designIT® HOUSES

These documents must be retained on site. Inspections may not be carried out if they are not.

BC220134

CarterHoltHarvey LVL

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 LVL Limited (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 (NZBC), 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.

Futurebuild LVL and SG8 components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:
1. NZS 3603:1993 Timber Structures Standard.
2. NZS 3604:2011 Timber-framed buildings.
3. AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
4. AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
5. AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.
6. AS 1720.1:2010 Timber structures. Part 1: Design methods.
7. AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 5 October 2021

For further information or advice contact:
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Email: designit@futurebuild.co.nz
Web: https://futurebuild.co.nz/

Specifier details:

Specifier:	Reshma Ravindranath
Business name:	Carters Manufacturing Wellington
Address:	Lower Hutt
Email:	reshma.ravindranath@carters.co.nz

Project & site details:

Project:	New House Cromwell 2
Reference:	358544C1
Site address:	64 Waipounamu Drive (Cromwell2) Kelson Lower Hutt
For (owner/s):	D.M.A.C Homes Ltd | T/A Friday Homes
Design wind zone	High
Snow loading	Design snow zone: N1, Altitude: 100 m (sub-alpine), Ground snow load, $S_g^{1,2}$ = 0.0 kPa

. designIT does not include any allowance for the effects of drifting and sliding of snow.
. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

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HUTT CITY TE AWA KAIRANGI

MEMBER DESIGN DETAILS

Member 1

1) Member code and description EJ01 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.4 m
Roof load width 'RLW'	1.8 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	4.7 mm	0.4 mm (long term)	11.0
Live load - $\Psi_{S}Q$	5.6 mm	0.1 mm	45.5
Wind load - W_S	7.0 mm	0.4 mm	18.9

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

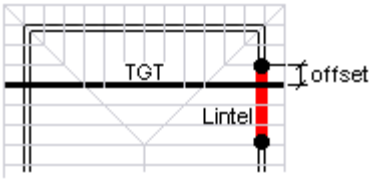
Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.1
1.2G + 1.5Q	0.80	-1.6
1.2G + W_u + Ψ_cQ	1.00	-2.3
0.9G + W_u	1.00	1.4

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

1) Member code and description EJ02 - Lintels - Supporting girder truss / truncated girder truss



2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Roof type	Light roof and ceiling - 40 kg/m²
Roof pitch	25.0 º
Truss spacing	900 mm

Eaves overhang	600 mm
TGT span	8300 mm
TGT setback	2327 mm
TGT offset	837 mm
Lintel span	2020 mm
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G + \Psi_L Q^*$	6.7 mm	2.4 mm (long term)	2.8
Live load - $\Psi_S Q$	8.1 mm	0.7 mm	11.2
Wind load - W_S	10.1 mm	2.2 mm	4.6

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-4.1
1.2G + 1.5Q	0.80	-6.3
$1.2G + W_u + \Psi_c Q$	1.00	-8.9
$0.9G + W_u$	1.00	5.7

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description	EJ03 - Lintels - In single or upper storey load bearing walls
2) Date prepared	01 December 2021
3) Serviceability criteria	AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	3.0 mm	1.7 mm (long term)	1.8
Live load - $\Psi_{S}Q$	3.6 mm	0.5 mm	7.0
Wind load - W_S	4.5 mm	1.5 mm	2.9

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-2.8
1.2G + 1.5Q	0.80	-4.5
1.2G + W_u + $\Psi_c Q$	1.00	-6.3
0.9G + W_u	1.00	4.2

8) Installation requirements

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

Member 4

1) Member code and description EJ04 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	3.0 mm	1.7 mm (long term)	1.8
Live load - $\Psi_{S}Q$	3.6 mm	0.5 mm	7.0
Wind load - W_S	4.5 mm	1.5 mm	2.9

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-2.8

1.2G + 1.5Q	0.80	-4.5
1.2G + W_u + Ψ_cQ	1.00	-6.3
0.9G + W_u	1.00	4.2

8) Installation requirements

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

Member 5

1) Member code and description EJ05 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.1 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	7.0 mm	3.9 mm (long term)	1.8
Live load - Ψ_sQ	8.4 mm	1.2 mm	7.1
Wind load - W_s	10.5 mm	3.5 mm	3.0

