Job Number:	BWhite
Issue:	Consulting Ltd
PRODUCER STATEMENT-PS1-DESIGN	
ISSUED BY: BWhite Consulting Ltd (Design Engineer: Bevan White)	
TO BE SUPPLIED TO: District Council IN RESPECT OF: Proposed NEW Farm Shed	
AT: 513 Waikino Rd, Karetu, New Zealand	
LEGAL DESCRIPTION	
We have been engaged by Ezequote Pty Ltd to provide Specific Structural Engineering Design ser requirements of Clause(s) B1 of the Building Code for part only (as specified in the attachment to this building work.	_
☐ ALL	connections
The design has been prepared in accordance with compliance documents to NZ Building Code issue Innovation & Employment Clauses B1/VM1 and B1/VM4	d by Ministry of Business,
The proposed building work covered by the producer statement is described on Ezequote drawings to dated together with the following specification, and other documents set out in the schedule attached Featured Report Dated 10/23/2023 and numbered "Second Page"	
On behalf of BWhite Consulting Ltd, and subject to:	
 Site verification of the following design assumptions: an Ultimate foundation bearing pressurated with NZS3604:2011 The building has a design life of 50 years and am Importance Level 1 Unless specifically noted, compliance of the drawings to None-Specific codes such as NZS36 been checked by this practice This Certificate does not cover any other building code clause including weather tightness Inspections of the building to be completed by District Council. As BWhite Consulting Ltd a inspections, we cannot issue a producer Statement-PS4- Construction Review. This Producer Statement-Design is valid for a building consent issued within 1 year from to All proprietary products meeting their performance specification requirements 	604 and NZS4229 have not are not undertaking
I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, documents provided or listed in the attached schedule, will comply with the relevant provisions of the presons who have undertaken the design have the necessary competency to do so. I also recommonstruction monitoring/observation:	ne Building Code and that b),
☑ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 or as per agreement with owner/developer (stated above	9)
I, Bevan White am CPEng 108276 I am Member of Engineering New Zealand and hold the following	qualification: BE.Civil
BWhite Consulting Ltd holds a current policy of Professional Indemnity Insurance no less than \$200	0,000.
Signed by Bevan White on behalf of BWhite Consulting Ltd Dated: 10/23/2023	
Email: bwhitecpeng@gmail.com Phone: 0211-979786	

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement 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.

 $This \ form \ is \ to \ accompany \ Form \ 2 \ of \ the \ Building (Forms) \ Regulations \ 2004 \ for \ the \ application \ of \ a \ Building \ Consent$

Date: 10/23/2023

BWhite

18B Jules Crescent,

Consulting Ltd

Bell Block New Plymouth 4312

New Zealand File No:

DESIGN FEATURES SUMMARY FOR PROPOSED NEW FARM SHED 513 WAIKINO RD, KARETU, NEW ZEALAND

Site Specific Loads

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	C
Importance Level	1	Ultimate wind & EQ ARI	100 Years	Max Height	4.2 m
Wind Region	NZ1	Terrain Category	2.89	Design Wind Speed	45.12 m/s
Wind Pressure	1.22 KPa	Lee Zone	NO	Ultimate Snow ARI	50 Years

Timber

Sawn Timber to be graded to the properties of SG6 and SG8 or better as mentioned on plans, with moisture content of 18% or less for dry and 25% or less for wet.

The following standards have been used in the design of this structure

- NZS 3603:1993 Timber Structures Standard
- NZS 3604:2011 Timber Framed Buildings. Standards New Zealand, 2011
- NZS 3404:1997 Steel Structures
- AS/NZS 1170 2003 Structural Design Actions
- AS/NZS 1170.2 2021 Structural Design Actions-Wind Action
- Branz. "Engineering Basis of NZS 3604". April 2013

Yours Faithfully

BWhite CONSULTING LTD

Bevan White

Director | BE Civil . CMengNZ CPEng

Email: bwhitecpeng@gmail.com Contact: 0211 979 786

Second page

 Job No.:
 608444
 Address:
 513 Waikino Rd, Karetu, New Zealand
 Date:
 10/23/2023

 Latitude:
 -35.341479
 Longitude:
 174.125133
 Elevation:
 58.5 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	C
Importance Level	1	Ultimate wind & Earthquake ARI	100 Years	Max Height	4.2 m
Wind Region	NZ1	Terrain Category	2.89	Design Wind Speed	45.12 m/s
Wind Pressure	1.22 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 Cp, i = -0.3

For roof CP,e from 0 m To 1.80 m Cpe = -0.98 pe = -1.08 KPa pnet = -1.08 KPa

For roof CP,e from 1.80 m To 3.60 m Cpe = -0.86 pe = -0.95 KPa pnet = -0.95 KPa

For wall Windward Cp, i = -0.3 side Wall Cp, i = -0.3

For wall Windward and Leeward CP,e from 0 m To 14.0 m Cpe = 0.7 pe = 0.77 KPa pnet = 0.77 KPa

