Association Consulting Engineers of New Zealand	New Zealand Institute of Architects	Institution Professional Engineers of New Zealand

P.I.M. No.....

Building Regulation Clause(s).....

PRODUCER STATEMENT - PS1 - DESIGN

(Guidance notes on the use of this form are printed on the reverse side)

ISSUED BY: C. SLIGO
(Suitably qualified Design Professional)

TO: KOWHAI TIMBER
(Owner)

TO BE SUPPLIED TO: RODNEY DISTRICT COUNCIL
(Territorial Authority)

IN RESPECT OF: CUTTING SHED AND TREATMENT SHED
(Description of Building Work)

AT: MATAKANA MILL

MATAKANA VALLEY ROAD, WARKWORTH
(Address)

LOT Pt Allot 51 **DP** Matakana Parish. **SO** .....

RILEY CONSULTANTS LTD has been engaged by KOWHAI TIMBER
(Design Firm) *(Owner/Developer/Contractor)*

to provide STRUCTURAL DESIGN services in respect of the
(Extent of Engagement)

requirements of Clause(s) B1 of the Building Regulations 1992 for

☑ All ☐ Part only as specified

of the building work. The design has been prepared in accordance with B1/VM1, B1/AS1
(verification method(s)/acceptable solution(s))

(respectively) of the approved documents issued by the Building Industry Authority and the work is described on

RILEY CONSULTANTS' drawings titled MATAKANA MILL
(Design Firm)

and numbered 95126/1 to 5. and the specification and other documents according to which the building is proposed to be constructed.

As an independent design professional covered by a current policy of Professional Indemnity Insurance to a minimum value of $200,000, I **BELIEVE ON REASONABLE GROUNDS** that subject to:

(i) the site verification of the following design assumptions Confirmation of ground conditions

and (ii) all proprietary products meeting the performance specification requirements,

the drawings, specifications, and other documents according to which the building is proposed to be constructed comply with the relevant provisions of the building code.

C. Sligo
(Signature suitably qualified Design Professional)

Date 29. 10. 97.

NZCE MIPENZ
(Professional Qualifications)

ERB/~~AERB~~ Reg No. 4587

P.O. Box 100253 N.S.M.C.
(Address)

Member ACENZ ☐

IPENZ ☑ ☐ NZIA

This form to accompany Form 3 of the Building Regulations 1992 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

This producer statement has been prepared by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand and the Building Officials Institute of New Zealand.

Four producer statements are available and brief details on the purpose of each are as follows:

Design: Intended for use by the person responsible for the design in circumstances where the Territorial Authority will rely on the producer statement to issue a Building Consent.

Design Review: Intended for use by a suitably qualified independent design professional where the territorial authority does not undertake an internal review and relies on the independent design professional's review to issue the building consent.

Construction: Intended for the use by the contractor of the building works where the territorial authority requires a producer statement at the completion of construction.

Construction Review: Intended for use by the person required by the Building Consent to undertake construction monitoring of the building works in circumstances where the Territorial Authority will rely on the producer statement to issue a Code Compliance Certificate.

The producer statements system is intended to provide territorial authorities with reasonable grounds for the issuing of a Building Consent or Code Compliance Certificate without having to duplicate design or construction checking by others.

The following criteria are recommended to Territorial Authorities with respect to the use of the producer statements.

Definition of Suitably Qualified Design Professional

A suitably qualified design professional should have recognised qualifications and experience for the work undertaken and should be either:

(i) an active member of the Association of Consulting Engineers of New Zealand (ACENZ) or;
(ii) a corporate member of the Institution of Professional Engineers of New Zealand (IPENZ) having a current policy of Professional Indemnity Insurance for a sum not less than $200,000 or;
(iii) a member of the New Zealand Institute of Architects (NZIA) having a current policy of Professional Indemnity Insurance for a sum of not less than $200,000.

Design Build Contracts

If the design professional is engaged by the contractor, the territorial authority should satisfy itself that it is appropriate for the territorial authority to rely upon a producer statement from the design professional.

Consulting Services during Construction Phase

There are several levels of service which a design professional may provide during the construction phase of a project. The territorial authority is encouraged to require that the service to be provided by the design professional is appropriate for the project concerned.

Requirement to provide Producer Statement

Territorial authorities should ensure that the applicant is aware of any circumstances in which there may be a requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the design professional's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

