Job No.: 401 Yard   **Address:** 82 Carters Road, Amberley, New Zealand   **Date:** 02/04/2024

Latitude: -43.152716   **Longitude:** 172.729438   **Elevation:** 43.5 m

General Input

Roof Live Load	0.25 KPa	Roof Dead Load	0.25 KPa	Roof Live Point Load	1.1 Kn
Snow Zone	N4	Ground Snow Load	0.9 KPa	Roof Snow Load	0.63 KPa
Earthquake Zone	3	Subsoil Category	D	Exposure Zone	B
Importance Level	1	Ultimate wind & Earthquake ARI	2000 Years	Max Height	3.6 m
Wind Region	NZ2	Terrain Category	2.0	Design Wind Speed	42.77 m/s
Wind Pressure	1.1 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 Pressues

Shed Type = Mono   Enclosed

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

For roof CP,e from 0 m To 1.7 m C_{pe} = -0.9533   pe = -0.94 KPa   pnet = -0.94 KPa

For roof CP,e from 1.7 m To 3.4 m C_{pe} = -0.8733   pe = -0.86 KPa   pnet = -0.86 KPa

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

For wall Windward and Leeward CP,e from 0 m To 6 m C_{pe} = 0.7   pe = 0.69 KPa   pnet = 1.02 KPa

For side wall CP,e from 0 m To 3.4 m C_{pe} =   pe = -0.64 KPa   pnet = -0.64 KPa

Maximum Upward pressure used in roof member Design = 0.94 KPa

Maximum Downward pressure used in roof member Design = 0.42 KPa

Maximum Wall pressure used in Design = 1.02 KPa

Maximum Racking pressure used in Design = 1.18 KPa

Design Summary

Purlin Design

Purlin Spacing = 900 mm   Purlin Span = 7350 mm   Try Purlin 240x45 LVL8

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 =0.94

K8 Upward =0.19   S1 Downward =13.82   S1 Upward =39.36

Shear Capacity of timber =5 MPa   Bending Capacity of timber =30 MPa NZS3603 Amt 4, table 2.3

Capacity Checks

$M_{1.35D}$	2.05 Kn-m	Capacity	5.85 Kn-m	Passing Percentage	**285.37 %**
$M_{1.2D+1.5L\ 1.2D+Sn\ 1.2D+WnDn}$	5.65 Kn-m	Capacity	7.80 Kn-m	Passing Percentage	**138.05 %**
$M_{0.9D-WnUp}$	-4.35 Kn-m	Capacity	-1.99 Kn-m	Passing Percentage	**45.75 %**
$V_{1.35D}$	1.12 Kn	Capacity	17.37 Kn	Passing Percentage	**1550.89 %**
$V_{1.2D+1.5L\ 1.2D+Sn\ 1.2D+WnDn}$	3.08 Kn	Capacity	23.16 Kn	Passing Percentage	**751.95 %**
$V_{0.9D-WnUp}$	-2.36 Kn	Capacity	-28.94 Kn	Passing Percentage	**1226.27 %**

Deflections

Modulus of Elasticity = 7500 MPa NZS3603 Amt 4, Table 2.3 considering at least 4 members acting together

k2 for Long Term Loads = 2

Deflection under Dead and Live Load = 51.36 mm   Limit by Woolcock et al, 1999 Span/240 = 30.42 mm

Deflection under Dead and Service Wind = 60.77 mm   Limit by Woolcock et al, 1999 Span/100 = 73.00 mm

Reactions

Second page

Maximum downward =3.08 kn   Maximum upward = -2.36 kn

Number of Blocking = 0   if 0 then no blocking required, if 1 then one midspan blocking required

Girt Design Front and Back

Girt's Spacing = 0 mm   Girt's Span = 3750 mm   Try Girt SG8 Dry

Moisture Condition = Wet (Moisture in timber is less than 18% and timber does not remain in continuous wet condition after installation)

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

K8 Upward =NaN   S1 Downward =NaN   S1 Upward =NaN

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

Capacity Checks

$M_{Wind+Snow}$	0.00 Kn-m	Capacity	NaN Kn-m	Passing Percentage	**NaN %**
$V_{0.9D-WnUp}$	0.00 Kn	Capacity	0.00 Kn	Passing Percentage	**NaN %**

Deflections

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

Deflection under Snow and Service Wind = NaN mm   Limit by Woolcock et al, 1999 Span/100 = 37.50 mm
Sag during installation = NaN mm

Reactions

Maximum = 0.00 kn

Girt Design Sides

Girt's Spacing = 0 mm   Girt's Span = 6000 mm   Try Girt SG8 Dry

Moisture Condition = Wet (Moisture in timber is less than 18% and timber does not remain in continuous wet condition after installation)

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

K8 Upward =NaN   S1 Downward =NaN   S1 Upward =NaN

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

Capacity Checks

$M_{Wind+Snow}$	0.00 Kn-m	Capacity	NaN Kn-m	Passing Percentage	**NaN %**
$V_{0.9D-WnUp}$	0.00 Kn	Capacity	0.00 Kn	Passing Percentage	**NaN %**

Deflections

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

Deflection under Snow and Service Wind = NaN mm   Limit by Woolcock et al. 1999 Span/100 = 60.00 mm
Sag during installation =NaN mm

Reactions

Maximum = 0.00 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 = Safecty factor (0.55) x Density of Soil(18) x Height of Pile() x Ks(1.5) x 0.5 x tan(30) x Pi x Dia of Pile(0.6) x Height of Pile()

Skin Friction = 0.00 Kn

Weight of Pile + Pile Skin Friction = 0.00 Kn

Uplift on one Pile = 16.09 Kn

Uplift is ok

Skin Friction = 0.00 Kn

Weight of Pile + Pile Skin Friction = 0.00 Kn

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