Design Certificate – Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code, provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

References:

NZS 3603:1993 Timber Structures Standard.
NZS 3604:2011 Timber-framed buildings.
AS 1720.1 – 2010 Timber structures. Part 1: Design methods.
AS 1684.1 – 1999 Residential timber framed construction. Part 1: Design criteria.
AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

29 April 2011

For further information or advice please contact:
Carter Holt Harvey Woodproducts New Zealand
173 Captain Springs Road, Onehunga. Auckland
Telephone 0800 808 131
Facsimile 0800 808 132
Email: designit@chhwoodproducts.co.nz

Specifier details:

Specifier:	Steven Green	
Business name:		
Address:	52 Kauri Point Road, Laingholm, Auckland	
Email:		
Phone:	**Mobile:** 027-496-4239	**Facsimile:**

Project & Site details:

Project:	House Alterations	**Ref. no.:**
At (address):	52 Kauri Point Road	
For (owner/s):	Catherine & Blair Morton Jones	
Wind zone:	High	
Snow loading	Snow region: N0, snow loading not applicable	

MEMBER DESIGN DETAILS

Member 1

1) Member code and description — D26 - Lintels - In lower storey load bearing walls

2) Date prepared — 15/05/2011

3) Design inputs

Span	4.3 m
Floor load width 'FLW'	2.6 m
Roof load width 'RLW'	4.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/400 x 45 hySPAN
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_c Q$ *	10.0 mm	7.7 mm (long term)	$\frac{10.0}{7.7} = 1.29$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,5] End [4] kN
1.35G	0.60	-16.0
1.2G + 1.5Q	0.80	-31.0
1.2G + W_u + Ψ_cQ	1.00	-19.8
0.9G + W_u	1.00	0.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 50 mm bearing at end supports
Nail lamination in accordance with Detail H1.

Member 2

1) Member code and description: D20 - Lintels - In lower storey load bearing walls

2) Date prepared: 15/05/2011

3) Design inputs

Span	2.0 m
Floor load width 'FLW'	1.8 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/190 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_c Q$ *	6.7 mm	4.5 mm (long term)	$\frac{6.7}{4.5} = 1.49$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,5] End [4] kN
1.35G	0.60	-4.2
1.2G + 1.5Q	0.80	-9.1

$1.2G + W_U + \Psi_C Q$	1.00	-6.4
$0.9G + W_U$	1.00	-1.5

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 3

1) Member code and description D26-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	4.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	2.6 m
Opening width	4300 mm

4) Member specification

Size, stress grade/product	Use 2/140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Wind load - W_S *	19.3 mm	10.8 mm	$\frac{19.3}{10.8} = 1.79$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1[1]	Limit states design reaction[2,3] End[4] kN	Horizontal kN
1.35G	0.60	-17.5	
1.2G + 1.5Q	0.80	-28.5	
$1.2G + W_U + \Psi_C Q$	1.00	-21.9	2.9
$0.9G + W_U$	1.00	2.9	2.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 1 full length stud plus 1 secondary Jamb Stud to Detail H19

Member 4

1) Member code and description D20-J2 - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	1.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	1.8 m
Opening width	2000 mm

4) Member specification

Size, stress grade/product	Use 140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S *	19.3 mm	12.1 mm	$\frac{19.3}{12.1} = 1.60$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-5.3	
1.2G + 1.5Q	0.80	-9.5	
1.2G + W_U + $\Psi_C Q$	1.00	-5.6	1.6
0.9G + W_U	1.00	-0.5	1.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted

Member 5

1) Member code and description W22 - Lintels - In lower storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	1.5 m
Floor load width 'FLW'	2.6 m
Roof load width 'RLW'	4.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/190 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G+\psi_L Q$ *	5.0 mm	2.4 mm (long term)	$\frac{5.0}{2.4} = 2.06$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1[1]	Limit states design reaction[2,3] End[4] kN
1.35G	0.60	-5.4
1.2G + 1.5Q	0.80	-10.7
1.2G + W_U + Ψ_CQ	1.00	-6.8
0.9G + W_U	1.00	0.2

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 6

1) Member code and description W22-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	4.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	2.6 m
Opening width	1500 mm

4) Member specification

Size, stress grade/product	Use 3/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Wind load - W_S *	19.3 mm	12.5 mm	$\frac{19.3}{12.5} = 1.54$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1[1]	Limit states design reaction[2,3] End[4] kN	Horizontal kN
1.35G	0.60	-7.5	
1.2G + 1.5Q	0.80	-12.2	
1.2G + W_U + Ψ_CQ	1.00	-9.4	1.3

$0.9G + W_U$	1.00	1.3	1.1

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Member 7

1) Member code and description D18 - Lintels - In lower storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	0.9 m
Floor load width 'FLW'	1.0 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	3.0 mm	0.3 mm (long term)	$\frac{3.0}{0.3} = 10.48$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-1.3
1.2G + 1.5Q	0.60	-2.5
$1.2G + W_U + \psi_C Q$	1.00	-1.4
$0.9G + W_U$	1.00	-0.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 8

1) Member code and description D18-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	1.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	1.0 m
Opening width	900 mm

4) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S *	19.3 mm	14.1 mm	$\frac{19.3}{14.1} = 1.37$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-2.1	
1.2G + 1.5Q	0.80	-3.4	
1.2G + W_U + Ψ_CQ	1.00	-2.3	1.0
0.9G + W_U	1.00	-0.1	0.8

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 1 full length stud plus 1 secondary Jamb Stud to Detail H19

Member 9

1) Member code and description W14 - Lintels - In lower storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	1.3 m
Floor load width 'FLW'	1.4 m
Roof load width 'RLW'	4.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	4.3 mm	2.3 mm (long term)	$\frac{4.3}{2.3} = 1.91$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-3.3
1.2G + 1.5Q	0.80	-5.7
1.2G + W_U + Ψ_CQ	1.00	-4.6
0.9G + W_U	1.00	1.1

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 10

1) Member code and description W14-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	4.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	1.4 m
Opening width	1250 mm

4) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S *	19.3 mm	16.8 mm	$\frac{19.3}{16.8} = 1.15$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-4.7	
1.2G + 1.5Q	0.80	-6.8	
1.2G + W_U + Ψ_CQ	1.00	-6.5	1.2

$0.9G + W_U$	1.00	1.0	1.0	

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 1 full length stud plus 1 secondary Jamb Stud to Detail H19

Member 11

1) Member code and description W21 - Lintels - In single or upper storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	1.2 m
Roof load width 'RLW'	4.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²

4) Member specification

Size, stress grade/product	Use 2/140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	4.0 mm	1.2 mm (long term)	$\frac{4.0}{1.2} = 3.27$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.80	-2.2
1.2G + 1.5Q	0.80	-4.9
$1.2G + W_U + \Psi_C Q$	1.00	-4.5
$0.9G + W_U$	1.00	3.6

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 12

1) Member code and description W21-J, Jamb studs - In single or upper storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Roof type	Light roof and ceiling - 40 kg/m²
Roof load width 'RLW'	4.0 m

Opening width	1200 mm
Stud height	2900 mm

4) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S *	19.3 mm	16.5 mm	$\frac{19.3}{16.5} = 1.18$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-1.9	
1.2G + 1.5Q	0.60	-3.1	
1.2G + W_U + Ψ_CQ	1.00	-4.1	1.2
0.9G + W_U	1.00	2.4	0.9

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 1 full length stud plus 1 secondary Jamb Stud to Detail H19

Member 13

1) Member code and description W17 - Lintels - In lower storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	1.9 m
Floor load width 'FLW'	1.4 m
Roof load width 'RLW'	4.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/190 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	6.3 mm	4.4 mm (long term)	$\frac{6.3}{4.4} = 1.43$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-4.9
1.2G + 1.5Q	0.80	-8.3
1.2G + W_U + Ψ_CQ	1.00	-6.8
0.9G + W_U	1.00	1.6

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 14

1) Member code and description W17-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	4.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	1.4 m
Opening width	1900 mm

4) Member specification

Size, stress grade/product	Use 3/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S*	19.3 mm	14.6 mm	$\frac{19.3}{14.6} = 1.32$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-6.3	
1.2G + 1.5Q	0.80	-9.2	
1.2G + W_U + Ψ_CQ	1.00	-6.8	1.6
0.9G + W_U	1.00	2.2	1.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Member 15

1) Member code and description

D12 - Lintels - In lower storey load bearing walls

2) Date prepared

15/05/2011

3) Design inputs

Span	0.9 m
Floor load width 'FLW'	3.2 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

Member specification

Size, stress grade/product	Use 2/140 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G+\psi_L Q$ *	3.0 mm	0.7 mm (long term)	$\frac{3.0}{0.7} = 4.41$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_f[1]	Limit states design reaction[2,3] End[4] kN
1.35G	0.60	-3.0
1.2G + 1.5Q	0.80	-7.0
$1.2G + W_U + \Psi_C Q$	1.00	-3.0
$0.9G + W_U$	1.00	-1.4

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 16

1) Member code and description

D12-J - Jamb studs - In lower storey of two storey construction

2) Date prepared

15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	1.0 m
Floor dead load	40 kg/m²

Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	3.2 m
Opening width	900 mm

4) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S*	19.3 mm	14.1 mm	$\frac{19.3}{14.1} = 1.37$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_f [1]	Limit states design reaction [2,3] End [4] kN	Limit states design reaction [2,3] Horizontal kN
1.35G	0.60	-5.0	
1.2G + 1.5Q	0.60	-9.3	
1.2G + W_U + Ψ_CQ	1.00	-4.9	1.0
0.9G + W_U	1.00	-0.8	0.8

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 1 full length stud plus 1 secondary Jamb Stud to Detail H19

Member 17

1) Member code and description D17 - Lintels - In lower storey load bearing walls

2) Date prepared 15/05/2011

3) Design inputs

Span	1.7 m
Floor load width 'FLW'	3.2 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof & ceiling - 40 kg/m²
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/150 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	5.7 mm	3.7 mm (long term)	$\frac{5.7}{3.7} = 1.52$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-5.7
1.2G + 1.5Q	0.80	-13.2
1.2G + W_U + Ψ_CQ	1.00	-5.6
0.9G + W_U	1.00	-2.7

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 18

1) Member code and description D17-J - Jamb studs - In lower storey of two storey construction

2) Date prepared 15/05/2011

3) Design inputs

Stud height	2900 mm
Roof type and mass	Light roof & ceiling - 40 kg/m²
Roof load width 'RLW'	1.0 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN
Floor load width 'FLW'	3.2 m
Opening width	1700 mm

4) Member specification

Size, stress grade/product	Use 3/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Wind load - W_S *	19.3 mm	13.6 mm	$\frac{19.3}{13.6} = 1.42$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN	Horizontal kN
1.35G	0.60	-7.6	
1.2G + 1.5Q	0.80	-14.3	
1.2G + W_U + Ψ_CQ	1.00	-7.5	1.5

$0.9G + W_U$	1.00	-1.2	1.2

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Jamb studs to be nogged at maximum 1350 mm
Notching of the jamb studs not permitted
Multiple sections to be nail laminated as per AS 1684
Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Member 19

1) Member code and description

TJ1 - Floor level trimming beams (trimmers)

2) Date prepared

15/05/2011

3) Design inputs

Trimming beam span	2.3 m
Floor load width 'FLW'	1.8 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/190 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	7.7 mm	6.1 mm (long term)	$\frac{7.7}{6.1} = 1.26$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-3.6
1.2G + 1.5Q	0.80	-7.4
1.2G + 1.5Q	0.80	-3.9

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports
Nail lamination required - refer AS 1684

Member 20

1) Member code and description

FJ1 - Floor joist - Supporting floor loads only

2) Date prepared

15/05/2011

3) Design inputs

Span	4.4 m - single
Joist spacing	450 mm

Lateral restraint condition	Bottom edge restrained by ceiling / ceiling battens at 600 crs max.
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 240 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$	14.7 mm	13.9 mm (long term)	$\frac{14.7}{13.9} = 1.05$
Floor flexibility *	2.0 mm per 1 kN	2.0 mm	$\frac{2.0}{2.0} = 1.02$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-1.8
1.2G + 1.5Q	0.60	-3.6
1.2G + 1.5Q	0.60	-3.3

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports (floor loads only)
Provide intermittent blocking along lines of support - refer AS 1684

Member 21

1) Member code and description FJ2 - Floor joist - Supporting floor loads only

2) Date prepared 15/05/2011

3) Design inputs

Span	3.6 m - single
Joist spacing	450 mm
Lateral restraint condition	Bottom edge restrained by ceiling / ceiling battens at 600 crs max.
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 240 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$	12.0 mm	6.2 mm (long term)	$\frac{12.0}{6.2} = 1.92$
Floor flexibility *	2.0 mm per 1 kN	1.3 mm	$\frac{2.0}{1.3} = 1.49$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-1.4
1.2G + 1.5Q	0.60	-2.9
1.2G + 1.5Q	0.60	-3.2

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements

Provide at least 30 mm bearing at end supports (floor loads only)
Provide intermittent blocking along lines of support - refer AS 1684

Member 22

1) Member code and description B1 - Bearer - Supporting floor loads only - double sections for pole frame construction

2) Date prepared 28/05/2011

3) Design inputs

Span	3.6 m - single
Floor load width 'FLW'	2.8 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/240 x 45 hySPAN
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	12.0 mm	11.8 mm (long term)	$\frac{12.0}{11.8} = 1.02$

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-10.5
1.2G + 1.5Q	0.80	-21.3
1.2G + 1.5Q	0.80	-6.4

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements	Minimum bearing area at end supports = 1500 mm² per piece - see Detail H3 Joists must extend over and be supported by both sections - see Detail H17 Spaced bearers are to be blocked between as specified in AS 1684.