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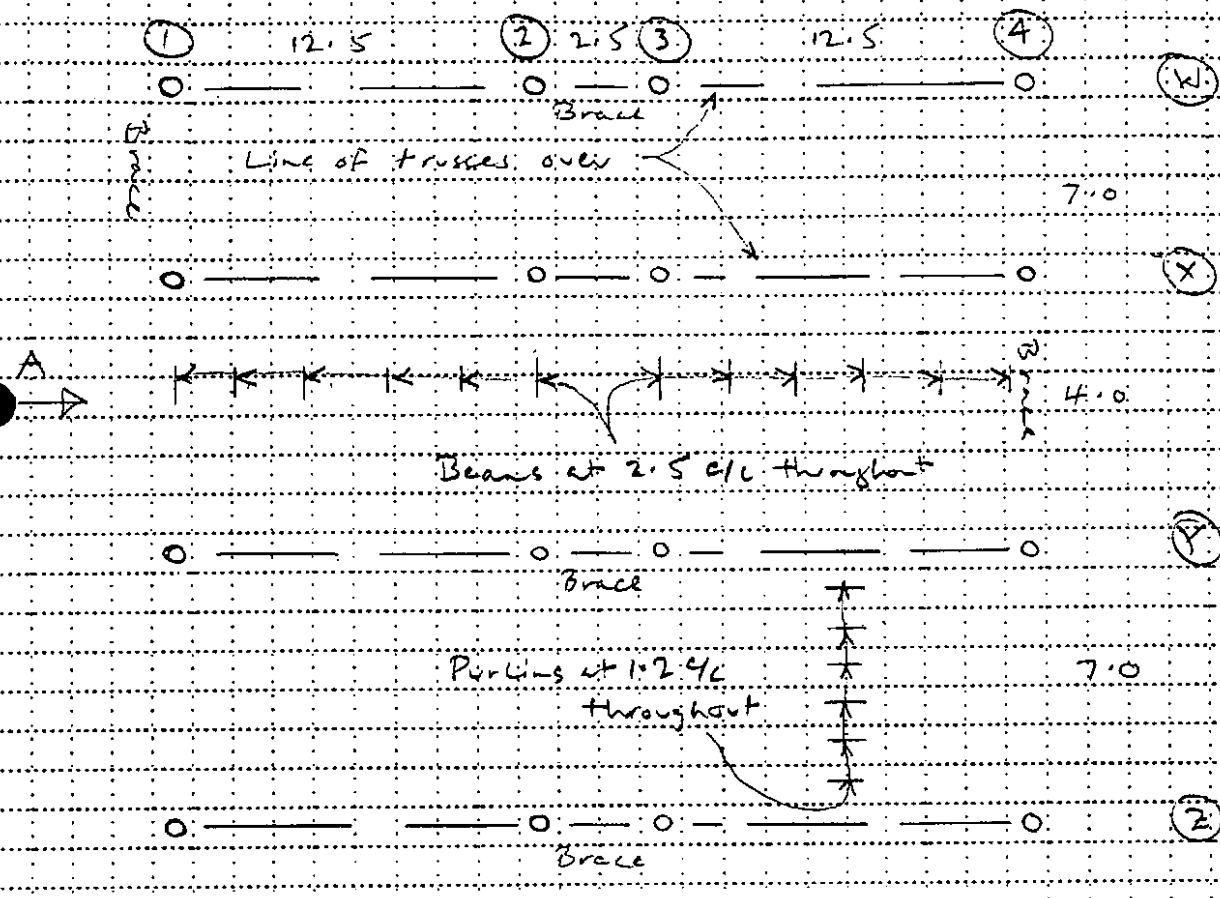
PHONE 489-7872
FAX. No.489-7873

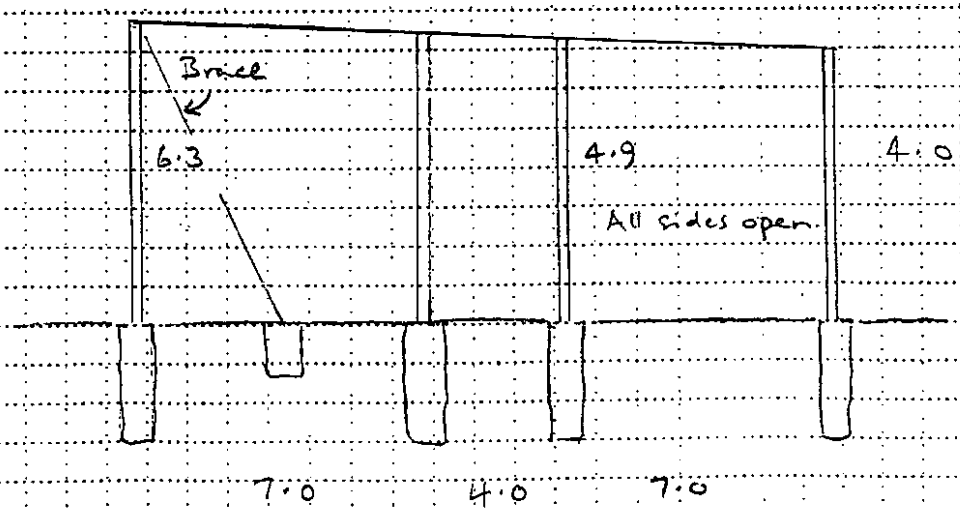
Job No: 95126 Page: 1 of Paces
Project: Matakana Mill.
Calc: CASS Date: 8-97
Check: Date:

Description KOWHAI TIMBER - ROOF FOR CUTTING SHED

CONFIGURATION



- Plan -



- Elevation A -

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Description

LOADS

DL Iron 0.06 KPa LL 0.25 KPa

Purlins 0.04

0.10 0.25 → DL, LL

- Wind

Basic 50 m/s M_{ls} = 0.93 $M_{z\,cat}$ = 0.75 (Cat 3)

M_s, M_t, M_c = 1.0

M_r = 0.9 Table 5.4.6 – Low risk structure

V_g = 50 × 0.93 × 0.75 × 0.9

= 31.4 m/s

q_{basic} = 0.6 × 31.4²

= 592 Pa – Say 0.5 KPa → q

Assume one wall blocked C_{pe} = 0.9 (5.6.3) C_{pi} = 0.3 (5.6.1)

$P_e = (0.9+0.3) \times 0.8 \times 1.0 \times 1.0 \times 0.5$ (K_A, K_L, K_P, q)

= 0.57 KPa → Wind

This presents a worse case than designing for a free roof, so design for DL+LL condition, and wind uplift.