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-4.1
1.2G + 1.5Q	0.80	-6.5
1.2G + W_u + Ψ_cQ	1.00	-9.1
0.9G + W_u	1.00	5.9

8) Installation requirements

- Provide at least 30 mm bearing at end supports

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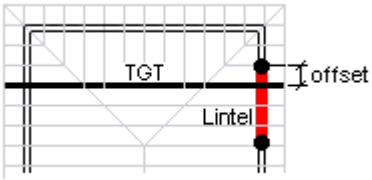
Member 6

1) Member code and description EJ06 - Lintels - Supporting girder truss / truncated girder truss



2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Roof type	Light roof and ceiling - 40 kg/m²
Roof pitch	25.0 º
Truss spacing	900 mm
Eaves overhang	600 mm
TGT span	4320 mm
TGT setback	1405 mm
TGT offset	465 mm
Lintel span	2020 mm
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + $\Psi_L Q^*$	6.7 mm	2.8 mm (long term)	2.4
Live load - $\Psi_S Q$	8.1 mm	0.8 mm	9.9
Wind load - W_S	10.1 mm	2.5 mm	4.1

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-2.0
1.2G + 1.5Q	0.80	-3.1
1.2G + W_u + $\Psi_c Q$	1.00	-4.3
0.9G + W_u	1.00	2.7

8) Installation requirements

- Provide at least 30 mm bearing at end supports

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Member 7

1) Member code and description EJ07 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.1 m
Roof load width 'RLW'	1.3 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + $\Psi_L Q^*$	10.0 mm	2.7 mm (long term)	3.7
Live load - $\Psi_S Q$	12.4 mm	0.7 mm	17.6
Wind load - W_S	15.5 mm	2.1 mm	7.3

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.5
1.2G + 1.5Q	0.80	-2.3
1.2G + W_u + $\Psi_c Q$	1.00	-3.1
0.9G + W_u	1.00	1.8

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 8

1) Member code and description EJ08 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

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6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	3.0 mm	0.3 mm (long term)	8.9
Live load - $\Psi_{S}Q$	3.6 mm	0.1 mm	35.9
Wind load - W_S	4.5 mm	0.3 mm	14.9

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-0.6
1.2G + 1.5Q	0.80	-0.9
1.2G + W_u + $\Psi_c Q$	1.00	-1.3
0.9G + W_u	1.00	0.8

8) Installation requirements

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

Member 9

1) Member code and description EJ09 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.3 m
Roof load width 'RLW'	1.8 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	7.7 mm	2.0 mm (long term)	3.9
Live load - $\Psi_{S}Q$	9.2 mm	0.5 mm	16.9
Wind load - W_S	11.5 mm	1.6 mm	7.0

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.6

1.2G + 1.5Q	0.80	-2.5
1.2G + W_u + Ψ_cQ	1.00	-3.5
0.9G + W_u	1.00	2.1

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 10

1) Member code and description EJ10 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.7 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	2.3 mm	0.8 mm (long term)	3.0
Live load - Ψ_sQ	2.8 mm	0.2 mm	11.6
Wind load - W_s	3.5 mm	0.7 mm	4.8

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-2.7
1.2G + 1.5Q	0.80	-4.2
1.2G + W_u + Ψ_cQ	1.00	-6.0
0.9G + W_u	1.00	3.9

8) Installation requirements

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

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Member 11

1) Member code and description EJ11 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.1 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G + \Psi_{LQ}$*	7.0 mm	3.9 mm (long term)	1.8
Live load - $\Psi_S Q$	8.4 mm	1.2 mm	7.1
Wind load - W_S	10.5 mm	3.5 mm	3.0

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-4.1
1.2G + 1.5Q	0.80	-6.5
$1.2G + W_u + \Psi_c Q$	1.00	-9.1
$0.9G + W_u$	1.00	5.9

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 12

1) Member code and description EJ12 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.7 m
Roof load width 'RLW'	5.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	2.3 mm	0.8 mm (long term)	3.0
Live load - Ψ_SQ	2.8 mm	0.2 mm	11.6
Wind load - W_S	3.5 mm	0.7 mm	4.8

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-2.7
1.2G + 1.5Q	0.80	-4.2
1.2G + W_U + Ψ_CQ	1.00	-6.0
0.9G + W_U	1.00	3.9

