Pole Shed App Ver 01 2022

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Date: **3/13/2025**

Council: **Council**

BWhite
Consulting Ltd

Subject: B2 compliance in respect of Proposed shed at Q2Q9+MCQ Upper Moutere, New Zealand

Council typically requests a Producer Statement/Other means of compliance for Design for Clause B2 of the Building Code-Durability

We are not able to provide a Producer Statement for durability because compliance needs to be shown on material-by-material basis using a variety of compliance methods, and not all materials used have a clear compliance path.

We can confirm that for the structural elements shown in our documentation under Clause B1:

Timber

Timber treatment has been selected to meet or exceed the requirements of table 1A of B2/AS1 and NZS3602

Steel fixing

Steel fixings are protected against weather as per table 4.1 and 4.2 of NZS3604-2011. Exposure Zone C

Yours Faithfully

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Note: This letter shall only be relied on by the Building Consent Authority named in Engineering New Zealand/ACE New Zealand Producer Statement PS1(B1) - Design in relation to the Building Work. Liability under this letter accrues to the Design Review Firm only. The total maximum amount of damages payable arising from this letter and all other statements provided to the Building Consent Authority in relation to this Building Work whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000

Job No.: 2502052   **Address:** Q2Q9+MCQ Upper Moutere, New Zealand   **Date:** 3/13/2025

Latitude: -41.210786   **Longitude:** 173.018608   **Elevation:** 66.5 m

General Input

Roof Live Load	0.25 KPa	Roof Dead Load	0.25 KPa	Roof Live Point Load	1.1 Kn
Snow Zone	N3	Ground Snow Load	0 KPa	Roof Snow Load	0 KPa
Earthquake Zone	2	Subsoil Category	D	Exposure Zone	C
Importance Level	1	Ultimate wind & Earthquake ARI	100 Years	Max Height	3.725 m
Wind Region	NZ2	Terrain Category	2.57	Design Wind Speed	47.37 m/s
Wind Pressure	1.35 KPa	Lee Zone	NO	Ultimate Snow ARI	50 Years
Wind Category	Very 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 $C_{P,e}$ from 0 m To 3.73 m Cpe = -0.9   pe = -1.09 KPa   pnet = -1.09 KPa

For roof $C_{P,e}$ from 3.73 m To 7.45 m Cpe = -0.5   pe = -0.61 KPa   pnet = -0.61 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 3.73 m Cpe = -0.65   pe = -0.79 KPa   pnet = -0.79 KPa

For side wall $C_{P,e}$ from 0 m To 3.73 m Cpe =   pe = -0.79 KPa   pnet = -0.79 KPa

Maximum Upward pressure used in roof member Design = 1.09 KPa

Maximum Downward pressure used in roof member Design = 0.65 KPa

Maximum Wall pressure used in Design = 1.25 KPa

Maximum Racking pressure used in Design = 1.46 KPa

Design Summary

Girt Design Front and Back

Girt's Spacing = 1100 mm   Girt's Span = 4500 mm   Try Girt 200x50 SG8 Dry

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 =0.97   S1 Downward =11.27   S1 Upward =12.60

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

Capacity Checks

$M_{Wind+Snow}$	3.48 Kn-m	Capacity	3.63 Kn-m	Passing Percentage	**104.31 %**
$V_{0.9D-WnUp}$	3.09 Kn	Capacity	16.08 Kn	Passing Percentage	**520.39 %**

Deflections

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

Deflection under Snow and Service Wind = 32.87 mm   Limit by Woolcock et al, 1999 Span/100 = 45.00 mm
Sag during installation = 24.86 mm

Reactions

Maximum = 3.09 kn

Girt Design Sides

Girt's Spacing = 1100 mm   Girt's Span = 4500 mm   Try Girt 200x50 SG8 Dry

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Middle Pole Design

Geometry

175 SED H5 (Minimum 200 dia. at Floor Level)	Dry Use	Height	3725 mm
Area	27598 mm2	As	20698.2421875 mm2
Ix	60639381 mm4	Zx	646820 mm3
Iy	60639381 mm4	Zx	646820 mm3
Lateral Restraint	3725 mm c/c		

Loads

Total Area over Pole = 20.25 m2

Dead	5.06 Kn	Live	5.06 Kn
Wind Down	13.16 Kn	Snow	0.00 Kn
Moment wind	11.37 Kn-m		
Phi	0.8	K8	0.68
K1 snow	0.8	K1 Dead	0.6
K1 wind	1		

Material

Peeling	Steaming	Normal	Dry Use
fb =	36.3 MPa	fs =	2.96 MPa
fc =	18 MPa	fp =	7.2 MPa
ft =	22 MPa	E =	9257 MPa

Capacities

PhiNcx Wind	268.86 Kn	PhiMnx Wind	12.71 Kn-m	PhiVnx Wind	49.01 Kn
PhiNcx Dead	161.32 Kn	PhiMnx Dead	7.62 Kn-m	PhiVnx Dead	29.41 Kn

Checks

(Mx/PhiMnx)+(N/phiNcx) = 0.98 < 1 OK

(Mx/PhiMnx)^2+(N/phiNcx) = 0.89 < 1 OK

Deflection at top under service lateral loads = 39.48 mm < 37.25 mm

Drained Lateral Strength of Middle pile in cohesionless soils Free Head short pile

Assumed Soil Properties

Gamma   18 Kn/m3   Friction angle   30 deg   Cohesion   0 Kn/m3

$K0 =$ $(1-\sin(30)) / (1+\sin(30))$

$Kp =$ $(1+\sin(30)) / (1-\sin(30))$

Geometry For Middle Bay Pole

$Ds =$ 0.6 mm   Pile Diameter

$L =$ 1500 mm   Pile embedment length

$f1 =$ 2794 mm   Distance at which the shear force is applied

$f2 =$ 0 mm   Distance of top soil at rest pressure

Loads

Moment Wind =   11.37 Kn-m

Shear Wind =   4.07 Kn

Pile Properties

Safety Factory   0.55

$Hu =$ 7.00 Kn   Ultimate Lateral Strength of the Pile, Short pile

$Mu =$ 11.74 Kn-m   Ultimate Moment Capacity of Pile

Checks

Applied Forces/Capacities = 0.97 < 1 OK

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(1500) x Ks(1.5) x 0.5 x tan(30) x Pi x Dia of Pile(0.6) x Height of Pile(1500)

Skin Friction = 18.17 Kn

Weight of Pile + Pile Skin Friction = 22.56 Kn

Uplift on one Pile = 17.52 Kn

Uplift is ok

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