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Description

PURLINS

Span 2500 @ 1200 c/c

DL + LL = 0.10 + 0.25 = 0.35 KPa (unfactored)

Wind = 0.48 − 0.10 = 0.38 KPa (ult)

DL + LL spacing 0.35 × 1.2 = 0.42 KN/m

100 × 50 radiata (working stress 6.0 MPa)

Capacity 0.53 KN/m (bending) 0.51 KN/m (deflⁿ)

Use 100 × 50 radiata on edge → Purlins

BEAMS — 7m Span:

Proposed to use 500 × 75 radiata pine.

Span = 7.0m @ 2.5m c/c

OW = 0.23 KN/m

DL = [(0.1 × 2.5) + 0.23] 1.2 = 0.58 KN/m (ult)

LL = 0.25 × 2.5 × 1.6 = 1.0 KN/m (ult)

Factored DL + LL	(1.2) (1.6)	1.58 KN/m
Wind = 0.57 × 2.5		= 1.42 KN/m
0.9DL = 0.57 × 0.9		= −0.43 KN/m
Nett uplift		0.99 KN/m

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Description

$M^*_{DL+LL} = 1.58 \times 7^2/8 = 9.68\ KNm$ ↓

$M^*_{WL-DL} = 0.99 \times 7^2/8 = 6.10\ KNm$ ↑

→ Applied Moments

$f_b = 17.7 \quad \phi = 0.8 \quad K_1 = 0.8 \quad K_4 = 1.14$

$\ell/b = 7000/75 = 93 \quad d/b = 6.7 \quad K_8 = 0.3$

ϕM_u (unrestrained) $= \phi \times K_1 \times K_4 \times K_8 \times f_b \times Z$

$= 0.8 \times 0.8 \times 1.14 \times 0.3 \times 17.7 \times 12.5 \times 500^2$

$= 12.1\ KNm. > M^*$ ∴ OK

→ Bending Capacity

$V^* = 1.58 \times 7/2 = 5.53\ KN.$

→ Applied Shear

$f_s = 3.8 \quad \phi = 0.8 \quad K_1 = 0.8 \quad K_4 = 1.14$

$\phi V_u = \phi \times K_1 \times K_4 \times f_s \times A$

$= 0.8 \times 0.8 \times 1.14 \times 3.8 \times 500 \times 75\ (N)$

$= 104\ KN.$

→ Shear Capacity

Check 250x75 for 7m span

Check ϕM_b 250x75 $= \phi \times K_1 \times K_4 \times K_8 \times f_b \times Z$

$= 0.8 \times 0.8 \times 1.14 \times 0.6 \times 17.7 \times 12.5 \times 250^2$

$= 6.05\ KNm$ NG

For 250x75 $d/b = 3.3$, $\ell/b = 93 \rightarrow K_8 = 0.6$

$Z = \frac{75 \times 250^2}{6}$

$= 12.5 \times 250^2\ mm^3$

Check Δ 7m span for: DL = 0.25 + 0.23 = 0.48 kN/m

$= 5/384 \times 0.48 \times 7000^4 / 80000 \times 781 \times 10^6$

$= 2.37\ mm$ or $3 \times DL = 7.13\ mm$ (>25?ms)

span / 580 OK

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Description

BEAMS (cont) – 4m span

$M^*_{DL+LL} = 1.58 \times 4^2/8 = 3.16$ KNm ↓

$M^*_{WL=DL} = 0.77 \times 4^2/8 = 1.54$ KNm ↑

50 x 250 $d/b = 4000/50 = 80$ $d/b = 5$ $k_\beta = 0.4$

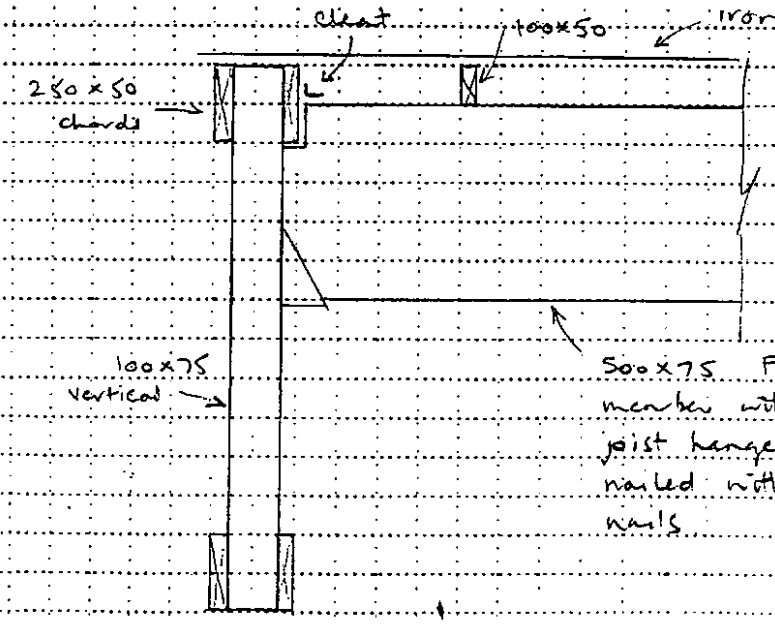
$\phi M_u = 0.8 \times 0.8 \times 1.14 \times 0.4 \times 17.7 \times 0.49 \times 10^6$ Nm

$= 2.53$ KNm (N.G.) Use 250 x 75 → 250x75

Need to restrain (solid block) 250 x 50 at midspan or use 300 x 50 or use 250 x 75 ($\phi M_b = 5.0$ KNm)

Bending governs Δ for this span.