Member 23

1) Member code and description	B2 - Bearer - Supporting floor loads only - double sections for pole frame construction
2) Date prepared	28/05/2011

3) Design inputs

Span	2.3 m - single
Floor load width 'FLW'	1.9 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/240 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	7.7 mm	3.2 mm (long term)	$\frac{7.7}{3.2} = 2.38$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,5] End [4] kN
1.35G	0.60	-4.8
1.2G + 1.5Q	0.80	-9.9
1.2G + 1.5Q	0.80	-4.4

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements	Minimum bearing area at end supports = 900 mm² per piece - see Detail H3

Member 24

1) Member code and description	B3 - Bearer - Supporting floor loads only - double sections for pole frame construction
2) Date prepared	28/05/2011

3) Design inputs

Span	3.8 m - single
Floor load width 'FLW'	1.5 m
Floor dead load	40 kg/m²
Floor live load	2.0 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/290 x 45 SG8 Laserframe

Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	12.0 mm	10.9 mm (long term)	$\frac{12.0}{10.9} = 1.10$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-5.9
1.2G + 1.5Q	0.80	-12.0
1.2G + 1.5Q	0.60	-4.8

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements — Minimum bearing area at end supports = 1100 mm² per piece - see Detail H3

Member 25

1) Member code and description — TJ2 - Joists supporting trimming beams

2) Date prepared — 30/05/2011

3) Design inputs

Joist span	4.3 m
Trimming beam offset	0.7 m
Area supported by joist	0.8 m²
Floor dead load	40 kg/m²
Floor live load	1.5 kPa/1.8 kN

4) Member specification

Size, stress grade/product	Use 2/240 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m³

5) Serviceability

Load case	Limit [3] on average deflection [2]	Estimated average deflection [2]	Rigidity ratio [4]
Long term load - $G+\psi_L Q$ *	14.3 mm	14.2 mm (long term)	$\frac{14.3}{14.2} = 1.01$
*Critical serviceability load case			

See 'Notes for interpretation of serviceability data' at the end of this report

6) Reactions

Load case	k_1 [1]	Limit states design reaction [2,3] End [4] kN
1.35G	0.60	-3.1
1.2G + 1.5Q	0.80	-7.1
1.2G + 1.5Q	0.60	-3.9

See 'Notes for interpretation of reaction data' at the end of this report

7) Installation requirements	Provide at least 30 mm bearing at end supports
	Nail lamination required - refer AS 1684

Notes for interpretation of serviceability data

1. "average deflection" is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS/NZS 1170, AS 1684.1 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
2. Deflection is the flexural response to load – 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS/NZS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

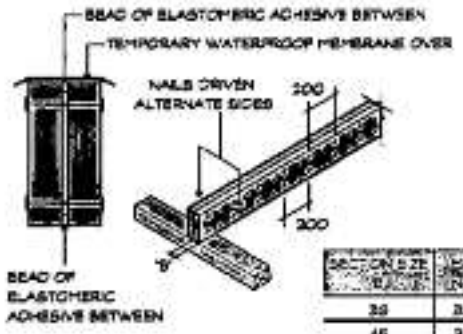
   As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!
3. The limits referred are those specified in AS 1684.1 for the stated load case.
4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1684.1

Notes for interpretation of reaction data

1. Duration of load factor 'k_1' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support

4. End reaction includes allowance for overhang/cantilever where one has been designed

Vertical nail lamination
- two pieces

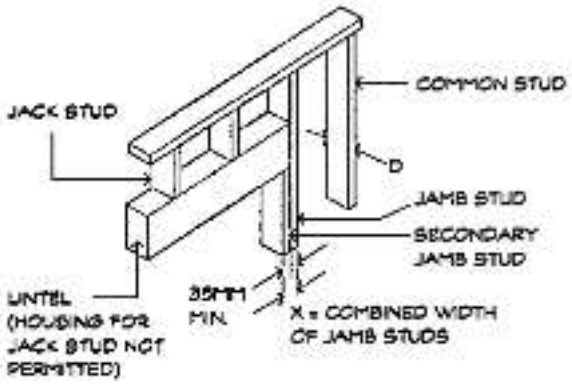


33	3.05 mm	75 mm
45	3.30 mm	90 mm
63	3.80 mm	100 mm

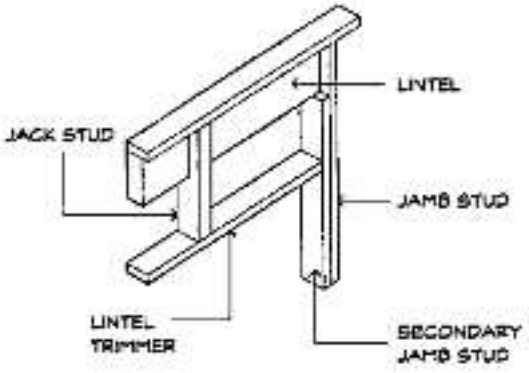
DETAIL H1

The details shown are intended to both limit the entry of moisture between the laminates and to provide adequate shear transfer.

Multiple Stud Configuration



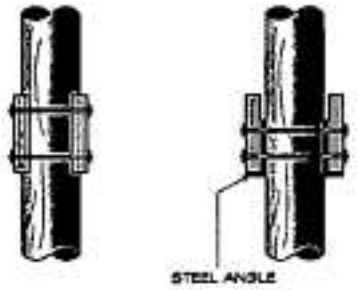
LINTELS HAVING BREADTH GREATER THAN HALF STUD DEPTH



LINTEL DIRECTLY BELOW TOP PLATE

DETAIL H19

Bearing at supports
- spaced bearers in pole frame construction



NOTCHED SEAT STEEL ANGLE SEAT

DETAIL H3

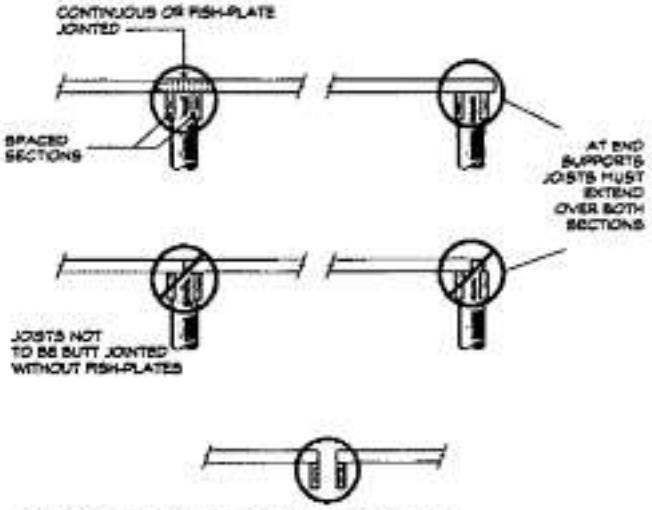
It is important that adequate bearing support is provided. It should not be assumed that merely bolting to the sides of poles will provide adequate support. Usually it will be necessary to provide a seat for bearing either by notching the pole or using a steel angle as shown.

NOTE:

1. In calculating the bearing area for a notched seat do not include any untreated Lyctus susceptible sapwood.
2. Bolts may be designed to partially or fully support the load - engineering design is required.

Joists supported by spaced bearers
- in pole frame construction

JOISTS MUST BE INSTALLED OVER SPACED BEARERS AND EITHER BE CONTINUOUS, LAP JOINTED OR BUTT JOINTED USING A METAL OR TIMBER FISH-PLATE.



FOR THIS CASE, EACH BEARER SHOULD BE INDIVIDUALLY DESIGNED FOR ITS LOADING

DETAIL H17

#1943

IPENZ ARCHITECTS ACENZ

Building Code Clause(s).....

PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY: **Design Management Consultants Limited**
(Design Firm)

TO: **B & C Morton Jones**
(Owner/Developer)

TO BE SUPPLIED TO: **Auckland Council**
(Building Consent Authority)

IN RESPECT OF: **Pole Foundations for House Alterations**
(Description of Building Work)

AT: **52 Kauri Point Road Laingholm Waitakere**
(Address)

We have been engaged by the owner/developer referred to above to provide **Structural design** services in respect of the requirements of **Pole foundations review**
Clause(s) **B1, VM1 – VM4** of the Building Code for:

☐ All or ☑ Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:
☑ Compliance Documents issued by Department of Building & Housing (*verification method / ~~acceptable solution~~*) or
☐ Alternative solution as per the attached schedule .....
The proposed building work covered by this producer statement is described on the drawings titled **House Alterations – C & B Morton-Jones** together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:
(i) Site verification of the following design assumptions:
a) *Size of existing pole encasement to be as shown on the drawings*

(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, **Lyall Bruce Green** am: CPEng IntPE **# 46696** *(Name of Design Professional)*

I am a Member of : ☑ IPENZ and hold the following qualifications: BE **(Hons)**

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*. The Design Firm is a member of ACENZ ☑ Yes ☐ No

SIGNED BY **Lyall Bruce Green** ON BEHALF OF **Design Management Consultants Ltd**
(Design Firm)

Date: 30/05/2011 (Signature).....

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.

dmc
Design Management Consultants Ltd
PO Box 5254, Frankton, Hamilton 3242
Phone: 07 850 5155 Fax: 07 850 5156

Project Ref:
Project: Kauri Pt Rd Waitoki
Client: Martin James
Date: 5/11 Page: 1

Author LG

House deck extensions

Check bearing capacity of existing pole footings to be retained to support existing deck & roof plus additional load from lower new deck

Tested soil tests ⇒ Depth = 1.4m
Observations orange/brown silt
Shear Vane (min 3 no) shear = 70kPa.
⇒ C

ϕq_{ult} 30:1 bearing $= 0.6 \times 5.14 \times C$
$\phi = 0.6$
$= 215$kPa.

Refer to attached drawing P02 for pole P1–P3 location and effect roof, upper deck & lower deck areas.

Loads
Dead
Existing light weight roof = 0.35kPa.
Existing & new deck 150×50 @ 400 / 90×35 @ 400 = 0.3kPa.
Decking = 0.2kPa.
Live = 2.0kPa.

	Dead (kN)	Live (kN) (2kPa.)
Pole P1		
Upper level		
Effective area roof = 3.1m²	1.1	
" " deck = 2.8m²	0.9	5.6
Lower level		
Effective area deck = 6.1m²	1.8	12.0
	3.7	17.6
Total U = 1.2G + 1.5Q = 30.8kN		
Pole P2 (No roof)		
Upper level area = $\frac{3.4+0}{2} \times 1.3 = 5.0$m²	1.5	10.0
Lower deck = $\left(\frac{3.4}{2}+0.2\right) \times 2.0 = 4.1$m²	1.2	8.2
	2.7kN	18.2kN
Total U = 1.2G + 1.5Q = 30.5kN		
Pole P3 No roof.		
Upper area = $\frac{4.1}{2} = 2.1$m²	0.6	4.2
Lower area = 5.4m²	1.6	10.8
	2.2	15.2
Total = 1.2G + 1.5Q = 25.4kN		

Therefore more Load in pole P1 = 30.8kN ⇒ 31.5kN

Add Weight of pole Tiny 0.15 × 0.6 × 6 = 0.7kN

dmc
Design Management Consultants Ltd
PO Box 5254, Frankton, Hamilton 3242
Phone: 07 850 5155 Fax: 07 850 5156

Project Ref:
Project:
Client: Morton-Jones
Date: / / Page: 2

Author: LG.

N^*_{max} $= 31.5$ kN
$U = 1.2G + 1.5Q$

Existing Foundations

150Ø

200-300 topsoil

Concrete encasement

Existing Pole Foundation

450Ø

For 450 Ø foundation

$q_{us} = \frac{31.5}{\pi/4 \times 0.45^2}$

$= 199$ kPa

$< \phi Q_{us} = 215$ kPa.

These face existing pile foundations can support existing deck/roof plus new deck proposed at ground floor level.

