



**KGW CONSULTING
ENGINEERS**

STRUCTURAL DESIGN REPORT

**Two Storey Townhouses
76 Pererika Street, Rotorua**

**APPROVED BUILDING CONSENT
BC82325
Date: 27/10/2021
Page: 1 of 52
Rotorua Lakes Council**

KGW Consulting Engineers Ltd

Structural Design Report

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Two Storey Townhouses 76 Pererika Street, Rotorua

Job number	J001027
Original Issue Date	June 2021
Status	For consent
Revision	0

Quality Assurance Statement		
Task	Responsibility	Signature & Date
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Structural Design Report

Two Storey Townhouses
76 Pererika Street, Rotorua

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- 8.0 Calculations
- 9.0 PS1 and Design Certificate
- 10.0 Paint Specification and Durability Statement

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1. GENERAL

1.1. Objective

This Design Features Report (DFR) is a detailed document defining the design criteria for this light timber framed town houses generally designed in accordance with B1:AS1 NZS3604:2011 with some elements of Specific Engineered Design.

1.2. Scope of work

The scope is in accordance with the Design Brief and Short Form agreement.

In general terms, the scope of work being undertaken by KGW Consulting Engineers Ltd is as follows:

To Acceptable Solutions - B1/AS1 NZS 3604:2011

- Subsoil Investigation
- Design of Foundations
- Design of Beams / Lintels / Framing
- Design of Bracing

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By Specific Engineering Design - B1/ VM1 / VM4

- Subsoil Investigation
- Design of Foundations (ribraft)
- Design of Retaining Walls
- Design of Beams / Lintels / Framing (portals, beam design)
- Design of Bracing (Partial bracing /design)
- Other [gravel raft detail with Geotech engineers' specifications]

1.3. Building Description

Two storey, light weight roof, timber frame with plaster and weatherboard cladding with a ribraft foundation.



1.4. Design Standards

The design standards used in the design of the building are.

The following standards have been used:

- NZS 3604:2011 Timber Framed buildings
- AS/NZS1170:2001 Structural Design Actions
- NZS3603:1993 Timber Structures Standard
- NZS 3101:2006 Concrete Structures Standard
- NZS 3404:1997 Steel Structures Standard
- NZS 4230:2004 Design of Reinforced Concrete Masonry Structures
- Other [N/A]

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2. GEOTECHNICAL AND SOIL CONDITIONS

2.1. Site Soil Conditions and Bearing Pressure

2.1.1. Available Reports

Stratum Specific Report March 2021

2.1.2. Geotechnical Requirements

The following foundation design is based the geotechnical report provided stratum Consultants (Ref no -233257). A summary of the requirements is shown below:

Foundation type: Ribraft slab with 1000mm deep gravel raft

Allowable bearing capacity: 100kpa allowable on top of compacted ground

Digout/Backfill requirements varies for each unit, refer to geotechnical report.

Site setback/slope stability requirements:

Liquefaction requirements: impact of liquefaction on shallow foundation will be low as per geotechnical report.

Minimum pile length: Not applicable

Expansive soil requirements: No expansive soil requirements noted in geotechnical report.

Long term settlement requirements: No settlement requirements noted in geotechnical report

Soil Class: Type A B C D E

3. DESIGN LOADS

3.1. General

For the purposes of consideration of loading, this building is Importance Level 2 in accordance with AS/NZS 1170.0:2002.

3.2. Vertical Loads

The table below summarizes the dead and live loads used for design as applicable for the dwelling.