TRUSS – BEAM CONNECTION



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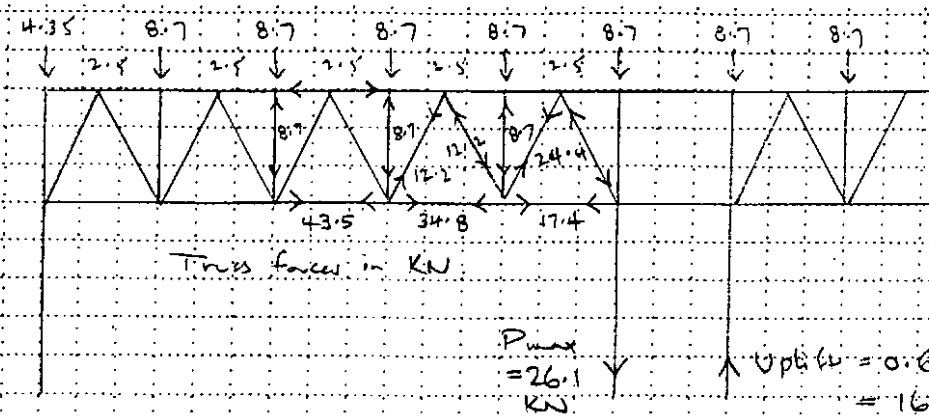
Description

TRUSSES X & Y



Truss forces in KN

P_{max} = 26.1 KN

Uplift = 0.6 (DL+LL) = 16.2 KN

Load to truss = 5.53 (7m span) + 3.16 (4m span) = 8.69 KN

M_{max} = 8.7 × 4 × 12.5 / 8 = 54.4 KNm

V_{max} = 8.7 × 4/2 = 17.4 KN

Bearing 0.6ϕ pile = $26/\pi/4 \times 0.6^2$ (area) = 93 KPa (OK)

Weight to resist uplift = 24 × 0.28 (bay) × 2 = 13.4 KN (OK)
(no addition, int truss neglected)

Exterior trusses (W 12) take 50% of these loads. Detail the same, except for internal panels, where 12ϕ bolts may be used to fix diagonals

Review bolt requirements (see P7 for bolt loads)

Detail 1 – 2M20 (end bays) 2M16 (other bays) (int trusses)
2M16 (") 1M16 (") (ext. trusses)

Detail 2 – As above.

Detail 3 – 1M12 throughout

Detail 4 – 2M16 each side

Detail 5: – O.K as shown – (1M20 to 4 chords)

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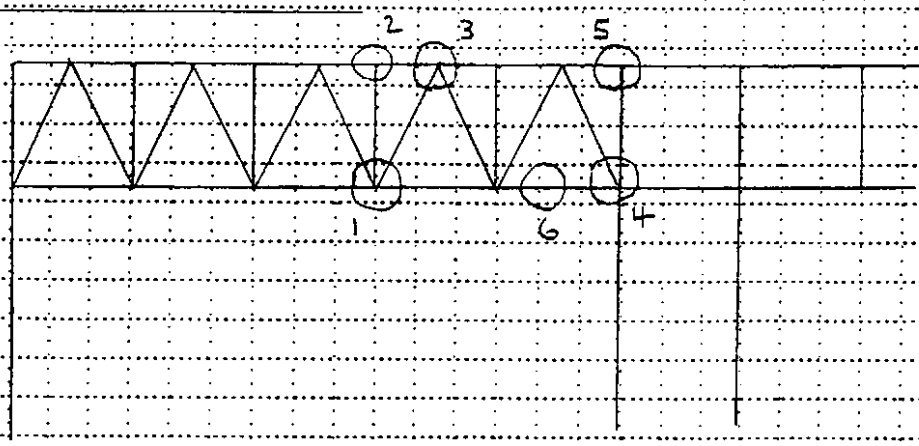
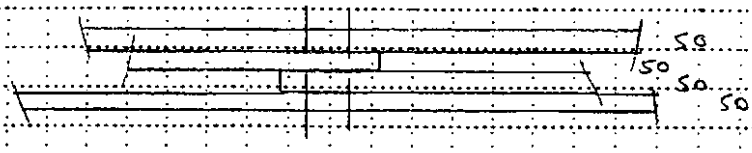
TRUSS CONNECTIONS



Bolt Requirements



Typical configuration. - Assume 16ϕ bolts all cases.

Characteristic load = 13.0 KN // grain } in 45 mm thick timber.
or = 4.65 KN ⊥ grain }

$K_1 = 0.8$ $K_{15} = 1.0$ (fewer than 4 bolts in dry timber)