Design Management Consultants		Page No :	1
JOB NAME:	B & C Morton-Jones House	Date	12/6/11
Job/File Number:	9000	Designer:	Lyall Green
Description:	Wind speed calcs	Checker:	1

Determination of Site Wind Speeds

Enter Return Period of interest 500

Determination of Site Wind Speed $V_{sit,\beta} = V_h * M_d * M_{(z,cat)} * M_s * M_t$ m/sec

Enter Wind Region ID = A7

Wind Regime with this region is Frontal

Regional Wind Speed = V_R = 45 Ajustment Factor = 1 = 45 m/sec V1.2

Directional (d) or Non-directional (n) wind speeds y

Elements being considered C *(C = Complete building & Primary Structure; O= Other elements)*

Wind Directional Multiplier, Md, for Region A7

N	NE	E	SE	S	SW	W	NW
0.9	0.9	0.8	0.9	0.9	0.9	1	1

Terrain/Height Multiplier

Enter Building Height Z= 9 m

Enter Reference height of interest 9 m *(can select several heights up the Building)*

Terrain Category Averaging Distance 1000 m *(As given in Table 4.2A)*

Enter the distance of each 1000 m of the site

Terrain Category present over TC	N	NE	E	SE	S	SW	W	NW
Averaging Distance 1	2/8000	2/8000	2/8000	2/8000	2/8000	2/8000	3/8000	3/8000
Starting at base of building and 2								
Moving away in an upwind direction 3								
4								
(Refer to Clause 4.2.3) 5								
6								
7								
8								
Sum of averaging distances	1187	1187	1187	1187	1187	1187	1105	1105
check distance provided>Required	OK	OK	OK	OK	OK	OK	OK	OK
Weighted average terrain category	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00
$M_{(z,cat)}$=	**0.98**	**0.98**	**0.98**	**0.98**	**0.98**	**0.98**	**0.83**	**0.83**

Shielding Effects *(Note Shielding Zone is arc radius 20h &+/- 45 degree perp to wall)*

Effective shielding length has been assessed as 180 m *(20 * Building Height)*

Effective shielding buildings are required to have Ht> 9 m *(Shielding Bldgs Ht >= Bldg Ht)*

(Note if Upwind Slope >0.2 then no shielding is present - Cl 4.3.1)

Enter		N	NE	E	SE	S	SW	W	NW
No. Bldgs in shielding zone of ht>h	No.	0	0	0	0	0	0	0	0
Avg. Height of shielding bldgs	m								
Avg. Breadth of shielding bldgs	m								
	Ls=	0	0	0	0	0	0	0	0

12/06/11

Design Management Consultants		Page No.:	2
JOB NAME:	B & C Morton-Jones House	Date	12/6/11
Job/File Number:	9000	Designer:	Lyall Green
Description:	Wind speed calcs	Checker:	1

Terrain Multiplier, Mt

(Max of Ml, Mc, Mh)

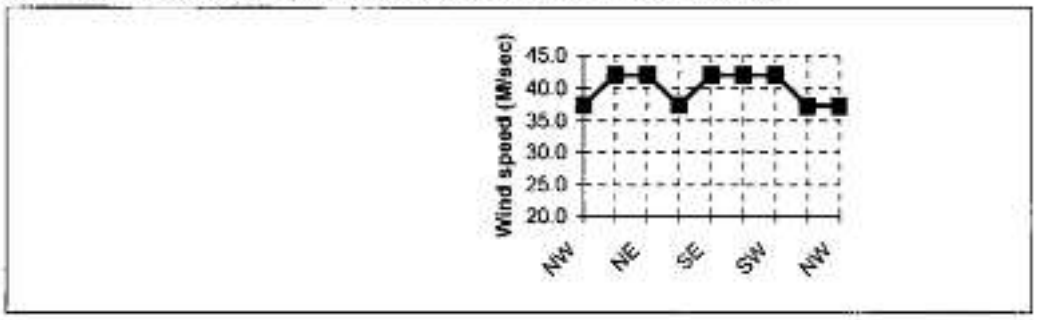
Hill Shape Multiplier		F	F	F	F	F	F	F	F
Enter Upwind Hill Shape (E,H,R,F)		H	H	H	H	H	H	E	E
(E=Escarpment, H=Hill, R=Ridge, F=Flat)									
Ridge Elevation	m	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Upwind Valley Elevation	m	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
H = Height of Terrain feature	m	10	10	10	10	10	10	10	10
Contour at midheight of feature	m								
Enter Lu		74	74	74	74	74	74	150	150
Crest Slope	Rad								
Distance from Site to Crest	m	30	30	30	30	30	30	30	30
Enter L if site is on Lee side of the slope									
Hill Shape Multiplier	Mh	1.058	1.06	1.06	1.06	1.06	1.06	1.00	1.00

Lee Zone Multiplier		N	NE	E	N	S	SW	W	N
Site is within a Lee Zone? (Y or N)					N				N
Distance Site to Leeward Crest	km				0.03				0.03
	Ml	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

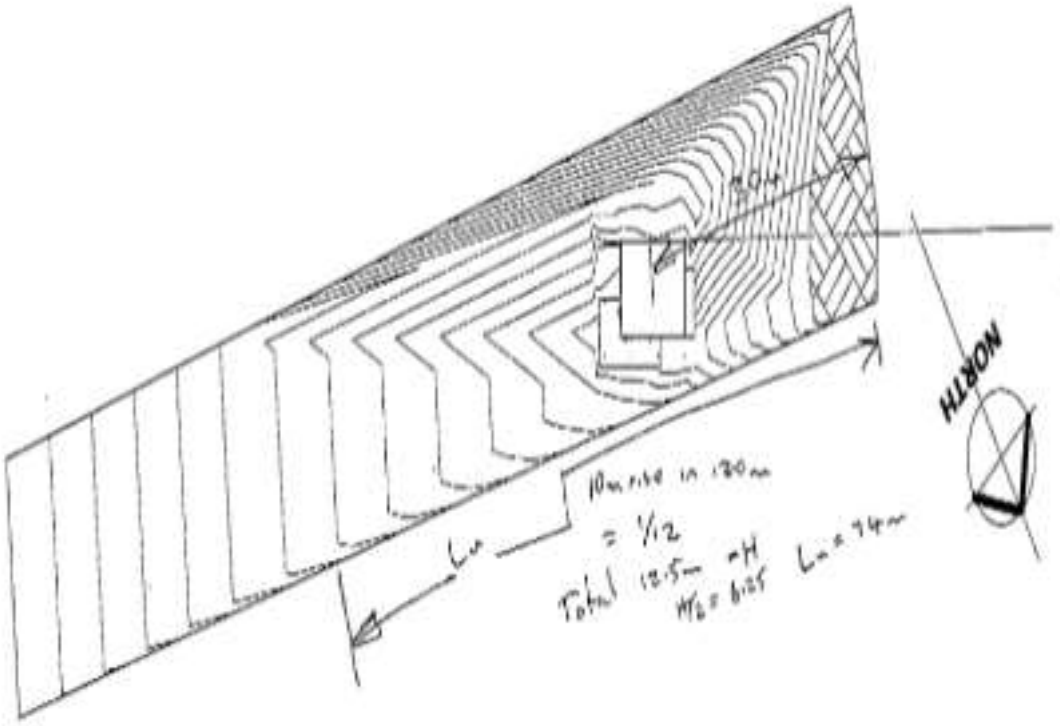
Elevation Multiplier (Eqn 4.4(1))	*(Note 5*	50							
Enter approx. Elevation if >500 m	m	0	Then Me =	1					
Topographic Multiplier	Mt	1.06	1.06	1.06	1.06	1.06	1.06	1.00	1.00

	NW	N	NE	E	SE	S	SW	W	NW
Product of Multipliers=		0.93	0.93	0.83	0.93	0.93	0.93	0.83	0.83
Directional Wind Speeds Are	37.3	42.1	42.1	37.4	42.1	42.1	42.1	37.3	37.3

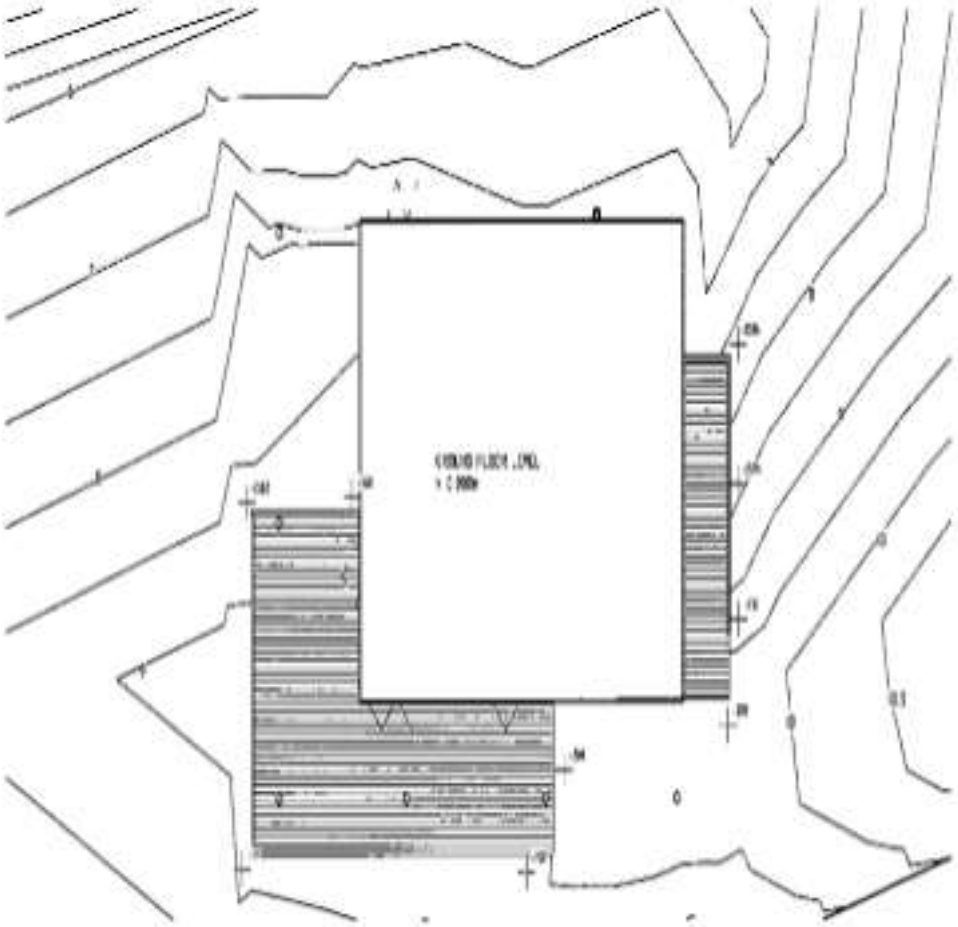
(Note Ultimate Wind Speed shall be greater than 30 m/sec for Ultimate conditions Cl 2.3)