For side wall CP,e from 0 m To 3.6 m Cpe = pe = -0.71 KPa pnet = -0.71 KPa

Maximum Upward pressure used in roof member Design = 1.08 KPa

Maximum Downward pressure used in roof member Design = 0.59 KPa

Maximum Wall pressure used in Design = 1.14 KPa

Maximum Racking pressure used in Design = 1.08 KPa

Design Summary

Purlin Design

Purlin Spacing = 900 mm Purlin Span = 5850 mm Try Purlin 240x45 LVL13

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 =0.24 S1 Downward =13.82 S1 Upward =35.08

Shear Capacity of timber =5.3 MPa Bending Capacity of timber =48 MPa NZS3603 Amt 4, table 2.3

Capacity Checks

M _{1.35D}	1.3 Kn-m	Capacity	9.37 Kn-m	Passing Percentage	72 0. 77 %
M1.2D+1.5L 1.2D+Sn 1.2D+WnDn	3.43 Kn-m	Capacity	12.49 Kn-m	Passing Percentage	364.14 %
$M_{0.9D\text{-W}n\text{Up}}$	-3.29 Kn-m	Capacity	-3.97 Kn-m	Passing Percentage	120.67 %
V _{1.35D}	0.89 Kn	Capacity	18.41 Kn	Passing Percentage	2068.54 %
$V_{1.2D+1.5L\ 1.2D+Sn\ 1.2D+WnDn}$	2.34 Kn	Capacity	24.54 Kn	Passing Percentage	1048.72 %
V _{0.9D-WnUp}	-2.25 Kn	Capacity	-30.68 Kn	Passing Percentage	1363.56 %

Deflections

Modulus of Elasticity = 12100 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 = 12.69 mm Limit by Woolcock et al, 1999 Span/240 = 24.17 mm Deflection under Dead and Service Wind = 16.81 mm Limit by Woolcock et al, 1999 Span/100 = 58.00 mm

Reactions

Maximum downward = -2.34 kn Maximum upward = -2.25 kn

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

Rafter Design External

External Rafter Load Width = 3000 mm External Rafter Span = 4484 mm Try Rafter 290x45 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 K1 Medium term = 0.8 K1 Long term = 0.6 K4 = 1 K5 = 1 K8 Downward = 0.89

K8 Upward =0.89 S1 Downward =15.23 S1 Upward =15.23

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

Capacity Checks

M1.35D	2.54 Kn-m	Capacity	3.78 Kn-m	Passing Percentage	148.82 %
M1.2D+1.5L 1.2D+Sn 1.2D+WnDn	6.71 Kn-m	Capacity	5.04 Kn-m	Passing Percentage	75.11 %

$M_{0.9D ext{-W}nUp}$	-6.45 Kn-m	Capacity	-6.29 Kn-m	Passing Percentage	97.52 %
V _{1.35D}	2.27 Kn	Capacity	12.59 Kn	Passing Percentage	554.63 %
$V_{1.2D+1.5L\ 1.2D+Sn\ 1.2D+WnDn}$	5.99 Kn	Capacity	16.79 Kn	Passing Percentage	280.30 %
$ m V_{0.9D ext{-}WnUp}$	-5.75 Kn	Capacity	-20.98 Kn	Passing Percentage	364.87 %

Deflections

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

k2 for Long Term Loads = 2

Deflection under Dead and Live Load = 11.25 mm Limit by Woolcock et al, 1999 Span/240= 19.44 mm Deflection under Dead and Service Wind = 14.91 mm Limit by Woolcock et al, 1999 Span/100 = 46.67 mm

Reactions

Maximum downward = 5.99 kn Maximum upward = -5.75 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

Factor of Safety = 0.7

For Perpendicular to grain loading

K11 = 14.9 fpj = 12.9 Mpa for Rafter with effective thickness = 45 mm

For Parallel to grain loading

K11 = 2.0 fcj = 36.1 Mpa for Pole with effective thickness = 100 mm

Eccentric Load check

V = phi x k1 x k4 x k5 x fs x b x ds (Eq 4.12) = -21.73 kn > -5.75 Kn

Single Shear Capacity under short term loads = -9.75 Kn > -5.75 Kn

Intermediate Design Sides

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 = 0.98

K8 Upward = 1.00 S1 Downward = 12.23 S1 Upward = 0.80

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

Capacity Checks

Mwind+Snow 2.53 Kn-m Capacity 6.06 Kn-m Passing Percentage 239.53 % V_{0.9D-WnUp} 2.59 Kn-m Capacity 27.5 Kn-m Passing Percentage 1061.78 %

Deflections

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

Deflection under Snow and Service Wind = 28.845 mm Limit by Woolcock et al, 1999 Span/100 = 39.00 mm