ϕ K_1 K_{15} No. Precas no bolts

Capacity ϕQ_u = $0.8 \times 0.8 \times 1.0 \times 4 \times 13 \times n$

= $33.3\,n$ KN // grain → Bolt cap //

or = $11.9\,n$ KN ⊥ grain → Bolt cap ⊥

at 45° Char. load, = $\dfrac{13 \times 4.65}{13 \sin^2 45 + 4.65 \cos^2 45}$

= 6.9 KN for 16ϕ bolts

Capacity ϕQ_u = $17.7\,n$ KN at 45° to grain → Bolt cap 45°

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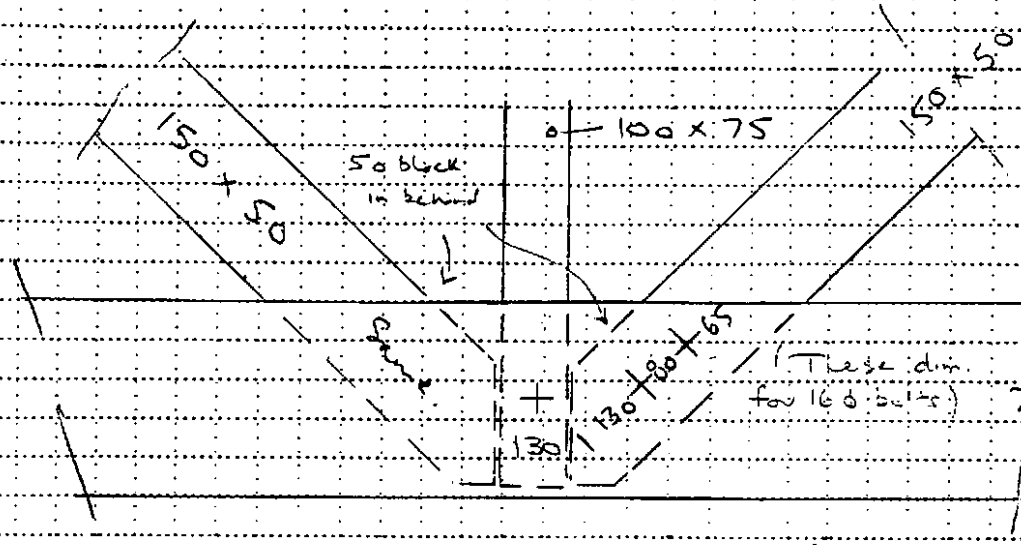
Description

Connection 1



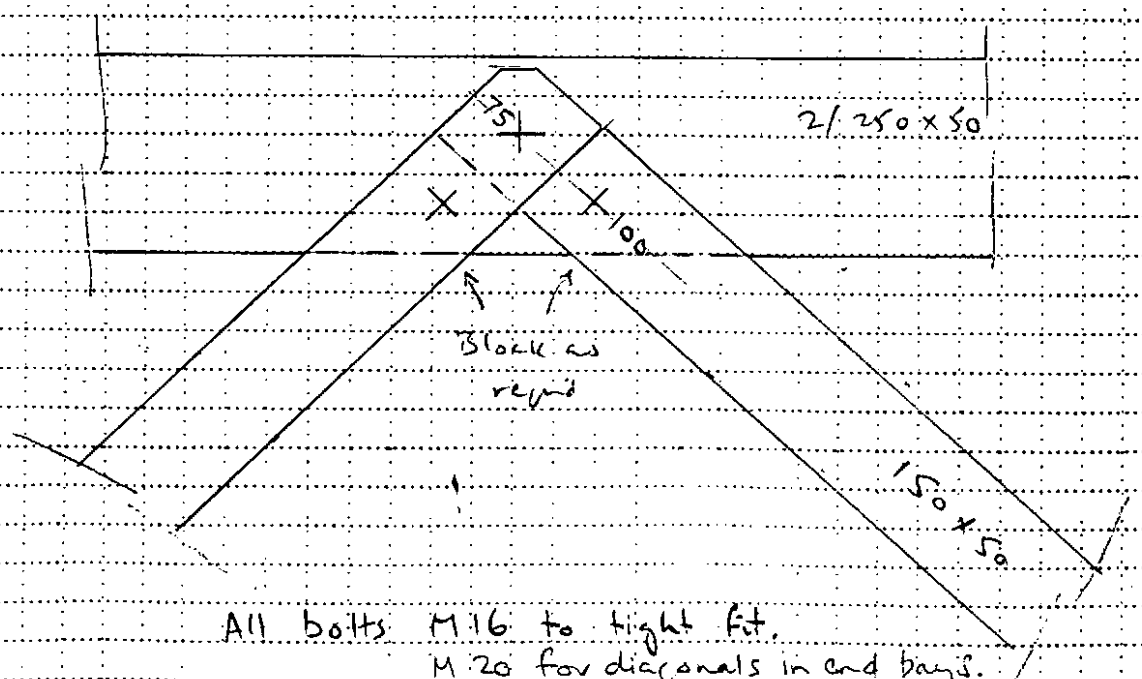
20 ϕ bolts for diagonals in end bays.
16 ϕ bolts throughout o'wise.

Bolts – Inside trusses →

Connection 2

Similar throughout – top & bottom

Connection 3



All bolts M16 to tight fit.
M 20 for diagonals in end bays.

