

Pole Shed App Ver 01 2022

Job No.: SB 048 Shed House **Address:** 164 Birchwood Road, Ohai, New Zealand **Date:** 3/6/2025
Latitude: -45.934481 **Longitude:** 167.946016 **Elevation:** 206 m

General Input

Roof Live Load	0.25 KPa	Roof Dead Load	0.25 KPa	Roof Live Point Load	1.1 Kn
Snow Zone	N5	Ground Snow Load	1.1 KPa	Roof Snow Load	0.77 KPa
Earthquake Zone	2	Subsoil Category	D	Exposure Zone	B
Importance Level	2	Ultimate wind & Earthquake ARI	500 Years	Max Height	3.72 m
Wind Region	NZ2	Terrain Category	1.77	Design Wind Speed	43.72 m/s
Wind Pressure	1.15 KPa	Lee Zone	NO	Ultimate Snow ARI	150 Years
Wind Category	High	Earthquake ARI	500		

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 3.57 m $C_{p,e} = -0.9$ $p_e = -0.93$ KPa $p_{net} = -0.93$ KPa

For roof $C_{p,e}$ from 3.57 m To 7.13 m $C_{p,e} = -0.5$ $p_e = -0.52$ KPa $p_{net} = -0.52$ 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 10.53 m $C_{p,e} = 0.7$ $p_e = 0.72$ KPa $p_{net} = 1.06$ KPa

For side wall $C_{p,e}$ from 0 m To 3.57 m $C_{p,e} =$ $p_e = -0.67$ KPa $p_{net} = -0.67$ KPa

Maximum Upward pressure used in roof member Design = 0.93 KPa

Maximum Downward pressure used in roof member Design = 0.44 KPa

Maximum Wall pressure used in Design = 1.06 KPa

Maximum Racking pressure used in Design = 1.20 KPa

Design Summary

Intermediate Design Front and Back

Intermediate Spacing = 1735.5 mm Intermediate Span = 3255 mm Try Intermediate 2x240x45 SG8

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

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K1 Short term = 1 K4 =1 K5 =1 K8 Downward =0.94

K8 Upward =1.00 S1 Downward =13.82 S1 Upward =0.83

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

Capacity Checks

M _{Wind+Snow}	2.53 Kn-m	Capacity	9.68 Kn-m	Passing Percentage	382.61 %
V _{0.9D-WnUp}	3.11 Kn	Capacity	-34.74 Kn	Passing Percentage	1117.04 %

Deflections

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

Deflection under Snow and Service Wind = 9.79 mm Limit by Woolcock et al, 1999 Span/250 = 13.02 mm

Reactions

Maximum = 3.11 kn

Intermediate Design Sides

Intermediate Spacing = 1760.5633802816903 mm	Intermediate Span = 3531 mm	Try Intermediate 2x240x45 SG8
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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 K4 =1 K5 =1 K8 Downward =0.94

K8 Upward =1.00 S1 Downward =13.82 S1 Upward =0.87

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

Capacity Checks

M _{Wind+Snow}	1.51 Kn-m	Capacity	9.68 Kn-m	Passing Percentage	641.06 %
V _{0.9D-WnUp}	1.71 Kn	Capacity	34.74 Kn	Passing Percentage	2031.58 %

Deflections

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

Deflection under Snow and Service Wind = 13.745 mm Limit by Woolcock et al, 1999 Span/250 = 14.12 mm

Reactions

Maximum = 1.71 kn

Girt Design Front and Back

Girt's Spacing = 1300 mm

Girt's Span = 1736 mm

Try Girt 140x45 SG8

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 K4 =1 K5 =1 K8 Downward =1.00

K8 Upward =0.92 S1 Downward =10.36 S1 Upward =14.39

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

Capacity Checks

M _{Wind+Snow}	0.52 Kn-m	Capacity	1.52 Kn-m	Passing Percentage	292.31 %
V _{0.9D-WnUp}	1.20 Kn	Capacity	10.13 Kn	Passing Percentage	844.17 %

Deflections

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

Deflection under Snow and Service Wind = 4.08 mm Limit by Woolcock et al, 1999 Span/250 = 6.94 mm

Sag during installation = 0.68 mm

Reactions

Maximum = 1.20 kn

Girt Design Sides

Girt's Spacing = 1300 mm

Girt's Span = 1761 mm

Try Girt 140x45 SG8

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 K4 =1 K5 =1 K8 Downward =1.00

K8 Upward =0.92 S1 Downward =10.36 S1 Upward =14.49

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

Capacity Checks

M _{Wind+Snow}	0.53 Kn-m	Capacity	1.51 Kn-m	Passing Percentage	284.91 %
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$V_{0.9D-WnUp}$	1.21 Kn	Capacity	10.13 Kn	Passing Percentage	837.19 %
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Deflections

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

Deflection under Snow and Service Wind = 4.32 mm Limit by Woolcock et al. 1999 Span/100 = 7.04 mm
Sag during installation = 0.72 mm

Reactions

Maximum = 1.21 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

K_s (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(1500) x K_s (1.5) x $0.5 \times \tan(30) \times \pi \times \text{Dia of Pile}(0.6) \times \text{Height of Pile}(1500)$

Skin Friction = 18.17 Kn

Weight of Pile + Pile Skin Friction = 21.61 Kn

Uplift on one Pile = 6.12 Kn

Uplift is ok