12/09/11



1 Full Topo
1:100



2 Enlarged Topo Drawing
1:100

C & D Morton-Jones
House Alterations
32 Kaui Point Road
Lairgholm
Auckland

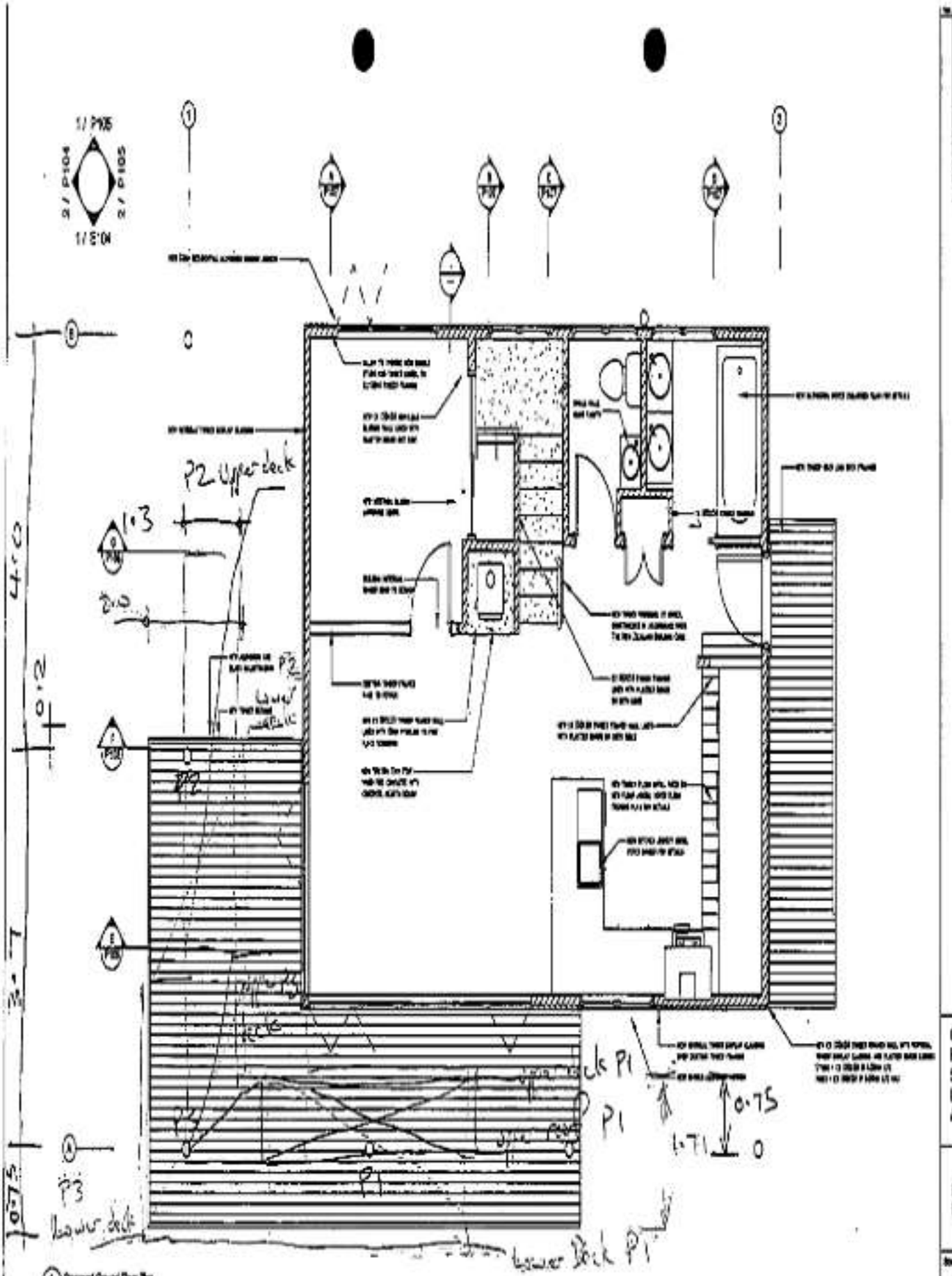
Topographical Plan

As indicated

Author

April 2011

T01



1 Proposed Ground Floor Plan
1:50

C & B Morris-Jones
House Alterations
62 Kauri Point Road
Langhams
Auckland

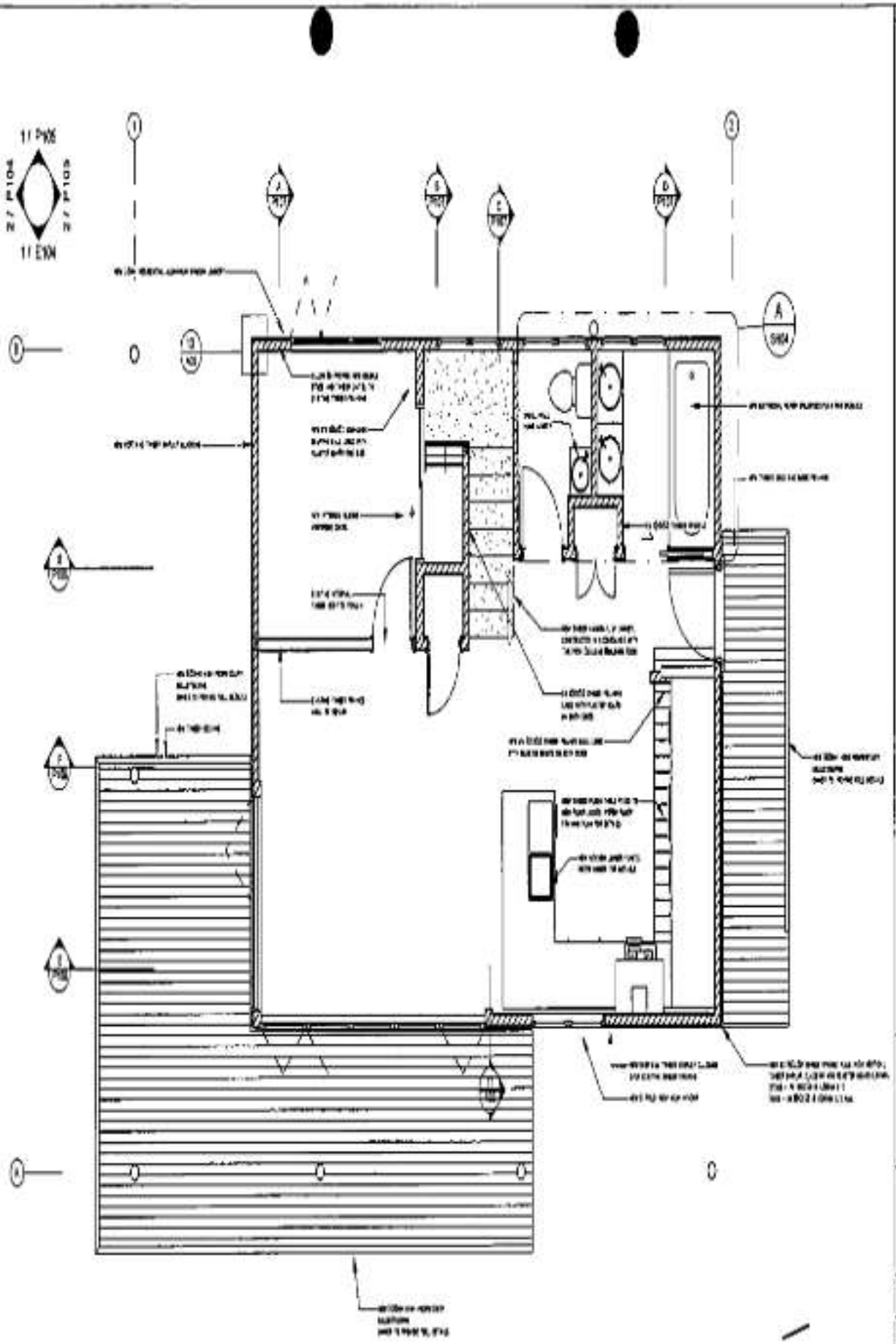
Proposed Ground Floor Plan

1:50

B.G.

April 2011

P102



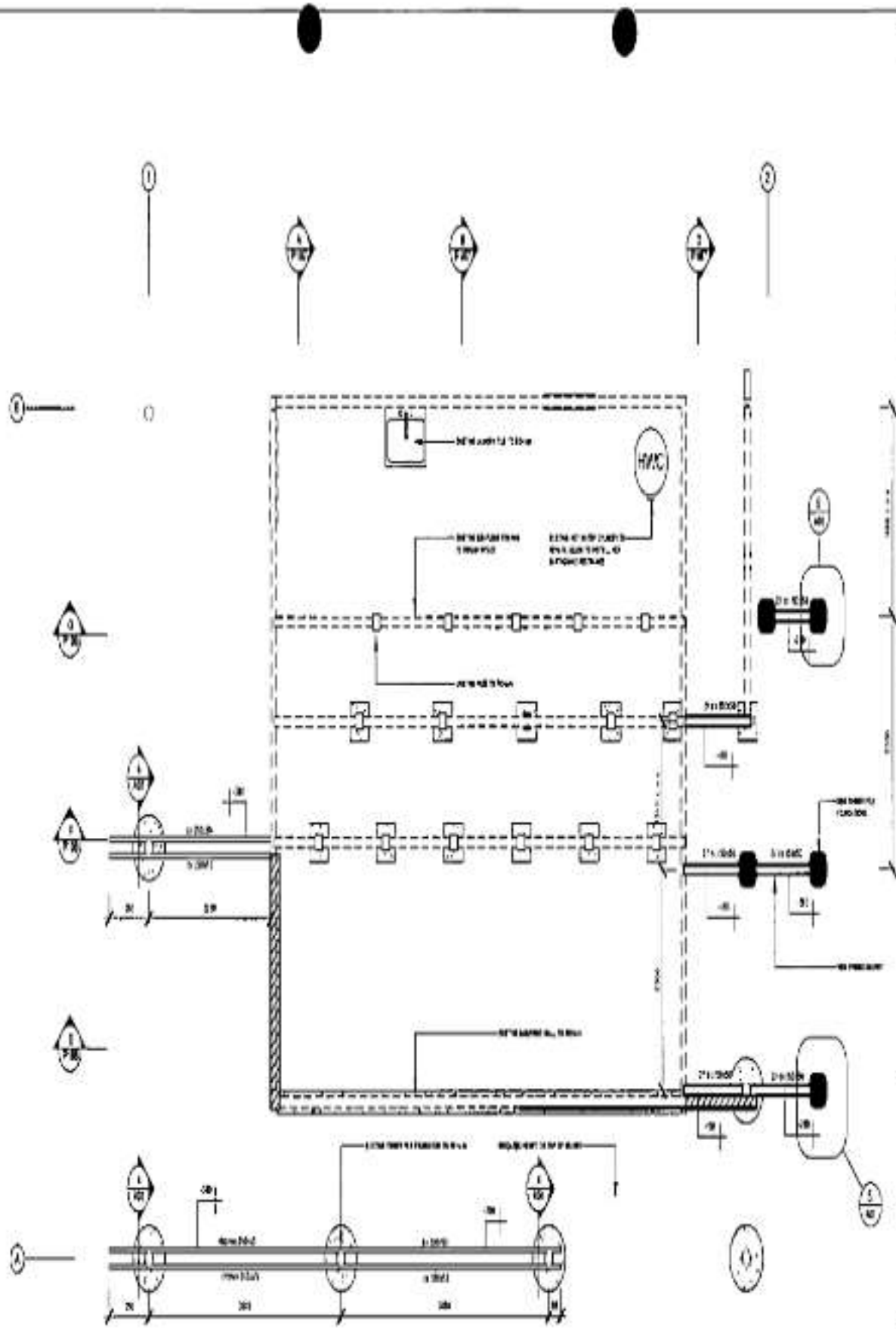
C & B Morton-Jones
House Alterations
52 Kauri Point Road
Leighton
Auckland

Proposed Ground Floor Plan

1 : 50

P102

CPEng 46696
2/6/2011



C & B Morton-Jones
House Alterations
53 Kaw Point Road
Langholm
Auckland

Proposed Basement &
Foundation Plan

1:50

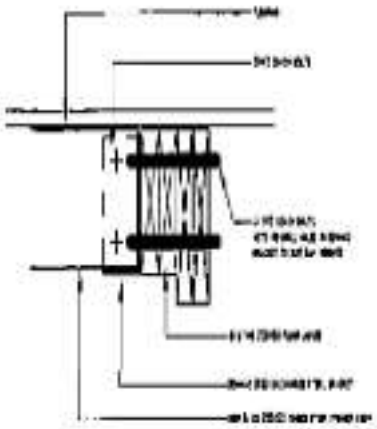
1901

A.G.

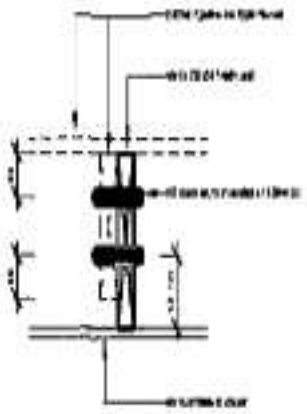
Apr 2011

P103

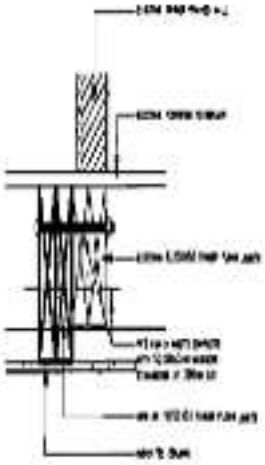
CIEng 46696
2/6/2011



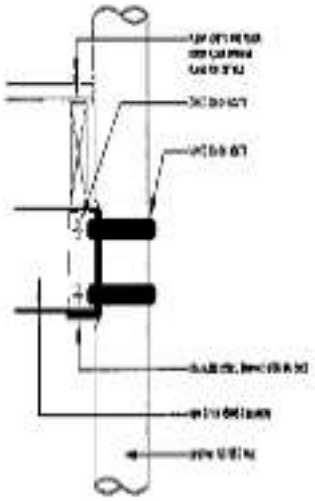
1 Shear Opening Tension Grout Connector Detail
P10 1:10



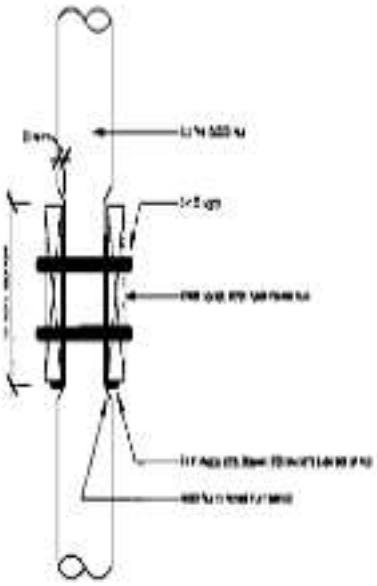
2 Supplementary Floor Joist Connection Detail
P10 1:10