Table 1 : Imposed Gravity loads*

Level/Area	Dead	Live Load	Superimposed Dead Load
Roof - Light	0.4 kPa	0.25 kPa	0 kPa
Roof - Heavy	1.1 kPa	0.25 kPa	0 kPa
Level 1 – floors internal	0.5 kPa	1.5 kPa	0 kPa
Level 1 – decks	0.5 kPa	2 kPa	0 kPa
Walls Light Cladding	0.5 kPa	0 kPa	0 kPa
Walls Heavy Cladding (up to 90 series brick)	2.1 kPa	0 kPa	0 kPa
Internal Walls light	.33kPa	0 kPa	0 kPa
Ground floor – internal concrete	24 kN/m ³	1.5 kPa	0 kPa
Ground Floor – internal – timber	0.5 kPa	1.5 kPa	0 kPa
Ground floor garage concrete	24 kN/m ³	2.5 kPa	0 kPa
Ground floor garage timber	0.6 kPa	2.5 kPa	0 kPa

*Point loads as per 1170 table 3.1

3.3. Wind Loads

The wind loads on this building have been determined by the following method;

3.3.1. Territorial Authority Wind Zone Maps – If available

Low
 Medium
 High
 Very High
 SED

4.3.4. Summary of Surface Treatments – Structural Steel

The paint manufacturer has carried out specific engineering design of paint system as per attached specification(s). This is outside the scope of the design.

4.3.5. Maintenance Requirements of Surface Treatments

The maintenance requirements for the above protective coating systems specified above are as per NZS/AS 2312. Please refer to paint specification.

5. MATERIALS SPECIFICATION

Please refer to structural drawings for all material property requirements.

6. PROPRIETARY SYSTEMS

Proprietary Systems

Proprietary systems included in the design of this building are outside of the scope of KGW Consulting Engineers. Please refer back to manufacturers for specifications, PS1 and details.

7. CONSTRUCTION MONITORING

7.1. Construction Monitoring Level

The design is based on the verification of specific design B1/VM1 / VM4 aspects to the construction by a suitably qualified Chartered Professional Engineer in accordance with ACENZ/Engineering New Zealand level:

CM1

CM2

CM3

CM4

CM5

7.2. Construction Monitoring – Inspections Required

We confirm that KGW Consulting Engineers has been engaged by the client to undertake construction monitoring to the recommended level above.

7.2.1. Inspections - Specific Engineer Designed Structure

The following inspections for specific design elements are required to meet this level. KGW require a minimum of 48hrs notice prior to any inspection. If no inspections are undertaken no PS4 can be issued.

- Confirmation of ground conditions after excavation. (100kPa allowable)
- Confirmation of the existing structure once the building is opened up.
- Inspection of backfill.

- Pile inspection.
- Strip / pad foundation inspection.
- Slab pre-pour (reinforcement) inspection.
- Blockwork wall pre-pour (reinforcement) inspection.
- Concrete pre-pour (reinforcement) inspection.
- Timber Beams / posts and connections. (beams)
- Steel Beams / posts / portal frames and connections. (portals)
- Bracing Systems – Specific Design. (bracing review/ design)
- Other – [N/A].

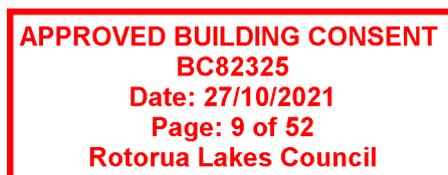
7.2.2. Inspections - Non Specific Design Structure (NZS 3604)

Inspection of nonspecific design structural elements to NZS 3604:2011 such as floorslabs/foundations, bracing, framing, and simple lintels generally undertaken by the Building Inspector for the Local Territorial Authority.

IMPORTANT: In order to make sure all the necessary inspections are undertaken for the works you should check your building consent conditions carefully and contact the Building Inspector for the Local Territorial Authority to confirm these requirements before enclosing or covering in any structural work. Failure to do so may result in refusal by the Local Territorial Authority to issue a Code Compliance certificate.

7.3. Temporary support and shoring

The design of temporary propping shoring and support during construction has not been undertaken and is not included in our engagement. This work is the responsibility of the Contractor undertaking the construction of the building.