8) Installation requirements

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

Member 13

1) Member code and description EJ13 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.1 m
Roof load width 'RLW'	2.3 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	7.0 mm	1.9 mm (long term)	3.8
Live load - Ψ_SQ	8.4 mm	0.5 mm	15.8
Wind load - W_S	10.5 mm	1.6 mm	6.6

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

	Limit States Design Reaction[2,3]

Load case	k_1[1]	End kN[4]
1.35G	0.60	-1.9
1.2G + 1.5Q	0.80	-3.0
1.2G + W_u + Ψ_cQ	1.00	-4.2
0.9G + W_u	1.00	2.6

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 14

1) Member code and description EJ14 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.1 m
Roof load width 'RLW'	1.4 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	7.0 mm	1.2 mm (long term)	5.9
Live load - Ψ_sQ	8.4 mm	0.3 mm	26.0
Wind load - W_s	10.5 mm	1.0 mm	10.8

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.2
1.2G + 1.5Q	0.80	-1.8
1.2G + W_u + Ψ_cQ	1.00	-2.6
0.9G + W_u	1.00	1.6

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 15

1) Member code and description GD01 - Lintels - In single or upper storey load bearing walls

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.5 m
Roof load width 'RLW'	1.8 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - G + Ψ_{LQ}*	8.3 mm	2.8 mm (long term)	2.9
Live load - $\Psi_{S}Q$	10.0 mm	0.8 mm	12.8
Wind load - W_S	12.5 mm	2.4 mm	5.3

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.7
1.2G + 1.5Q	0.80	-2.6
1.2G + W_u + Ψ_cQ	1.00	-3.6
0.9G + W_u	1.00	2.2

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 16

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

2) Date prepared 01 December 2021

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.0 m
Roof load width 'RLW'	1.8 m
Roof type and mass	Light roof and ceiling - 40 kg/m²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Long term load - $G + \Psi_L Q^*$	6.7 mm	1.3 mm (long term)	5.2
Live load - $\Psi_S Q$	8.0 mm	0.4 mm	22.3
Wind load - W_S	10.0 mm	1.1 mm	9.2

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1[1]	Limit States Design Reaction[2,3] End kN[4]
1.35G	0.60	-1.5
1.2G + 1.5Q	0.80	-2.3
$1.2G + W_u + \Psi_c Q$	1.00	-3.2
$0.9G + W_u$	1.00	2.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

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 1170 and AS 1720.

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 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 1720.3 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 detailed.

Notes for interpretation of reaction data

. Duration of load factor 'k_1' for strength as per NZS 3603:1993
. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
. End reaction includes allowance for overhang/cantilever where one has been designed

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Demand Calculation Sheet

Job Details

Name:	Cromwell (Cromwell 2)
Street and Number:	Lot 40, 42, 43, 58, 62, 64, 67, 69 & 73 Kelson Heights
Lot and DP Number:	Lot 40, 42, 43, 58, 62, 64, 67, 69 & 73 DP TBC
City/Town/District:	Lower Hutt
Designer:	E Horner
Company:	Prime Designs
Date:	Tuesday, 11 January 2022

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Light
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.4
Building Height to Apex (m)	4.9
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.4
Building Length (m)	15.9
Building Width (m)	8.3
Building Plan Area (m²)	100

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Building Location

Wind Zone = High

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Earthquake Zone 3

Soil Type D & E (Deep to Very Soft)

Annual Prob. of Exceedance: 1 in 500 (Default)

Bracing Units required for Wind

	Along	Across
Single Level	**435**	**817**

Bracing Units required for Earthquake

	Along & Across
Single Level	**531**

GIB EzyBrace® Bracing Software

Single Level Along Resistance Sheet

Job Name: Cromwell (Cromwell 2)