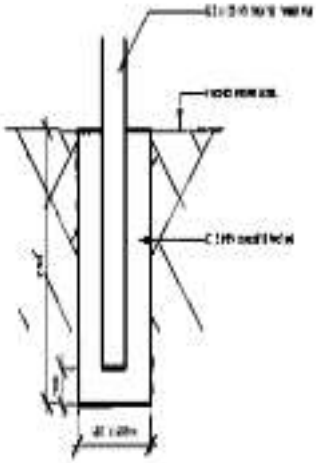
4 Plate Beam Fixing Detail
P10 1:10



3 New Beam to Existing SED Pile Connection Detail 1
P10 1:10



New Beam to Existing SED Pile Connection Detail 2
P10 1:10



5 Typical Pile Fixing Detail
P10 1:10

C & B Morton-Jones
House Alterations
52 Kauri Point Road
Launchalm
Auckland

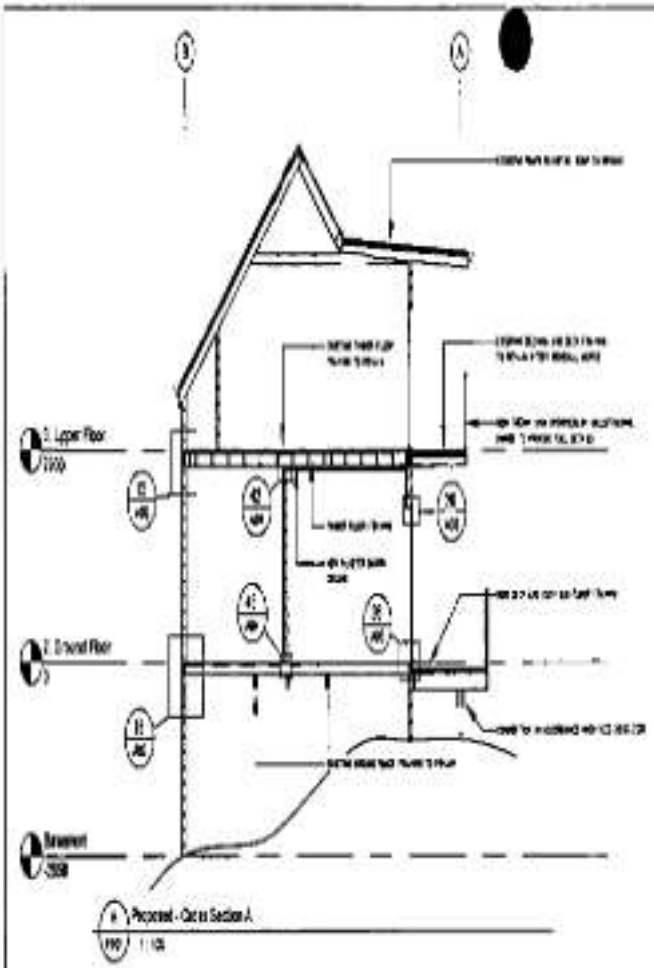
Structural Details

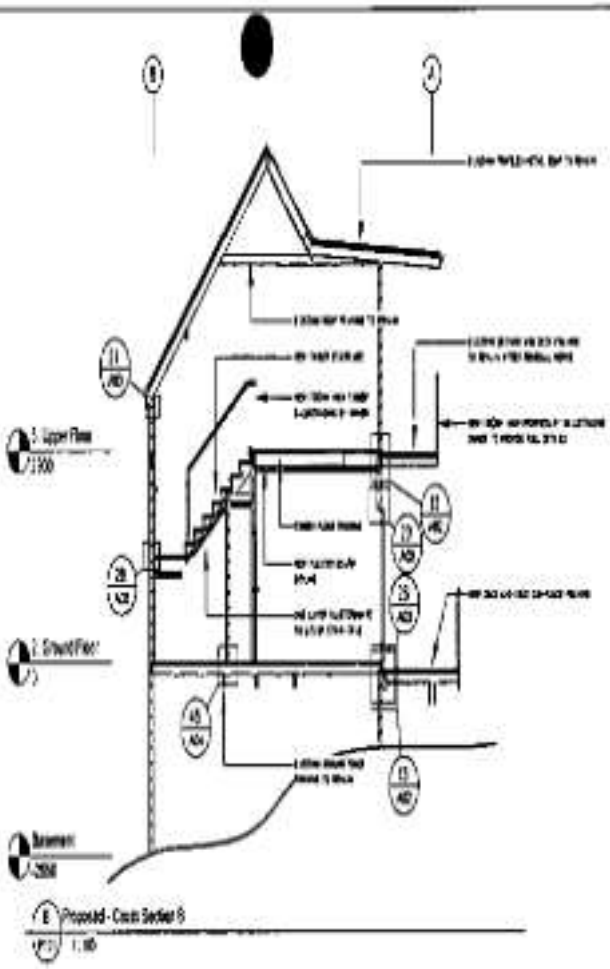
As Indicated

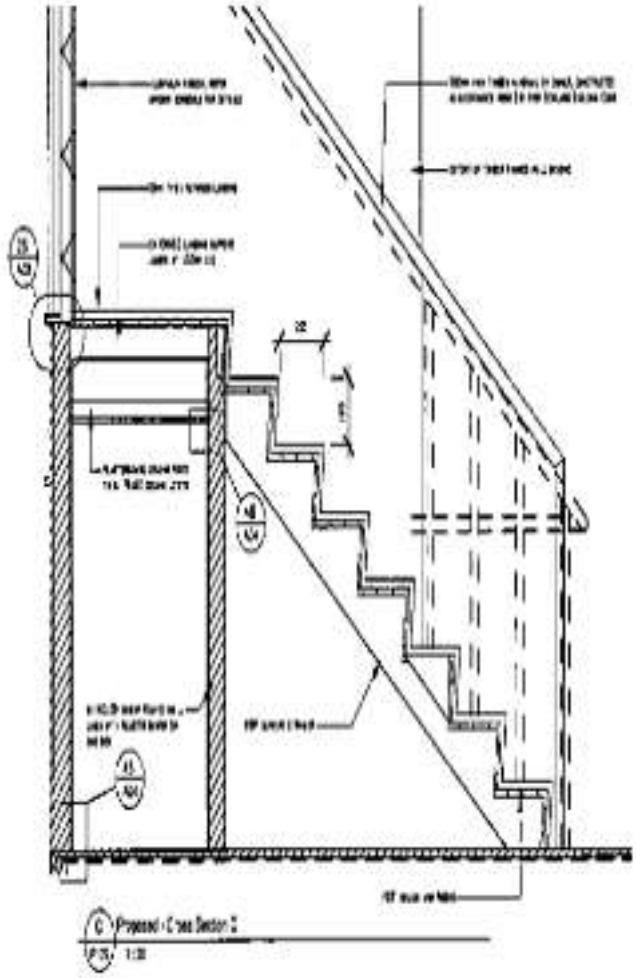
1100

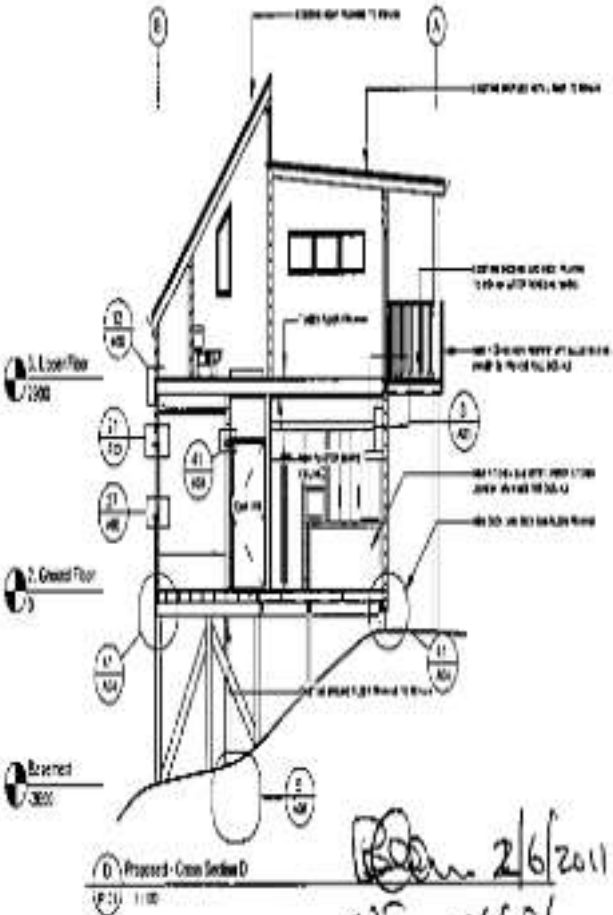
A01

2/6/2011
CPEng 46696









C & B Niven-Jones
House Alterations
38 Kauri Point Road
Leighton
Auckland

Proposed Cross Sections

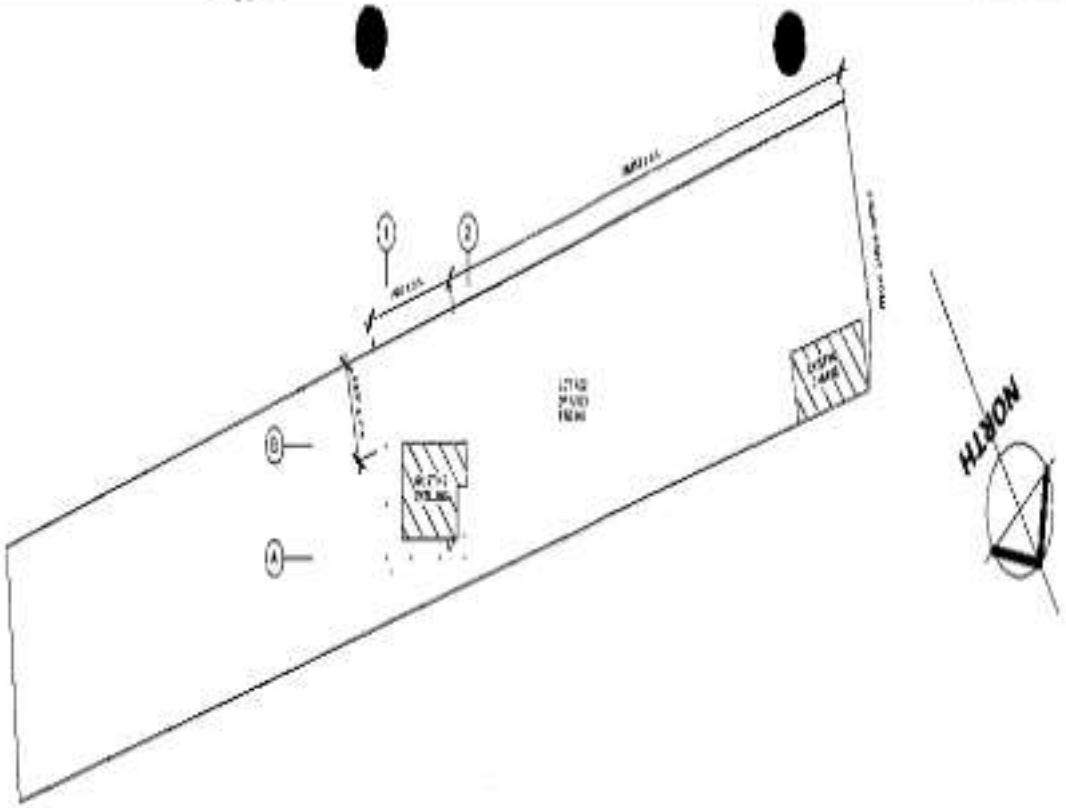
As indicated

April 2011

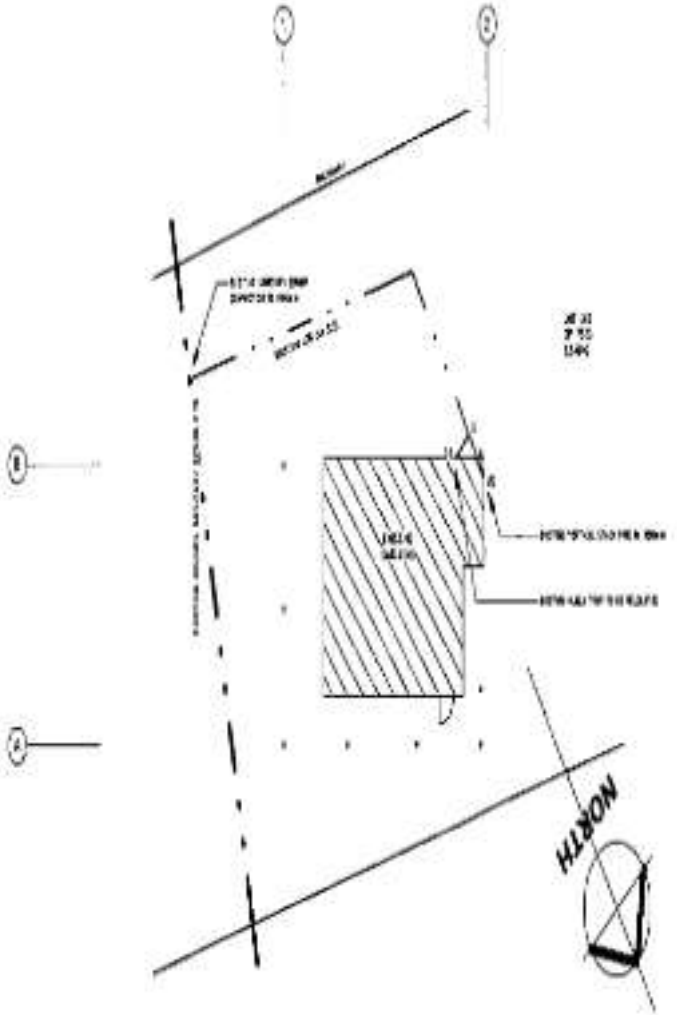
P107

2/6/2011

CEng 466996



1 Existing Ground Floor Plan
1:100



2 Enlarged Site & Drainage Plan
1:200

C & B Morton-Jones
House Alterations
92 Kauri Point Road
Langhorne
Auckland

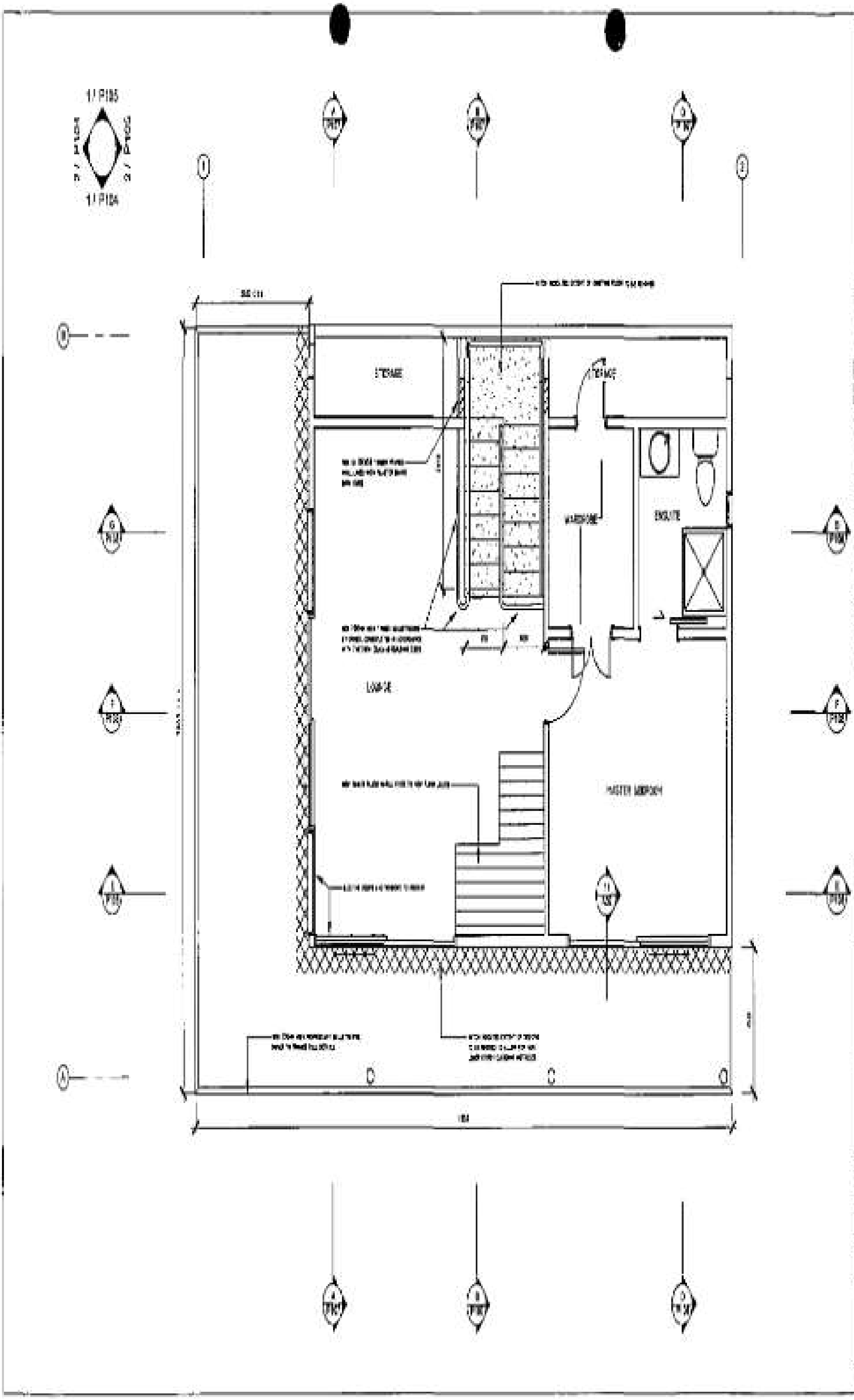
Existing Site Plan

As indicated

1:100

April 2011

E100



C & B Marlow-Jones
House Alterations
52 Kauri Point Road
Laingholm
Auckland

Proposed Upper Floor Plan

Scale: (original sheet size A3)
1 : 50

Drawn: S.G.

Date: April 2011

Drawing: P101

GIB® EzyBrace™ FP for GIB® EzyBrace™ Systems, 2009

GIB® Wall Bracing Calculation Sheet A — two storey — V03/09

Job Details

Name	Catherine & Blair Morton-Jones
Street and Number	52 Kauri Point Road
Lot and DP Number	
City/Town/District	Laingholm, Auckland
Designer	
Company Name	
Date	5/05/2011

BRANZ Appraised
Appraisal No.294 (2000)

Select GIB® Lining Option: 10 mm GIB® Plasterboard

Building Specification

		Upper Floor	Lower Floor
Number of storeys	two		
Floor Loading	2kPa		
Foundation Type	subfloor		
Cladding Weight (subfloor)	medium		
Cladding Weight		medium	medium
Roof Weight		light	light
Room in Roof Space		yes	no
Roof Pitch (degrees)		45	45
Roof height above eaves (m)		2.4	1.0
Building height to apex (m)		8.6	
Ground to lower floor level (m)		1.8	
Lower to upper floor level (m)			2.9
Stud Height (m)		2.7	2.7
Building Length (m)		9.0	9.0
Building Width (m)		6.4	6.4
Building Plan Area (m2)		58	58

check heights, storey less than 2 m

Building Location

Wind Zone	*High*
Select by Building Consent Authority Map or Preference	Not Available
Region	R1
Terrain	Coastal
Exposure	Exposed
Topography	Gentle

Earthquake Zone: C

Consult GIB® EzyBrace™ Systems, 2009 for Wind Zone definitions

Bracing Units required for Wind

Demand W (BU)	subfloor	lower	Walls upper
along	1365	863	403
across	1809	1139	525

Bracing Units required for Earthquake

Demand along / across E (BU)	Walls		
	subfloor	lower	upper
	769	669	392

Catherine & Blair Morton-Jones

GIB® EzyBrace™ FP for GIB® EzyBrace™ Systems, 2009

GIB® Wall Bracing Calculation Sheet B — Lower Walls Along — V03/09

Along

Bracing Line		Bracing Elements provided						Wind	Earthq.
1	2	3	4	6	5	7	8	9W	10EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Available Wall Length L (m)	Angle to Bracing line (degrees)	Element Height H (m)	Bracing Type	Supplier	BUs Achieved	BUs Achieved
A	90	1	0.75		2.7	BL1(10)	GIB®	80	74
	OK	2	2		2.7	BL1(10)	GIB®	213	178
line totals		3							
W	293	4							
EQ	252	5							
B	70	1	2.2		2.7	BLG	GIB®	235	235
	OK	2	1.2		2.7	BLG	GIB®	128	128
line totals		3							
W	363	4							
EQ	363	5							
C	90	1	0.8		2.7	BL1(10)	GIB®	85	79
	not enough	2							
line totals		3							
W	85	4							
EQ	79	5							
		1	0.65		2.7	BL1(10)	GIB®	69	65
	OK	2	0.65		2.7	BL1(10)	GIB®	69	65
line totals		3							
W	138	4							
EQ	130	5							
		1							
		2							
line totals		3							
W		4							
EQ		5							
		1							
		2							
line totals		3							
W		4							
EQ		5							
		1							
		2							
line totals		3							
W		4							
EQ		5							
		1							
		2							
line totals		3							
W		4							
EQ		5							

						Wind	Earthq.
Totals Achieved	Achieved/Demand	W	102%	EQ	123%	880	823
Timber Floor, design limit of 120 BU/m			*accepted*			*OK*	*OK*
Totals Required (from Demand)						863	669

Wall Bracing Systems
For full construction details see technical literature

Lower Walls Along

Supplier	System	Minimum Length (m)	BUs W/m	BUs EQ/m
	none			
GIB®	GS1(10)	0.4		
GIB®	GS2(10)	0.6		
GIB®	BL1(10)	0.4		
GIB®	BLP	0.4		
GIB®	BLG	0.6		
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			

BRANZ Appraised
Appraisal No. 294 (2009)

Timber Floor

Based on BRANZ research we recommend a limit of 120 BU/m for NZS3604 timber floors. If this limit is declined specific engineering must ensure that uplift forces generated by elements rated higher than 120 BU/m can be resisted by the floor framing.

In case the limit is accepted please ensure not to enter custom elements with ratings higher than 120 BU/m

accept limit of 120 BU/m for timber floors

Distribution (NZS3604:1999 minimum values)		
Internal wall bracing lines	70	BU
External wall bracing lines	10 x L(m)	BU
Lines supporting diaphragms	100	BU
Recommended distribution check (75% x D/n)		
No bracing line less than	162	BU

Catherine & Blair Morton-Jones

GIB® EzyBrace™ FP for GIB® EzyBrace™ Systems, 2009

GIB® Wall Bracing Calculation Sheet B — Lower Walls Across

V03/09

Across

Bracing Line		Bracing Elements provided						Wind	Earthq.