Reactions

Maximum = 2.59 kn

Girt Design Front and Back

Girt's Spacing = 900 mm Girt's Span = 3000 mm Try Girt 190x45 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 = 0.98

K8 Upward =0.56 S1 Downward =12.23 S1 Upward =22.32

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

Capacity Checks

Mwind+Snow 1.15 Kn-m Capacity 1.70 Kn-m Passing Percentage 147.83 % V0.9D-WnUp 1.54 Kn-m Capacity 13.75 Kn-m Passing Percentage 892.86 %

Deflections

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

Deflection under Snow and Service Wind = 6.28 mm Limit by Woolcock et al, 1999 Span/100 = 30.00 mm Sag during installation = 6.06 mm

Reactions

Maximum = 1.54 kn

Girt Design Sides

Girt's Spacing = 900 mm

Girt's Span = 2333 mm

Try Girt 190x45 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 =0.98

K8 Upward =0.69 S1 Downward =12.23

S1 Upward = 19.69

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

Capacity Checks

 $M_{Wind+Snow}$

0.70 Kn-m

Capacity

2.08 Kn-m

Passing Percentage

297.14 %

 $V_{0.9D\text{-WnUp}}$

1.20 Kn-m

Capacity

13.75 Kn-m

Passing Percentage

1145.83 %

Deflections

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

Deflection under Snow and Service Wind = 2.30 mm

Limit by Woolcock et al. 1999 Span/100 = 23.33 mm

Sag during installation = 2.22 mm

Reactions

Maximum = 1.20 kn

End Pole Design

Geometry For End Bay Pole

Geometry

Dry Use

Height 4000 mm

Area

27598 mm2

60639381 mm4

As Zx

Zx

20698.2421875 mm2

646820 mm3

646820 mm³

Ix Iy

60639381 mm4

Lateral Restraint mm c/c

Loads

Total Area over Pole = 14 m^2

Dead	3.50 Kn	Live	3.50 Kn
Wind Down	8.26 Kn	Snow	0.00 Kn

Moment Wind 5.34 Kn-m

 Phi
 0.8
 K8
 0.61

 K1 snow
 0.8
 K1 Dead
 0.6

K1 wind 1

Material

Peeling	Steaming	Normal	Dry Use
fb =	36.3 MPa	$f_S =$	2.96 MPa
fc =	18 MPa	$\mathbf{fp} =$	7.2 MPa
ft =	22 MPa	E =	9257 MPa

Capacities

PhiNex Wind	240.87 Kn	PhiMnx Wind	11.39 Kn-m	PhiVnx Wind	49.01 Kn
PhiNcx Dead	144.52 Kn	PhiMnx Dead	6.83 Kn-m	PhiVnx Dead	29.41 Kn

Checks

(Mx/PhiMnx)+(N/phiNcx) = 0.53 < 1 OK

 $(Mx/PhiMnx)^2 + (N/phiNcx) = 0.28 < 1 OK$

Deflection at top under service lateral loads = 23.54 mm < 41.90 mm

 $D_S = 0.6 \text{ mm}$ Pile Diameter

L = 2000 mm Pile embedment length

fl = 3150 mm Distance at which the shear force is applied

f2 = 0 mm Distance of top soil at rest pressure

Loads

Total Area over Pole = 14 m^2

 $\label{eq:moment Wind = 5.34 Kn-m}$ Shear Wind = 1.70 Kn

Pile Properties

Safety Factory 0.55

Hu = 13.84 Kn Ultimate Lateral Strength of the Pile, Short pile

Mu = 26.70 Kn-m Ultimate Moment Capacity of Pile

Checks

Applied Forces/Capacities = 0.20 < 1 OK

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

Assumed Soil Properties

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

 $K0 = \frac{(1-\sin(30)) / (1+\sin(30))}{Kp} = \frac{(1+\sin(30)) / (1-\sin(30))}{(1-\sin(30))}$

Geometry For End Bay Pole

Ds = 0.6 mm Pile Diameter

L= 2000 mm Pile embedment length

f1 = 3150 mm Distance at which the shear force is applied

f2 = 0 mm Distance of top soil at rest pressure

Loads

Moment Wind = 5.34 Kn-m Shear Wind = 1.70 Kn

Pile Properties

Safety Factory 0.55

Hu = 13.84 Kn Ultimate Lateral Strength of the Pile, Short pile

Mu = 26.70 Kn-m Ultimate Moment Capacity of Pile

Checks

Applied Forces/Capacities = 0.20 < 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(2000) x Ks(1.5) x 0.5 x tan(30) x Pi x Dia of Pile(0.6) x Height of Pile(2000)

Skin Friction = 32.31 Kn

Weight of Pile + Pile Skin Friction = 36.32 Kn

Uplift on one Pile = 35.91 Kn

Uplift is ok