m	Passing Percentage	178.57 %
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V _{0.9D-WnUp}	1.28 Kn	Capacity	12.06 Kn	Passing Percentage	942.19 %
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Deflections

Modulus of Elasticity = 6700 MPa NZS3603 Amt 4, Table 2.3

Deflection under Snow and Service Wind = 15.12 mm Limit by Woolcock et al. 1999 Span/100 = 35.00 mm
Sag during installation = 9.10 mm

Reactions

Maximum = 1.28 kn

Uplift Check

Density of Concrete = 24 Kn/m³

Density of Timber Pole = 5 Kn/m³

Due to cast in place pile, the surface interaction between soil and pile will be rough thus angle of friction between both is taken equal to soil angle of internal friction

Ks (Lateral Earth Pressure Coefficient) for cast into place concrete piles = 1.5

Formula to calculate Skin Friction = Safety factor (0.55) x Density of Soil(18) x Height of Pile(1300) x Ks(1.5) x 0.5 x tan(30) x Pi x Dia of Pile(0.6) x Height of Pile(1300)

Skin Friction = 13.65 Kn

Weight of Pile + Pile Skin Friction = 17.68 Kn

Uplift on one Pile = 11.06 Kn

Uplift is ok