1	2	3	4	6	5	7	8	9W	10EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Available Wall Length L (m)	Angle to Bracing line (degrees)	Element Height H (m)	Bracing Type	Supplier	BUs Achieved	BUs Achieved
E	70	1	1.2		2.7	BL1(10)	GIB®	128	114
	OK	2	2.7		2.7	BL1(10)	GIB®	288	240
line totals		3							
W	416	4							
EQ	354	5							
F	70	1	0.7		2.7	BLG	GIB®	75	75
	OK	2	0.5		2.7	BL1(10)	GIB®	53	51
line totals		3							
W	128	4							
EQ	125	5							
G	70	1	1.85		2.7	BLG	GIB®	197	197
	OK	2							
line totals		3							
W	197	4							
EQ	197	5							
H	70	1	0.4		2.7	BL1(10)	GIB®	43	41
	OK	2	0.4		2.7	BL1(10)	GIB®	43	41
line totals		3							
W	85	4							
EQ	82	5							
I	70	1	3		2.7	BL1(10)	GIB®	320	267
	OK	2							
line totals		3							
W	320	4							
EQ	267	5							
		1							
		2							
line totals		3							
W		4							
EQ		5							
		1							
		2							
line totals		3							
W		4							
EQ		5							
		1							
		2							
line totals		3							
W		4							
EQ		5							

						Wind	Earthq.
Totals Achieved	Achieved/Demand	W	101%	EQ	153%	1147	1025
Timber Floor, design limit of 120 BU/m			accepted			OK	OK
Totals Required (from Demand)						1139	669

Wall Bracing Systems
For full construction details see technical literature

Lower Walls Across

Supplier	System	Minimum Length (m)	BUs W/m	BUs EQ/m
	none			
GIB®	GS1(10)	0.4		
GIB®	GS2(10)	0.6		
GIB®	BL1(10)	0.4		
GIB®	BLP	0.4		
GIB®	BLG	0.6		
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			

BRANZ Appraised
Approval No.294 (2003)

Timber Floor

Based on BRANZ research we recommend a limit of 120 BU/m for NZS3604 timber floors. If this limit is declined specific engineering must ensure that uplift forces generated by elements rated higher than 120 BU/m can be resisted by the floor framing.

In case the limit is accepted please ensure not to enter custom elements with ratings higher than 120 BU/m

accept limit of 120 BU/m for timber floors ▼

Distribution (NZS3604:1999 minimum values)		
Internal wall bracing lines	70	BU
External wall bracing lines	10 x L(m)	BU
Lines supporting diaphragms	100	BU
Recommended distribution check (75% x D/n)		
No bracing line less than	171	BU

Design Navigator H1 Compliance Report

Project Summary

H1 Report created by:	Design Management Consultants
Project Name:	Kauri Point Road
Client:	Catherine & Blair Morton-Jones
Lot No:	
Comment:	
Project Id:	27525
Report Date:	08/05/2011

Compliance Result

This building complies with H1 via the following methods:

the Schedule Method in NZS4218:2004 (Sept 2008 R-values)
the Calculation Method in NZS4218:2004 (Sept 2008 R-values)
the BPI Method

H1 Compliance Details

NZS4218:2004 Schedule Method Compliance

The use of the Schedule Method is permitted.

In order to comply the R-values for all the construction elements must be the same or larger than the permitted minimum R-values. This design complies with the NZS4213:2004 Schedule Method.

Non-Solid Construction

	Permitted Minimum	Proposed Minimum	
Floor:	1.3	1.4	✓
Non-solid Walls:	1.9	2.15	✓
Glazing in Non-solid Walls:	0.26	0.26	✓
Roof:	2.9	3.35	✓
Skylights:	0.26		✓

If multiple solid wall types levels are used the table shows the requirements for the corresponding walls and windows in them. For solid timber and for other solid constructions two options are shown for each. But the components of these options can not be mixed. I.e. it is not permitted to use the solid timber wall R-value from option 1 and the solid timber window R-value from option 2.

H1 Compliance Details

NZS4218:2004 Calculation Method Compliance

The use of the Calculation Method is permitted.

In order to comply the Actual Heat Loss must be the same or smaller than the Reference Heat Loss AND all component R-values must be the same or larger than 60% of the R-values in the '60% Rule' table below. This design complies with the NZS4218:2004 Calculation Method.

Heat Loss:	Reference building	Proposed building
	236	185

Minimum R-values ("60% rule"):

	Permitted Minimum	Proposed Minimum	
Floor:	0.8	1.4	✓
Non-solid Walls:	1.1	2.15	✓
Glazing in Non-solid Walls:	0.15	0.26	✓
Roof:	1.7	3.35	✓
Skylights:	0.15		✓

The Reference building has the following areas and R-values.

				Non-solid	Solid Timber	Other Solid
				100.0 %	0.0 %	0.0 %
Floor:	Area:	58 m²	R-values:	1.3	1.3	1.3
Walls excl. glazing:	Area:	84.9 m²	R-values:	1.9	1	0.6
Glazing (up to 30%):	Area:	27.8 m²	R-values:	0.26	0.26	0.26
Roof:	Area:	58 m²	R-values:	2.9	3.6	3.6
Skylights:	Area:	0 m²	R-values:	0.31	0.31	0.31
Heat Loss:				206	233	249

For mixed constructions the heat loss of the reference building is calculated as the sum of the heat losses for each type of wall construction multiplied by the fraction of the wall area of each type. This approach is based on clause 4.2.9 of NZS4218:2009 because NZS4218:2004 has no clear guidance on mixed constructions. Note that all other requirements (window area (30%) and skylight area (1.2m²) threshold for Schedule Method, maximum R-value takeoff (40%), etc.) are still using NZS4218:2004 including the 2007 H1 amendments because this is the Acceptable Solution for Clause H1.

H1 Compliance Details

Building Performance Index Compliance

The use of the Building Performance Index (BPI) method is permitted.

This design complies with the BPI.

In order to comply the design must have a BPI smaller or equal to 1.55 kWh/DegMonth.m². Your building has a BPI of 1.33 kWh/DegMonth.m².