									Wind	EQ
									Demand	
									435	531
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1190 273%	1083 204%
a	1	0.45		2.4	GS1-N	GIB®	24	26		
	2	0.50		2.4	GS1-N	GIB®	28	29		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	3.55		2.4	GS1-N	GIB®	245	213		
	External Length = 15.7								318 OK	291 OK
b	1	3.69		2.4	GS1-N	GIB®	255	221		
	2	2.00		2.4	GS1-N	GIB®	138	120		
	3	3.55		2.4	GS2-NOM	GIB®	178	178		
	External Length = 5.5								570 OK	519 OK
c	1	1.28		2.4	GS1-N	GIB®	88	77		
	2	0.69		2.4	GS1-N	GIB®	41	41		
	3	1.85		2.4	GS1-N	GIB®	128	111		
	4	0.75		2.4	GS1-N	GIB®	45	44		
	External Length = 15.9								302 OK	272 OK

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GIB EzyBrace® Bracing Software

Single Level Across Resistance Sheet

Job Name: Cromwell (Cromwell 2)

									Wind	EQ
									Demand	
									817	531
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1011 124%	953 179%
m	1	0.40		2.4	BL1-H	GIB®	36	40		
	2	0.40		2.4	BL1-H	GIB®	36	40		
	3	0.40		2.4	BL1-H	GIB®	36	40		
	4	0.40		2.4	BL1-H	GIB®	36	40		
	External Length = 8.3								142 OK	160 OK
n	1	1.18		2.4	GS1-N	GIB®	81	71		
	2	0.59		2.4	GS2-NOM	GIB®	30	30		
									110 OK	100 OK
o	1	1.90		2.4	GS1-N	GIB®	131	114		
	2	3.12		2.4	GS1-N	GIB®	215	187		
									346 OK	301 OK
p	1	1.90		2.4	GS1-N	GIB®	131	114		
	2	1.79		2.4	GS1-N	GIB®	124	107		
									255 OK	221 OK
q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.50		2.4	GS1-N	GIB®	28	29		
	4	0.47		2.4	BL1-H	GIB®	43	47		
	5	0.47		2.4	BL1-H	GIB®	43	47		
	External Length = 8.3								157 OK	170 OK

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Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
CHH	EP1 0.4	0.4	80	95
CHH	EP1 0.6	0.6	95	105
CHH	EP1 1.2	1.2	120	135

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BUILDABLE CONSENT LAYOUT

For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone.
Or a pair of CT200's at 900mm centres for extra high wind zone.
This fixing is to meet the minimum requirements as per NZS3604.

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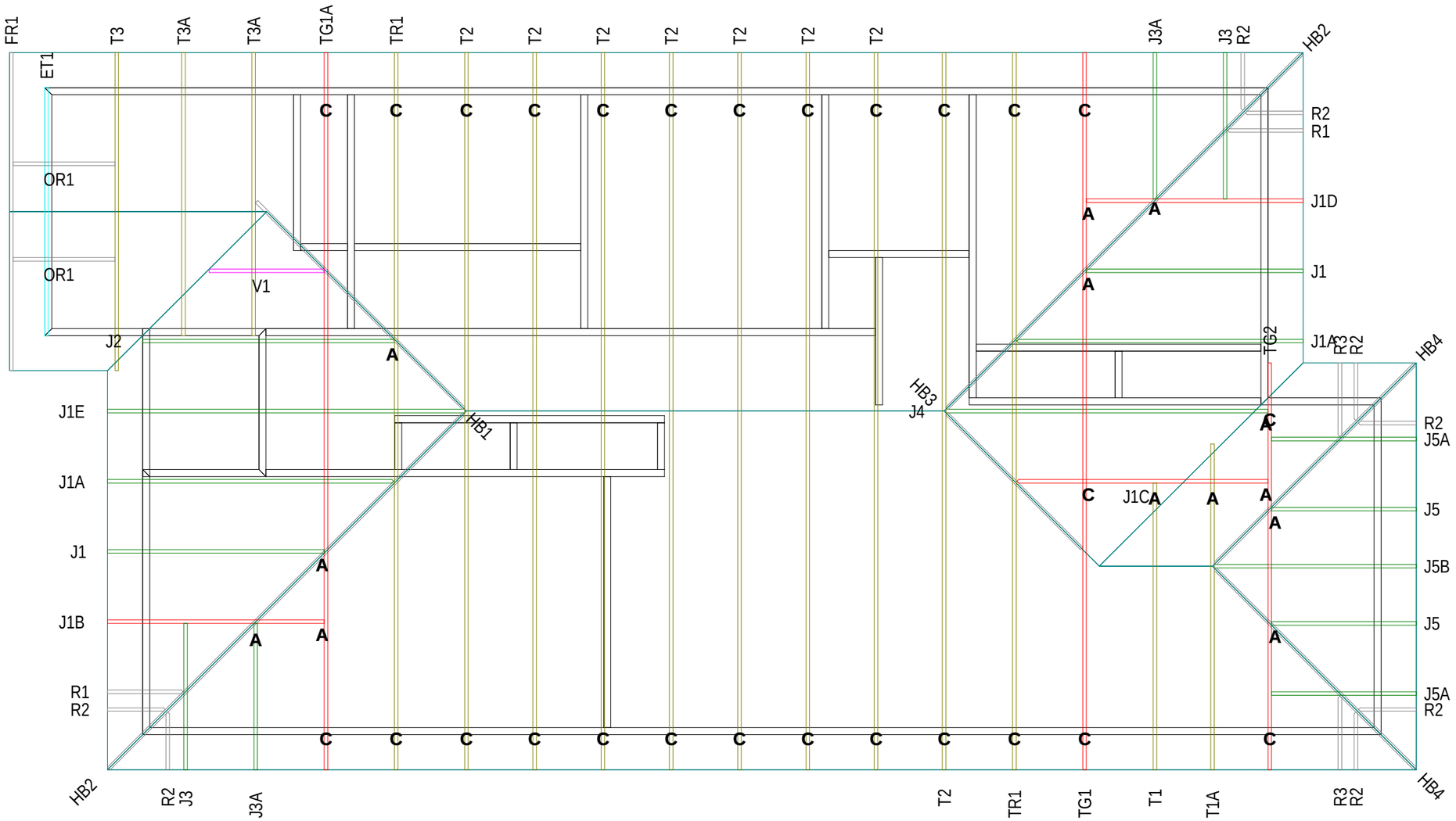