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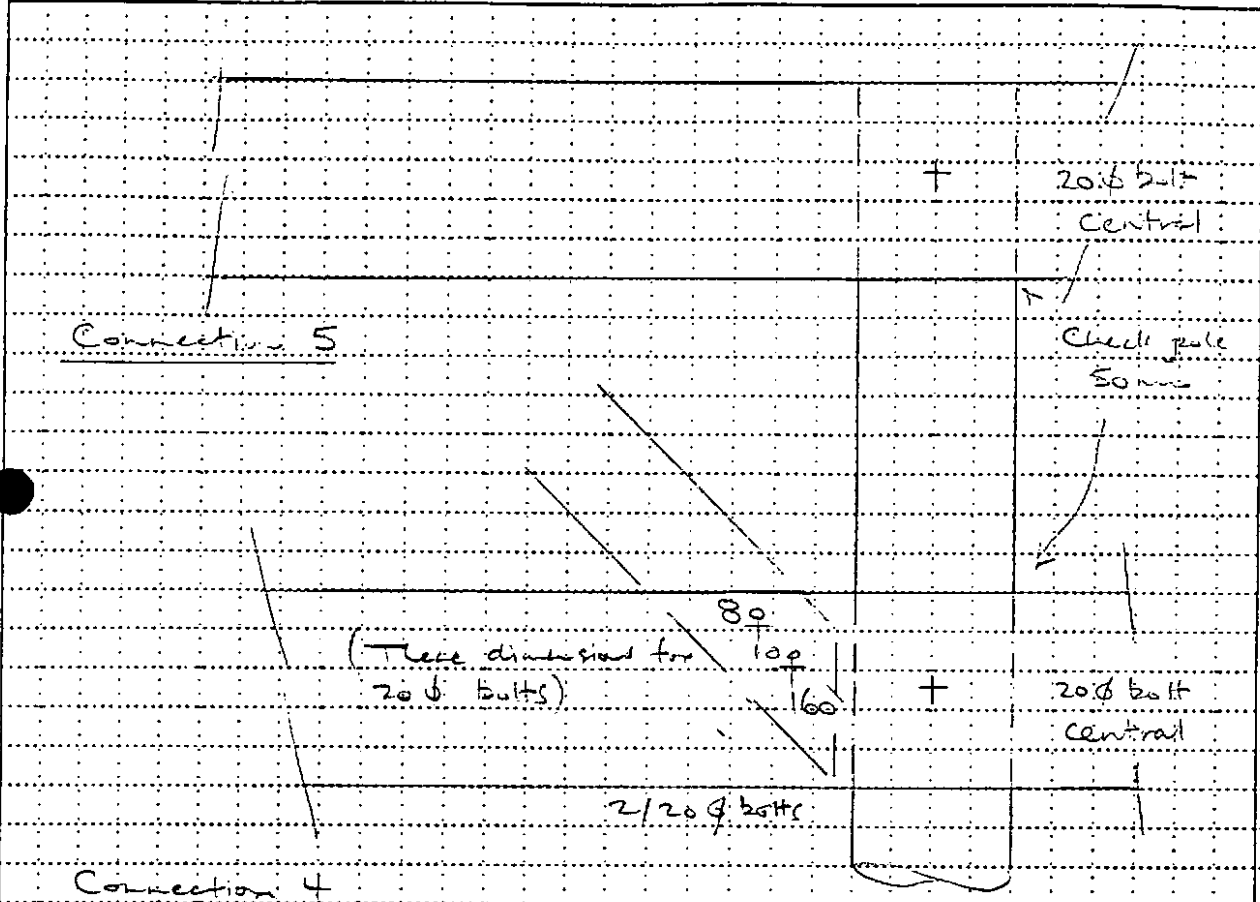
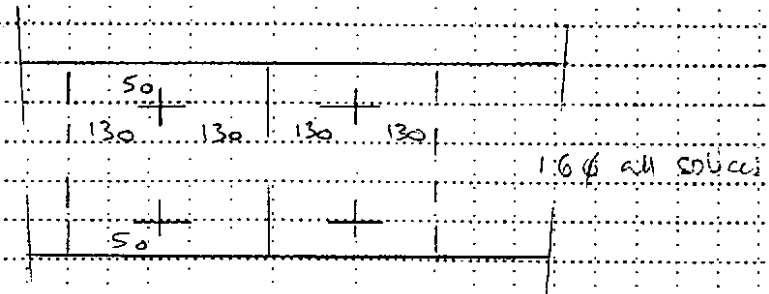


Connection 5

Connection 4



Connection 6

Splice tab chords at end bays or as close as possible

Bolts for 2 outside trusses (W + Z)

Diagonals 1-16ϕ with 2-16 in end bays.

All other connections as shown.

→ Bolts outside trusses

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TRUSS MEMBERS

Top Chord – Max force = 43 KN compression. = N^*

$f_c = 20.9$ MPa $S = K_{12} L/d = \frac{0.7 \times 2500}{150} = 12.$

$K_1 = 0.8$ $K_4 = 1.14$ $K_8 = 1.0$ for $S = 12.$

$$\phi N_u = \phi \times K_1 \times K_4 \times K_8 \times 20.9 \times 250 \times 100$$

$= 380$ KN $> N^*$ (OK)

Diagonal – Max force = 30 KN = N^*

$S = \frac{0.75 \times 1750}{50} = 26$ $K_8 = 0.45$ $K_4 = 1.0$

$$\phi N_u = \phi \times K_1 \times K_4 \times K_8 \times S_i \gamma^* \times f_c$$

$$\phi N_u = 0.8 \times 0.8 \times 1.0 \times 0.45 \times 150 \times 50 \times 20.9$$

$= 45$ KN $> N^*$ (OK)

Max tension force of the same order as $f_t = 10.6$ MPa

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Job No: 95126 Page: 1 of Pages
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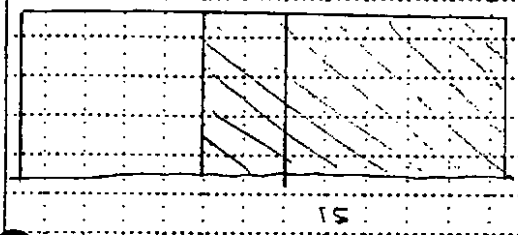
Description

LATERAL LOAD

Worst case is Line (2) load for 15 m.