Please refer to www.design.navigator.co.nz/BPICorrelation.pdf regarding the recognition of the BPI for NZBC compliance verification. An alternative BPI calculation tool is the BRANZ AUT software.

Compliance with Clause E3

This building complies with the R-value targets in NZBC Clause E3

Component	Minimum R-value	Project R-value
Framed wall constructions with cavities	1.5	____
Single skin masonry wall without a cavity	0.6	____
Solid timber wall no less than 60 mm thick	0.6	____
Roof or ceilings	1.5	____

Design Details

Building Dimensions

Floor Area	58
Gross Wall Area	92.7
Net Wall Area	69.5
Wall (North) Area	16.6
Wall (East, South and West) Area	52.9
Gross Roof Area	58
Net Roof Area	58
Glazing Area	23.2
Window (North) Area	10.2
Window (East, South and West) Area	13
Skylight Area	0

Glazing Area Percentages

Total Glazing Percentage	25.1%
East, South and West Window Percentage	19.7%
Total over 30%	no
East, South and West over 30%	no
Total over 50%	no

Information required for BPI calculation

Living Floor Area	58	Note: This includes also internal floors.
Average Room Height	2.7	
Thermal Mass Level	Light weight	Suspended timber floor with timber framed walls or a heavily carpeted slab floor with timber framed walls.

Climate

Location	Auckland
Climate Zone	1

Heat Loss Details

	ID	Orient.	Width	Height	Gross Area	Net Area	R-value*	Heat Loss	Shad. Coeff.**	Solid Wall***
Floors										
Floor 1	Ground Floor				58	58	1.4	41.4		
Walls										
Wall 1	North	North	8.95	3	26.9	16.6	2.15	7.7		C
Window 1-1	D26		4.3	2.1		9	0.28	34.7	0.86	
Window 1-2	W22		1.5	0.8		1.2	0.28	4.6	0.86	
Wall 2	West	West	6.5	3	19.5	17.5	2.15	8.1		C
Window 2-1	D19		1	2		2	0.28	7.7	0.86	
Wall 3	South	South	8.95	3	26.9	20	2.15	9.3		C
Window 3-1	W14		1.25	1		1.3	0.28	4.8	0.86	
Window 3-2	W16		1.25	1		1.3	0.28	4.8	0.86	
Window 3-3	W21		1.2	2		2.4	0.28	9.2	0.86	
Window 3-4	W17		1.9	1		1.9	0.28	7.3	0.86	
Wall 4	East	East	6.5	3	19.5	15.3	2.15	7.1		C
Window 4-1	D20		2.1	2		4.2	0.28	16.2	0.86	
Roofs										
Roof 1	Upperfloor		58	1	58	58	3.35	17.3		
Total Heat Loss								180.2		

* Any slab floor regardless of its dimensions can be assumed to have an R-value of at least R-1.3 (H1/VM1 and H1/AS1, Replacement Table 1, Note (4)).
** The Shading Coefficient is only required for SP1 calculations.
*** C: Cavity Construction (any construction that is not solid), T: Solid Timber, S: Other Solid Construction (Note that the use of solid timber and other solid construction types is discretional. ie solid timber walls and other solid walls can be treated as if they are non-solid (NZS4218:2004 section 3.1.4.1.)

Floor Construction Details

1 Suspended Floor

internal surface 0.09

Flooring 18mm Hardwood Timber
R-value: 0.11

Timber Frame & Cavity 90mm joists @ 600mm

Frame Area: 7.8% | *Cavity Area: 92.2%*

Timber Frame	Polystyrene EPS 50mm (INS
R-value: 0.75	Grade 1.19

Floor Lining none
R-value: 0

Insulation value of the subfloor space

Suspended floor area [m²]:	58
Perimeter length [m]:	34.9
Perimeter height [m]:	1.5
Perimeter type:	Continuous perimeter wall (exposed)

R-value: 0.05

1.4 m²K/W.

Wall Construction Details

1 Timber frame (direct fixed cladding)

external surface 0.03

Cladding Bevelled weatherboard with building paper
R-value: 0.28

Air Barrier Building paper
R-value: 0.01

Timber Frame & Cavity 90mm studs @ 600mm, dwangs @ 800mm

Frame Area: 15.1%	*Cavity Area: 84.9%*
Timber Frame *R-value: 0.75*	Pink®Batts® R2.2 Wall 2.2
	still Airgap none *R-value: 0*

Wall Lining Gypsum plasterboard 10mm
R-value: 0.04

internal surface 0.09

2.15 m²K/W.

Roof Construction Details

1 Timber framed roof, flat ceiling

external surface 0.03

Roofing 15mm construction plywood
R-value: 0.13

Roof space (still air) 0.11

Insulation [i] 0

Timber Frame & Cavity 190mm rafters or joists @ 800mm, dwangs @ 900mm

Frame Area: 12%

Trusses and dwangs
R-value: 1.56

Cavity Area: 88%

Insulation 3.6

Ceiling Lining Gypsum plasterboard 10mm
R-value: 0.04

internal surface 0.09

Recessed downlights

Ceiling area [m²]: 58 Number of downlights: 10 Clearance from lamp holder side [m]: 0.05 [i]

3.35 m²K/W.

1. DEFINITION OF RISK

Table 1:		Definition of Risk		
		(tick)	Paragraph 3.2.2 Figure 2 NZBC	
A	Wind Zone		Low Risk	Low wind zone as described by NZS 3604
			Medium Risk	Medium wind zone as described by NZS 3604
		X	High Risk	High wind zone as described by NZS 3604
			Very High Risk	Very high wind zone as described by NZS 3604
B	Number of Storeys		Low Risk	One storey
			Medium Risk	Two storeys in part
			High Risk	Two storeys in part
		X	Very High Risk	More than two storeys
C	Roof / Wall Intersection Design	X	Low Risk	Roof-to-wall intersection fully protected (e.g. hip and gable roof with eaves)
			Medium Risk	Roof-to-wall intersection partly exposed (e.g. hip and gable roof with no eaves)
			High Risk	Roof-to-wall intersection fully exposed (e.g. parapets, enclosed balustrades, or eaves at greater than 90° to vertical with soffit lining)
			Very High Risk	Roof elements finished within the boundaries formed by the exterior walls (e.g. lower ends of aprons, chimneys, dormers etc.)
D	Eaves Width (1)(2)		Low Risk	Greater than 600 mm for single storey
		X	Medium Risk	451-600mm for single storey, or over 600mm for two storey
			High Risk	101-450mm for single storey, or 451-600mm for two storey, or greater than 600mm above two storey
			Very High Risk	0-100mm for single storey, or 0-450mm for two storey, or less than 600mm for two storey
E	Envelope complexity	X	Low Risk	Simple rectangular, L, T or boomerang shape, with single cladding type
			Medium Risk	Moderately complex, angular or curved shapes (e.g. Y or arrowhead with no more than two cladding type
			High Risk	Complex, angular or curved shapes (e.g. Y or arrowhead with multiple cladding types)
			Very High Risk	As for High risk, but with junctions not covered in C or F of this table (e.g. box windows, pergolas, multi-storey re-entrant shapes etc)
F	Deck Design (3)	X	Low Risk	None, timber slat deck or porch at ground level
			Medium Risk	Fully covered in plan by roof, or timber slat deck attached at first or second floor level
			High Risk	Enclosed deck exposed in plan or cantilevered at first floor level
			Very High Risk	Enclosed deck exposed in plan or cantilevered at second floor or above

Notes:

(1)	Eaves width measured horizontally from external face of wall cladding to outer edge of overhand, including gutters and fascias.
(2)	Balustrades and parapets count as 0mm eaves
(3)	The term *deck* includes balconies, as described in the Definitions

2. THE RISK SCORE

Table 2 sets out the *Risk Matrix* that shall be used to define the *Risk Score* for a building within the scope of the Acceptable Solution.

A *Risk Score* is calculated for each evaluation of the building. Claddings are the selected form Table 3 according to the *Risk Scores*, or the highest *Risk Score* may be used for all walls.

Table 2:	Building Envelope Risk Matrix								
	Paragraph 3.1.2. Figure 1 NZBC								
Risk Factor	**LOW**	**Score**	**MEDIUM**	**Score**	**HIGH**	**Score**	**VERY HIGH**	**Score**	**Subtotals for each Risk Factor**
Wind Zone (per NZS 3604)	0		0		1	1	2		1
Number of Storeys	0		1		2		4	4	4
Roof / Wall Intersection Design	0	0	1		3		5		0
Eaves Width	0		1	1	2		5		1
Envelope Complexity	0	0	1		3		6		0
Desk Design	0	0	2		4		6		0
(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right hand column. Finally, add up the figures in the right hand column to get the total risk score.)							**Total Risk Score**		**6**

3. SUITABLE WALL CLADDING

Table 3:	Suitable Wall Cladding					
	Paragraph 3.1.2,3.4.1.1,3.4.2.1,3.4.2.2,3.4.3.2,9.1.1,9.4.1.2,9.4.1.3,9.6, Figure 1 NZBC					
Risk Score	Suitable Wall Cladding (1)					
	Tick Box	Direct Fixed to Framing		Tick Box	Over Nominal 20mm Drained Cavity	
0 - 6	X	a)	Timber weatherboards – all types		a)	Masonry Veneer (2)
		b)	Fibre cement weather boards		b)	Stucco
		c)	Vertical profiled metal (3) – corrugated and symmetrical		c)	Horizontal profile metal (2) corrugated and trapezoidal only
		d)	Fibre cement sheet (4)			
		e)	Plywood sheet			
		f)	EIFS			
7 -12		a)	Bevel-back timber weatherboards		a)	Masonry Veneer (2)
		b)	Vertical timber board and batten		b)	Stucco
		c)	Vertical profiled metal (3) – corrugated only		c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
13 - 20		a)	Vertical profiled metal (3)– corrugated only		a)	Masonry Veneer (2)
					b)	Stucco
					c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
					i)	Bevel-back weatherboards
Over 20	a)	Redesign the building to achieve a lower score, or				
	b)	Specific design - The design may need changing to reduce the risk - The *Building Consent Authority* may require more comprehensive details and documentation providing evidence of weathertightness - The *Building Consent Authority*, Designer, or Owner may require more inspections. - A third party audit of the design may be required.				

Notes:

(1)	**The wall claddings in this table are limited to those covered in this Acceptable Solution.**
(2)	Traditional Masonry Veneer as per SNZ HB 4236, with minimum 40mm cavity.
(3)	Refer Figure 38 for Profiles
(4)	Except stucco over a fibre cement backing.

1. DEFINITION OF RISK

Table 1:		Definition of Risk		
		(tick)	Paragraph 3.2.2 Figure 2 NZBC	
A	Wind Zone		Low Risk	Low wind zone as described by NZS 3604
			Medium Risk	Medium wind zone as described by NZS 3604
		X	High Risk	High wind zone as described by NZS 3604
			Very High Risk	Very high wind zone as described by NZS 3604
B	Number of Storeys		Low Risk	One storey
			Medium Risk	Two storeys in part
			High Risk	Two storeys in part
		X	Very High Risk	More than two storeys
C	Roof / Wall Intersection Design	X	Low Risk	Roof-to-wall intersection fully protected (e.g. hip and gable roof with eaves)
			Medium Risk	Roof-to-wall intersection partly exposed (e.g. hip and gable roof with no eaves)
			High Risk	Roof-to-wall intersection fully exposed (e.g. parapets, enclosed balustrades, or eaves at greater than 90° to vertical with soffit lining)
			Very High Risk	Roof elements finished within the boundaries formed by the exterior walls (e.g. lower ends of aprons, chimneys, dormers etc.)
D	Eaves Width (1)(2)		Low Risk	Greater than 600 mm for single storey
		X	Medium Risk	451-600mm for single storey, or over 600mm for two storey
			High Risk	101-450mm for single storey, or 451-600mm for two storey, or greater than 600mm above two storey
			Very High Risk	0-100mm for single storey, or 0-450mm for two storey, or less than 600mm for two storey
E	Envelope complexity	X	Low Risk	Simple rectangular, L, T or boomerang shape, with single cladding type
			Medium Risk	Moderately complex, angular or curved shapes (e.g. Y or arrowhead with no more than two cladding type
			High Risk	Complex, angular or curved shapes (e.g. Y or arrowhead with multiple cladding types)
			Very High Risk	As for High risk, but with junctions not covered in C or F of this table (e.g. box windows, pergolas, multi-storey re-entrant shapes etc)
F	Deck Design (3)	X	Low Risk	None, timber slat deck or porch at ground level
			Medium Risk	Fully covered in plan by roof, or timber slat deck attached at first or second floor level
			High Risk	Enclosed deck exposed in plan or cantilevered at first floor level
			Very High Risk	Enclosed deck exposed in plan or cantilevered at second floor or above

Notes:	
(1)	Eaves width measured horizontally from external face of wall cladding to outer edge of overhand, including gutters and fascias.
(2)	Balustrades and parapets count as 0mm eaves
(3)	The term *deck* includes balconies, as described in the Definitions

2. THE RISK SCORE

Table 2 sets out the *Risk Matrix* that shall be used to define the *Risk Score* for a building within the scope of the Acceptable Solution.

A *Risk Score* is calculated for each evaluation of the building. Claddings are the selected form Table 3 according to the *Risk Scores*, or the highest *Risk Score* may be used for all walls.