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If metal ceiling battens on clips are used, 90x45 SG8 bottom chord restraints are required at 1800mm centres fixed with 2/90x3.15dia nails (skew nails if on edge).
All gable trusses are designed to suit cladding manufacturer's framing requirements.
If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.

CARTERS
Wellington Manufacturing
(04) 5670287

JOB No **358544C1**

Client: DMAC Homes Ltd T/A Friday Homes
Job: New House- Cromwell 2
Site: 64 Waipounamu Drive (Cromwell 2)
Kelson
Lower Hutt

Pitch: 25.0deg
Roof Type: Longrun
Overhang: 450mm
Wind Area: High
Roof Snow: 0.000kPa
Ceiling Restraint Centres: 600mm

Trusses and rafters at 900mm max centres unless stated otherwise. This layout is to be read in conjunction with the Architectural plans.

DRAWN Reshma | 1 Dec,2021

FIXINGS

A = 47x90 Joist Hanger
B = 47x120 Joist Hanger
C = CT200 (pair)
D = 47x190 Joist Hanger
E = 95x165 Joist Hanger
F = SH-140 Split Hanger
G = SH-180 Split Hanger
H = SH-220 Split Hanger
J = 2x6kN Strap (12kN Total)
K = 6kN Strap
L = Multigrip (single)
M = Multigrips (pair)
N = Nailon Plate (240x110x1)
P = 16kN Pack
Q = 9kN Pack
S = CPC 40 Single Cleat
T = CPC 40 Short (pair)
U = CPC 80 Single Cleat
V = 16kN Uplift
W= 24kN Uplift
X = 25kN Uplift
Y = 35kN Uplift
Z = 45kN Uplift

Unless otherwise indicated, all specified truss fixings are to use L/Lok product nail fasteners (as per the MiTek On-site Guide) when the choice of using screws or nails is optional.

All truss to frame fixings require 2 additional 2/90x3.15dia skew nails.

All truss fixings not indicated as above must have 2 wire dogs for cross joints and 2/90x3.15dia nails for butt joins.

Fixings shown are for fixing trusses to the top plate. Any other point load uplift fixings down through the framing stud to top plate, stud to bottom plate, bottom plate to floor remain the responsibility of the architect / draughtsman.