Force to roof
$= 15 \times 4 \times 0.5$
$= 30\ KN$

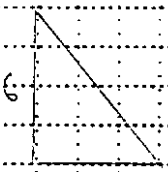
Load taken to 2 braces $= 15\ KN$ per brace

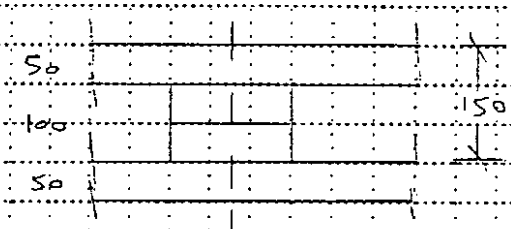
Force in brace at 45° $= 21\ KN = N^*$

Length Comm $= 7.2m$ $S = k_2 L/d$

$= \frac{0.7 \times 7200}{150}$

$= 34$





$K_8 = 0.28$

160 bolt two shear

	ϕ	k_1	k_4	k_8	L_c	Size
$\phi N_v =$	0.8	× 0.8 ×	1.0 ×	0.28 ×	20.9 ×	250 × 100

$= 94KN > N^*$ OK

Cut braces in 50 mm both sides 200 ϕ Pole, fix with M20 bolt.

Brace →

Provide dragon ties to stiffen roof against torsion.

→ Dragon Ties

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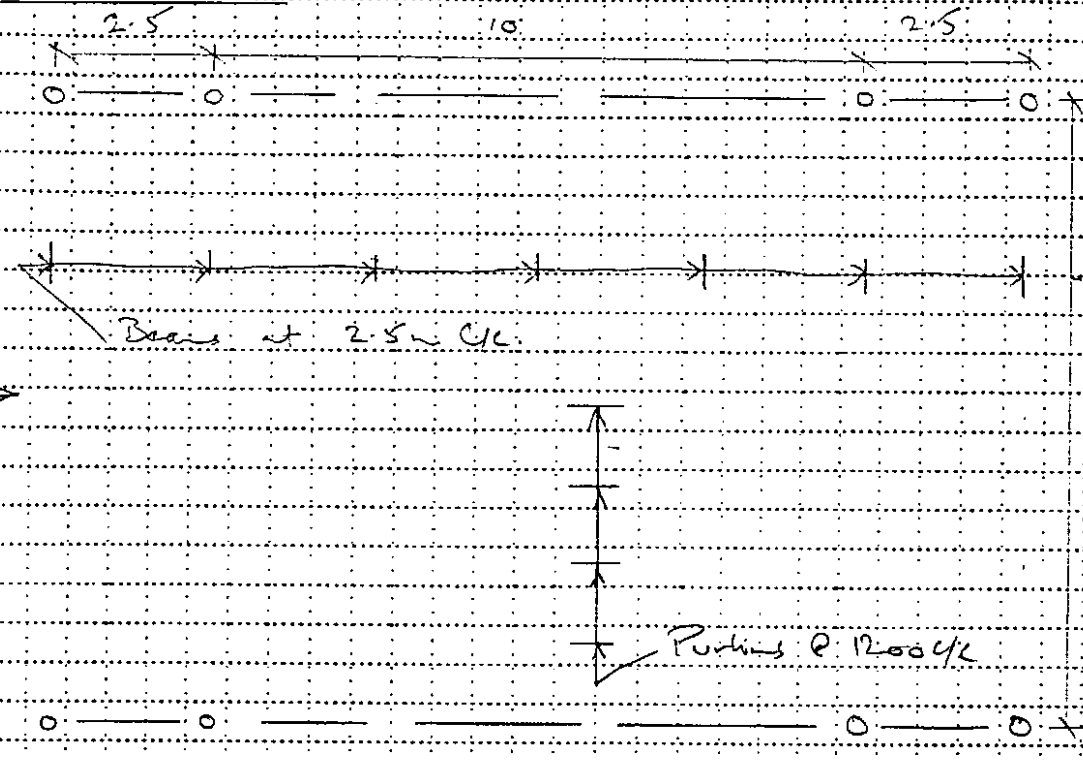
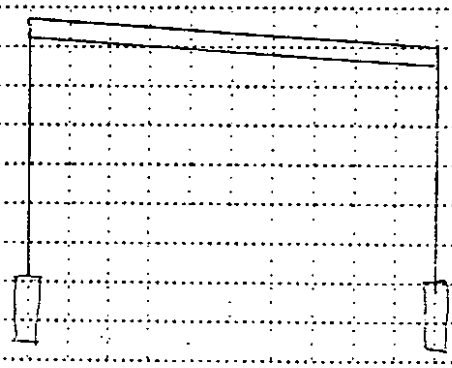
Job No: 95216 Page: 1 of Pages
Project: Matakana Mill
Calc: CAS Date: 8-97
Check: Date:

Description KOWHAI TIMBER - ROOF FOR TREATMENT SHED.