Table 2:	Building Envelope Risk Matrix								
	Paragraph 3.1.2. Figure 1 NZBC								
Risk Factor	**LOW**	**Score**	**MEDIUM**	**Score**	**HIGH**	**Score**	**VERY HIGH**	**Score**	**Subtotals for each Risk Factor**
Wind Zone (per NZS 3604)	0		0		1	1	2		1
Number of Storeys	0		1		2		4	4	4
Roof / Wall Intersection Design	0	0	1		3		5		0
Eaves Width	0		1	1	2		5		1
Envelope Complexity	0	0	1		3		6		0
Desk Design	0	0	2		4		6		0
(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right hand column. Finally, add up the figures in the right hand column to get the total risk score.)							**Total Risk Score**		6

3. SUITABLE WALL CLADDING

Table 3:	Suitable Wall Cladding					
	Paragraph 3.1.2,3.4.1.1,3.4.2.1,3.4.2.2,3.4.3.2,9.1.1,9.4.1.2,9.4.1.3,9.6, Figure 1 NZBC					
Risk Score	Suitable Wall Cladding (1)					
	Tick Box	Direct Fixed to Framing		Tick Box	Over Nominal 20mm Drained Cavity	
0 - 6	X	a)	Timber weatherboards – all types		a)	Masonry Veneer (2)
		b)	Fibre cement weather boards		b)	Stucco
		c)	Vertical profiled metal (3) - corrugated and symmetrical		c)	Horizontal profile metal (2) corrugated and trapezoidal only
		d)	Fibre cement sheet (4)			
		e)	Plywood sheet			
		f)	EIFS			
7 -12		a)	Bevel-back timber weatherboards		a)	Masonry Veneer (2)
		b)	Vertical timber board and batten		b)	Stucco
		c)	Vertical profiled metal (3) - corrugated only		c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
13 - 20		a)	Vertical profiled metal (3)– corrugated only		a)	Masonry Veneer (2)
					b)	Stucco
					c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
					i)	Bevel-back weatherboards
Over 20	a)	Redesign the building to achieve a lower score, or				
	b)	Specific design - The design may need changing to reduce the risk. - The *Building Consent Authority* may require more comprehensive details and documentation providing evidence of weathertightness - The *Building Consent Authority*, Designer, or Owner may require more inspections. - A third party audit of the design may be required.				

Notes:

(1)	**The wall claddings in this table are limited to those covered in this Acceptable Solution.**
(2)	Traditional Masonry Veneer as per SNZ HB 4236, with minimum 40mm cavity.
(3)	Refer Figure 38 for Profiles
(4)	Except stucco over a fibre cement backing.

1. DEFINITION OF RISK

Table 1:		Definition of Risk		
		(tick)	Paragraph 3.2.2 Figure 2 NZBC	
A	Wind Zone		Low Risk	Low wind zone as described by NZS 3604
			Medium Risk	Medium wind zone as described by NZS 3604
		X	High Risk	High wind zone as described by NZS 3604
			Very High Risk	Very high wind zone as described by NZS 3604
B	Number of Storeys		Low Risk	One storey
			Medium Risk	Two storeys in part
			High Risk	Two storeys in part
		X	Very High Risk	More than two storeys
C	Roof / Wall Intersection Design	X	Low Risk	Roof-to-wall intersection fully protected (e.g. hip and gable roof with eaves)
			Medium Risk	Roof-to-wall intersection partly exposed (e.g. hip and gable roof with no eaves)
			High Risk	Roof-to-wall intersection fully exposed (e.g. parapets, enclosed balustrades, or eaves at greater than 90° to vertical with soffit lining)
			Very High Risk	Roof elements finished within the boundaries formed by the exterior walls (e.g. lower ends of aprons, chimneys, dormers etc.)
D	Eaves Width (1)(2)		Low Risk	Greater than 600 mm for single storey
		X	Medium Risk	451-600mm for single storey, or over 600mm for two storey
			High Risk	101-450mm for single storey, or 451-600mm for two storey, or greater than 600mm above two storey
			Very High Risk	0-100mm for single storey, or 0-450mm for two storey, or less than 600mm for two storey
E	Envelope complexity	X	Low Risk	Simple rectangular, L, T or boomerang shape, with single cladding type
			Medium Risk	Moderately complex, angular or curved shapes (e.g. Y or arrowhead with no more than two cladding type
			High Risk	Complex, angular or curved shapes (e.g. Y or arrowhead with multiple cladding types)
			Very High Risk	As for High risk, but with junctions not covered in C or F of this table (e.g. box windows, pergolas, multi-storey re-entrant shapes etc)
F	Deck Design (3)	X	Low Risk	None, timber slat deck or porch at ground level
			Medium Risk	Fully covered in plan by roof, or timber slat deck attached at first or second floor level
			High Risk	Enclosed deck exposed in plan or cantilevered at first floor level
			Very High Risk	Enclosed deck exposed in plan or cantilevered at second floor or above

Notes:

(1)	Eaves width measured horizontally from external face of wall cladding to outer edge of overhang, including gutters and fascias.
(2)	Balustrades and parapets count as 0mm eaves
(3)	The term *deck* includes balconies, as described in the Definitions

2. THE RISK SCORE

Table 2 sets out the *Risk Matrix* that shall be used to define the *Risk Score* for a building within the scope of the Acceptable Solution.

A *Risk Score* is calculated for each evaluation of the building. Claddings are the selected form Table 3 according to the *Risk Scores*, or the highest *Risk Score* may be used for all walls.

Table 2:	Building Envelope Risk Matrix								
	Paragraph 3.1.2. Figure 1 NZBC								
Risk Factor	**LOW**	**Score**	**MEDIUM**	**Score**	**HIGH**	**Score**	**VERY HIGH**	**Score**	**Subtotals for each Risk Factor**
Wind Zone (per NZS 3604)	0		0		1	1	2		1
Number of Storeys	0		1		2		4	4	4
Roof / Wall Intersection Design	0	0	1		3		5		0
Eaves Width	0		1	1	2		5		1
Envelope Complexity	0	0	1		3		6		0
Desk Design	0	0	2		4		6		0
(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right hand column. Finally, add up the figures in the right hand column to get the total risk score.)							**Total Risk Score**		6

3. SUITABLE WALL CLADDING

Table 3:	Suitable Wall Cladding					
	Paragraph 3.1.2,3.4.1.1,3.4.2.1,3.4.2.2,3.4.3.2,9.1.1,9.4.1.2,9.4.1.3,9.6, Figure 1 NZBC					
Risk Score	Suitable Wall Cladding (1)					
	Tick Box	Direct Fixed to Framing		Tick Box	Over Nominal 20mm Drained Cavity	
0 - 6	X	a)	Timber weatherboards – all types		a)	Masonry Veneer (2)
		b)	Fibre cement weather boards		b)	Stucco
		c)	Vertical profiled metal (3) - corrugated and symmetrical		c)	Horizontal profile metal (2) corrugated and trapezoidal only
		d)	Fibre cement sheet (4)			
		e)	Plywood sheet			
		f)	EIFS			
7 -12		a)	Bevel-back timber weatherboards		a)	Masonry Veneer (2)
		b)	Vertical timber board and batten		b)	Stucco
		c)	Vertical profiled metal (3) - corrugated only		c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
13 - 20		a)	Vertical profiled metal (3)– corrugated only		a)	Masonry Veneer (2)
					b)	Stucco
					c)	Horizontal profile metal (2) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
					i)	Bevel-back weatherboards
Over 20	a)	Redesign the building to achieve a lower score, or				
	b)	Specific design - The design may need changing to reduce the risk - The *Building Consent Authority* may require more comprehensive details and documentation providing evidence of weathertightness - The *Building Consent Authority*, Designer, or Owner may require more inspections. - A third party audit of the design may be required.				

Notes:

(1)	**The wall claddings in this table are limited to those covered in this Acceptable Solution.**
(2)	Traditional Masonry Veneer as per SNZ HB 4236, with minimum 40mm cavity.
(3)	Refer Figure 38 for Profiles
(4)	Except stucco over a fibre cement backing.

1. DEFINITION OF RISK

Table 1:		Definition of Risk		
		(NZS)	Paragraph 3.2.2 Figure 2 NZBC	
A	Wind Zone		Low Risk	Low wind zone as described by NZS 3604
			Medium Risk	Medium wind zone as described by NZS 3604
		X	High Risk	High wind zone as described by NZS 3604
			Very High Risk	Very high wind zone as described by NZS 3604
B	Number of Storeys		Low Risk	One storey
			Medium Risk	Two storeys in part
			High Risk	Two storeys in part
		X	Very High Risk	More than two storeys
C	Roof / Wall Intersection Design	X	Low Risk	Roof-to-wall intersection fully protected (e.g. hip and gable roof with eaves)
			Medium Risk	Roof-to-wall intersection partly exposed (e.g. hip and gable roof with no eaves)
			High Risk	Roof-to-wall intersection fully exposed (e.g. parapets, enclosed balustrades, or eaves at greater than 90° to vertical with soffit lining)
			Very High Risk	Roof elements finished within the boundaries formed by the exterior walls (e.g. lower ends of aprons, chimneys, dormers etc.)
D	Eaves Width (1)(2)		Low Risk	Greater than 600 mm for single storey
		X	Medium Risk	451-600mm for single storey, or over 600mm for two storey
			High Risk	101-450mm for single storey, or 451-600mm for two storey, or greater than 600mm above two storey
			Very High Risk	0-100mm for single storey, or 0-450mm for two storey, or less than 600mm for two storey
E	Envelope complexity	X	Low Risk	Simple rectangular, L, T or boomerang shape, with single cladding type
			Medium Risk	Moderately complex, angular or curved shapes (e.g. Y or arrowhead with no more than two cladding type
			High Risk	Complex, angular or curved shapes (e.g. Y or arrowhead with multiple cladding types)
			Very High Risk	As for High risk, but with junctions not covered in C or F of this table (e.g. box windows, pergolas, multi-storey re-entrant shapes etc)
F	Deck Design (3)	X	Low Risk	None, timber slat deck or porch at ground level
			Medium Risk	Fully covered in plan by roof, or timber slat deck attached at first or second floor level
			High Risk	Enclosed deck exposed in plan or cantilevered at first floor level
			Very High Risk	Enclosed deck exposed in plan or cantilevered at second floor or above

Notes:

(1)	Eaves width measured horizontally from external face of wall cladding to outer edge of overhang, including gutters and fascias.
(2)	Balustrades and parapets count as 0mm eaves
(3)	The term *deck* includes balconies, as described in the Definitions

2. THE RISK SCORE

Table 2 sets out the *Risk Matrix* that shall be used to define the *Risk Score* for a building within the scope of the Acceptable Solution.

A *Risk Score* is calculated for each evaluation of the building. Claddings are the selected form Table 3 according to the *Risk Scores*, or the highest *Risk Score* may be used for all walls.

Table 2:	Building Envelope Risk Matrix								
	Paragraph 3.1.2. Figure 1 NZBC								
Risk Factor	**LOW**	**Score**	**MEDIUM**	**Score**	**HIGH**	**Score**	**VERY HIGH**	**Score**	**Subtotals for each Risk Factor**
Wind Zone (per NZS 3604)	0		0		1	1	2		1
Number of Storeys	0		1		2		4	4	4
Roof / Wall Intersection Design	0	0	1		3		5		0
Eaves Width	0		1	1	2		5		1
Envelope Complexity	0	0	1		3		8		0
Desk Design	0	0	2		4		5		0
(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right hand column. Finally, add up the figures in the right hand column to get the total risk score.)							**Total Risk Score**		**6**

3. SUITABLE WALL CLADDING

Table 3:	Suitable Wall Cladding					
	Paragraph 3.1.2,3.4.1.1,3.4.2.1,3.4.2.2,3.4.3.2,9.1.1,9.4.1.2,9.4.1.3,9.6, Figure 1 NZBC					
Risk Score	Suitable Wall Cladding (1)					
	Tick Box	Direct Fixed to Framing		Tick Box	Over Nominal 20mm Drained Cavity	
0 - 6	X	a)	Timber weatherboards – all types		a)	Masonry Veneer (2)
		b)	Fibre cement weather boards		b)	Stucco
		c)	Vertical profiled metal (3) – corrugated and symmetrical		c)	Horizontal profile metal (3) corrugated and trapezoidal only
		d)	Fibre cement sheet (4)			
		e)	Plywood sheet			
		f)	EIFS			
7 -12		a)	Bevel-back timber weatherboards		a)	Masonry Veneer (2)
		b)	Vertical timber board and batten		b)	Stucco
		c)	Vertical profiled metal (3) – corrugated only		c)	Horizontal profile metal (3) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
13 - 20		a)	Vertical profiled metal (3)– corrugated only		a)	Masonry Veneer (2)
					b)	Stucco
					c)	Horizontal profile metal (3) corrugated and trapezoidal only
					d)	Rusticated Weatherboards
					e)	Fibre cement weatherboards
					f)	Fibre cement sheet
					g)	Plywood sheet
					h)	EIFS
					i)	Bevel-back weatherboards
Over 20	a)	Redesign the building to achieve a lower score, or				
	b)	Specific design • The design may need changing to reduce the risk • The *Building Consent Authority* may require more comprehensive details and documentation providing evidence of weathertightness • The *Building Consent Authority*, Designer, or Owner may require more inspections. • A third party audit of the design may be required.				

Notes:

(1)	**The wall claddings in this table are limited to those covered in this Acceptable Solution.**
(2)	Traditional Masonry Veneer as per SNZ HB 4236, with minimum 40mm cavity.
(3)	Refer Figure 38 for Profiles
(4)	Except stucco over a fibre cement backing.