Truss Layout

BUILDABLE CONSENT LAYOUT

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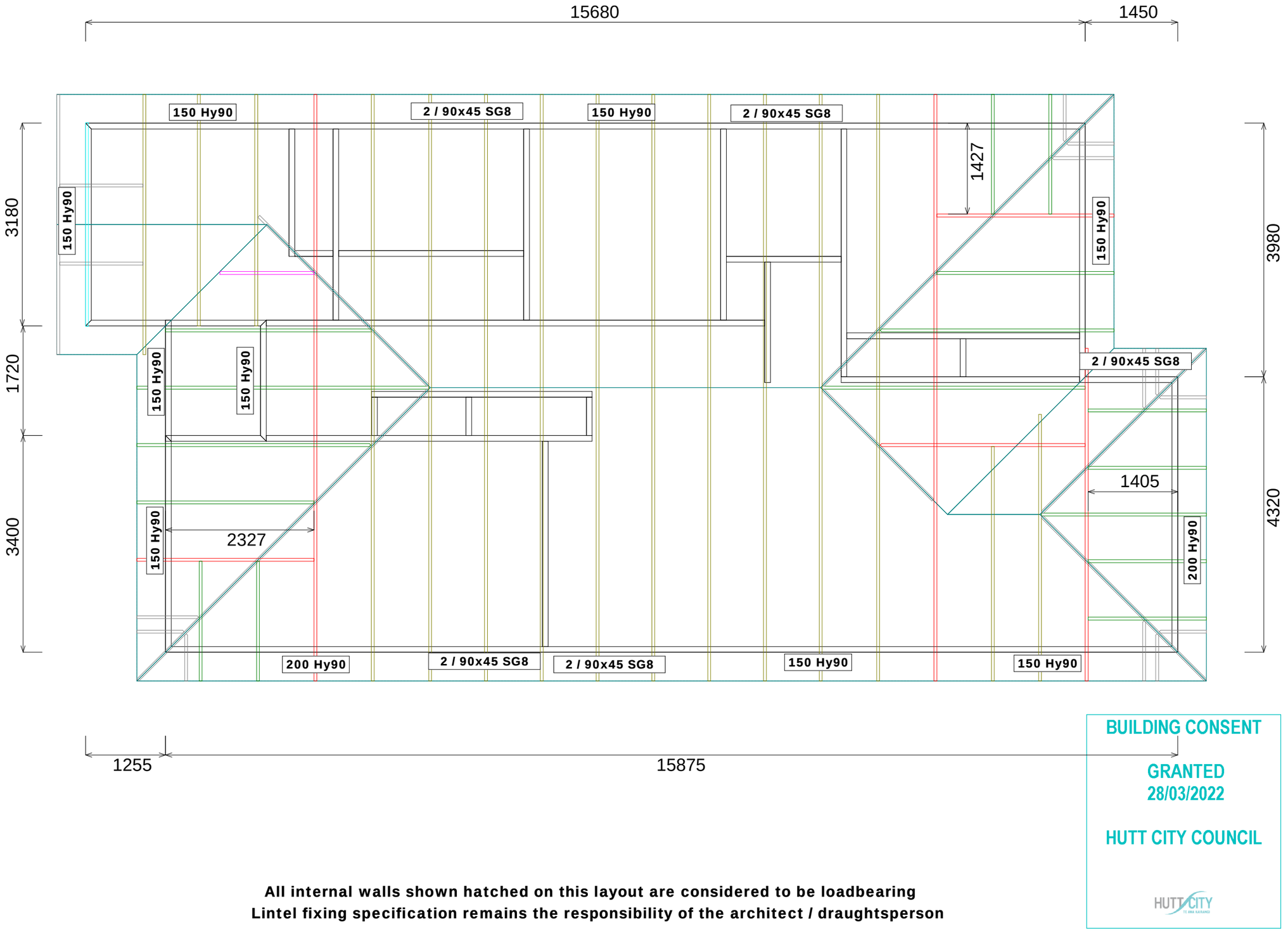

CARTERS
Wellington Manufacturing
(04) 5670287

JOB No **358544C1**

Client: DMAC Homes Ltd T/A Friday Homes
Job: New House- Cromwell 2
Site: 64 Waipounamu Drive (Cromwell 2)
Kelson
Lower Hutt

Pitch: 25.0deg
Roof Type: Longrun
Overhang: 450mm
Wind Area: High
Roof Snow: 0.000kPa

Trusses and rafters at 900 mm max centres unless stated otherwise. This layout is to be read in conjunction with the Architectural plans.