CONFIGURATION





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Description

LOADS

DL = 0.10 KN/m² LL = 0.25 KN/m²

Wind = 0.48 KPa (Same assumptions as for the cutting shed)

BEAMS

Same load, span 10.5m. Try 500 x 75

DL+LL (factored) = 1.58 KN/m

$M^* = 1.58 \times 10.5^2/8 = 21.8$ KNm

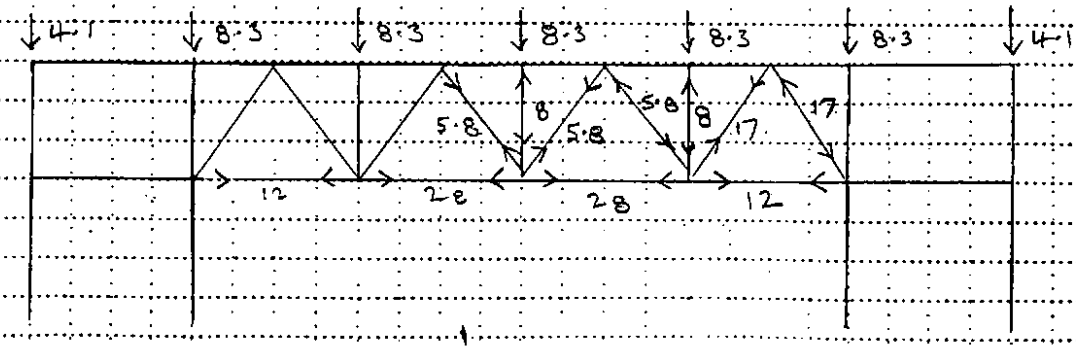
If beam is restrained at 1/3 points $d/b = \frac{3500}{75} = 47$

Then $k_8 = 0.53$ for $d/b = 6.7$

$\phi M_b = 0.8 \times 0.8 \times 1.14 \times 0.53 \times 17.7 \times 12.5 \times 500^2$

= 21.4 KNm. (Near enough.)

TRUSSES



Load per beam = $1.58 \times 10.5/2 = 8.3$KN.

By inspection, 1 M16 bolt per member adequate throughout, use same splice detail.

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Description

LATERAL LOAD

Max. wind force = 1.5 × 2.5 × 0.48 = 18 KN

This is spread over 8 poles acting at centrelines

Load per pole = 18/8 = 2.25 KN at 5m lever arm

For 250 ϕ poles 1.0 m creek depth and allowable soil pressure 100 kPa, depth of embedment

= 1.3 m. → Embedment

Take poles to 2m as for cutting shed

Brace 2 bays, and use drag ties to stiffen roof structure.

Wind uplift = 0.77 KN/m² (P3)

Total force = 0.77 × 10.5 × 15

= 121 KN or 15 KN/pole

Weight/pole = 13.4 KN not allowing for adhesion.

OK

Check DL Δ Beams @ 0.48 KN/m DL (P4 previous calcs)

$$= \frac{5}{384} \times \frac{0.48 \times 10.4 \times 10^4}{8000 \times 781 \times 10^6}$$

= 16.9 mm

For m.c > 25%, appropriate factor is 3

3 × DL Δ = 20.7 mm = Span/483

OK

SPECIFICATION

TIMBER ROOF CONSTRUCTION

SCOPE

The works covered in this section of the Specification include the supply of all materials, labour, plant and equipment for the construction of the timber truss buildings detailed on the drawings.

MATERIALS

(a) Timber

All timber poles shall be Radiata Pine, free from decay, splits or checks and any other defects which materially affect the strength of the pole.

All truss members, bearers and purlins shall be No. 1 Framing Grade.

All timbers are to be pressure treated to the following New Zealand Timber Preservation Authority Specifications with "Tanalith" NCA.

Poles: H5 at 16kg per cubic metre retention.
Trusses, Beams and Purlins: H1.

Where any timbers are cut or notched after pressure treatment, they shall be protected by a liberal brush application of "Ensele" tanalith concentrated solution or copper naphenate.

All timbers shall be straight with a curvature deviation less than 5mm under 1000mm straight edge.

No pole shall be jointed or spliced in any manner whatsoever.

(b) Concrete

Cast in-situ concrete shall be ordinary grade as defined in NZS 3109, have a specified compressive strength of 17.5 MPA at 28 days, and a nominated slump of 100mm.

All aggregates and water shall comply with the requirements of NZS 3121:1980. The maximum size of coarse aggregate shall be 19mm.

(c) **Bolts and Hardware**

Bolts and nuts shall be galvanised mild steel to B.S.15 standards. All bearing surfaces on timber shall be provided with 6mm washers of a size equal to three bolt diameters. All bolts shall be a neat fit in predrilled holes, and shall be greased prior to insertion. Bolts must be long enough to project 6mm beyond the nut when tightened.

CONSTRUCTION

The work shown on the drawings shall be performed in a tradesman like manner in accordance with accepted trade principles and appropriate New Zealand Standards.

Poles

The poles shall be installed in the correct location shown on the drawings with equipment suitable for the type of work. All poles which are broomed, split or otherwise damaged during handling or installation shall be replaced as directed by the Engineer.

(I) Augered and Cast Insitu

Holes should be drilled to the diameter specified on the drawings or as directed by the engineer. Loose debris should be removed from the base of the drilled holes and care taken to protect the hole prior to pole installation. On completion of drilling a concrete punch pad shall be placed in the base of the hole. Holes shall be dewatered prior to concrete pouring. All holes should be poured on the same day as they are augered. Concrete encasement of poles shall extend to the ground surface.

iii) Tolerances and Approvals

The pole tops shall be at such levels as to support trusses without packing or splicing.

Poles shall be in straight rows with a tolerance of 20mm between the centre of any pole top and straight line.

Poles shall be plumb with a tolerance of 15mm per 1m length.