DRAWN Reshma | 1 Dec,2021

Dn kN | Up kN — Ultimate Limit State Loads

Notification of point loaded lintels or point loads on internal walls where the downward load is higher than 8kN (85mm raft type slab) or 10kN (100mm standard slab), or the upward load is greater than 10kN.

Any roof loads as stated on this layout over 16kN up or down are outside the scope of NZS3604, and the architect / draughtsperson is responsible for the design to transfer the loads to the ground.

The lintels have been sized using one of the following:

hy90, hyONE and hySPAN lintels have been sized using the designIT for houses - New Zealand series 6 software.

GANGLAM and FLITCH BEAMS have been sized using the MiTek Beam Program V1.10 June 2011.

Unless otherwise stated the timber grade for all lintels is SG8. Lintels not shown are to be selected as per NZS3604: 2011.

All internal walls shown hatched on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson

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MiTek New Zealand Limited

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PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.miteknz.co.nz

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **358544C1** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20 ® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clause B1 of the New Zealand Building Code.

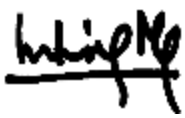
On behalf of MiTek New Zealand Limited, and subject to:

i) All proprietary products meeting their performance specification requirements
ii) The provision of adequate roof bracing and overall building stability
iii) Correct selection and placement of GANG-NAIL connector plates
iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
v) The design being undertaken by the accredited fabricator under the terms of the software licence
vi) Timber is graded to the requirements of NZS 3603:1993
vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20® truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than $500,000.

On behalf of MiTek New Zealand Limited, **Date: Tuesday, 7 December 2021**



In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

BC220134

Job: 358544C1 Client: DMAC Homes Ltd T/A Friday Homes Site: New House- Cromwell 2
Phone: 64 Waipounamu Drive (Cromwell 2)
Description: Kelson
Building Consent No.: Lower Hutt Phone:

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek ® trusses.

Job Details

Importance Level : 2

Design Working Life : 50 years

Roof Truss

Timber Group: MSG8 DDP H1.2

Pitch: 25.000 deg

Nominal Overhang: 450 mm

Roof

Material: Longrun

Dead Load: 0.210 kPa

Restraints: 900 mm centres

Live Load: Qur = 0.250 kPa
Qc = 1.100 kN

Ceiling

Material: Gib 13mm/Rondo Screwed

Dead Load: 0.200 kPa

Restraints: 600 mm centres

Live Load: Qc = 1.400 kN

Wind

Area: High (44.0 m/s)

Pressure Coeff: Cpe = varies; Cpi = -0.30, 0.20

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek ® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ~~Txx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
ET1	1	3189	25.000	900	*OR1	2	1305	0.000	900	J3A	2	1427	25.000	900
*FR1	1	4080	25.000	900	*R1	2	968	25.000	900	J5A	2	1405	25.000	900
*HB1	1	3771	18.249	900	*R2	8	741	25.000	900	J5B	1	1405	25.000	900
*HB2	2	6451	18.249	900	*R3	2	946	25.000	900	T1	1	3227	25.000	900
*HB3	1	2460	18.249	900	T1A	1	3227	25.000	900	T3A	2	3180	25.000	900
*HB4	2	3637	18.249	900	T2	8	8300	25.000	900	J1B	1	2327	25.000	900
J1	2	2327	25.000	900	T3	1	3180	25.000	900	J1C	1	2327	25.000	900
J2	1	3227	25.000	900	TR1	2	8300	25.000	900	J1D	1	2327	25.000	900
J3	2	1427	25.000	900	V1	1	1474	25.000	900	TG1	1	8300	25.000	900
J4	1	2327	25.000	900	J1A	2	2327	25.000	900	TG2	1	4320	25.000	900
J5	2	1405	25.000	900	J1E	1	2327	25.000	900	TG1A	1	8300	25.000	900

Total quantity : 60

The computer design input has been carried out by:

MiTek 20/20 Software Operator: Reshma

MiTek Candidate Number and Qualifications: **Ravindranath**

Accredited Fabricator:

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Your Building Partner

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Tuesday, 7 December 2021

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