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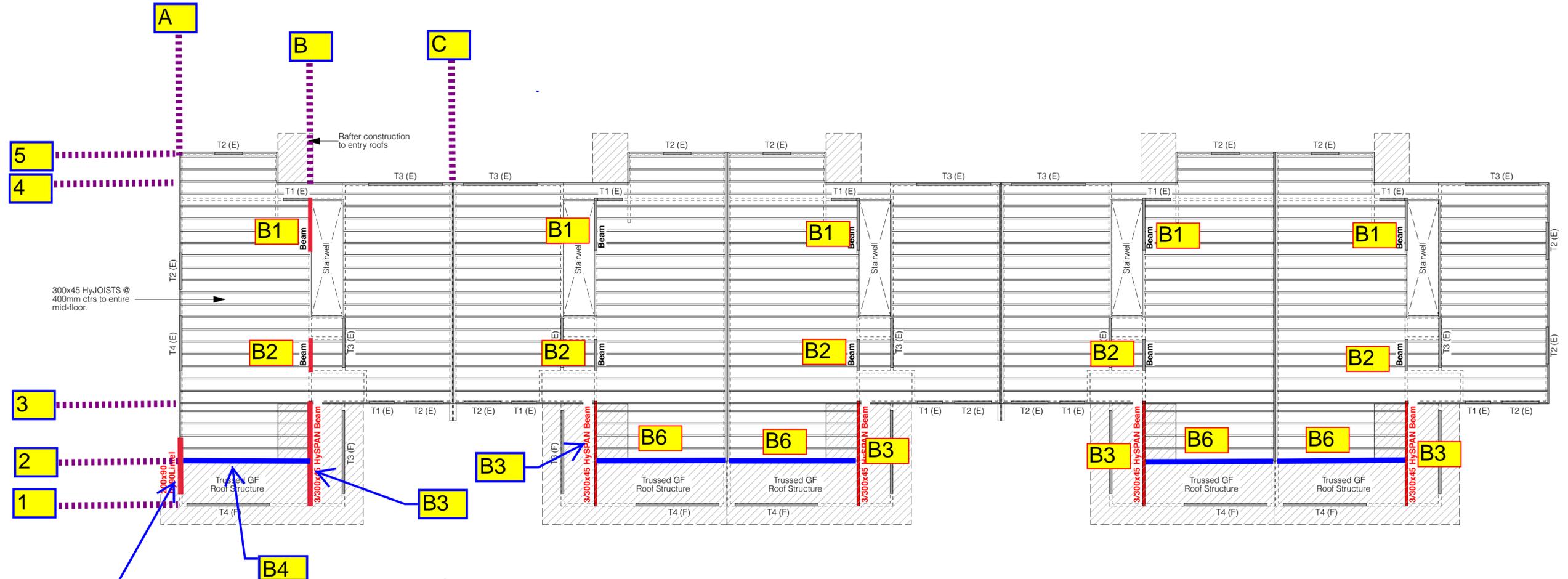
SECTION 8

Section 8.1 – Beam Design

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Midfloor Beams layout Plan

B1 & B2 done by Architect



Floor Framing Notes:

Floor joists to be fixed between beams and boundary joists with joist hangers.
 Install HyJOIST blocking at intervals not exceeding 1.8m along lines of support.
Refer to CHH LVL Residential Design Guide for further information on fixing of floor joists.
 Refer to Futurebuild HyJOIST supplement (July 2018) for further information on what size and where holes can be drilled through HyJOIST floor joists.
 Where a load bearing wall runs parallel to the line of floor joists beneath, support it with a pair of floor joists as detailed in NZS 3604:2011 Clause 7.1.3.1.
Bottom Plate Fixing - TIMBER MID-FLOOR:
 External Walls and Internal Bracing Walls
 3/ 90x3.15 power driven nails @ 600mm ctrs max.
 Internal Walls
 1/ 90x3.15 power driven nail @ 600mm ctrs max.
Mid-Floor Flooring Type:
 Mid-floor flooring to be 19mm untreated plywood except to wet areas which is to be H3.2 treated.

Lintel Size and Fixing Legend:

T3 (F)	← Lintel uplift fixing type (in brackets)
▲	Lintel Type/Size
T1	140x88 Prolam PL8 lintel
T2	190x88 Prolam PL8 lintel
T3	240x88 Prolam PL8 lintel
T4	315x88 Prolam PL8 lintel

For further information on lintel location and design - read in conjunction with truss manufacturers documentation.
 Refer to lintel fixing details on sheet 409 for further information.

Lintel sizes to be confirmed after truss design has been received.

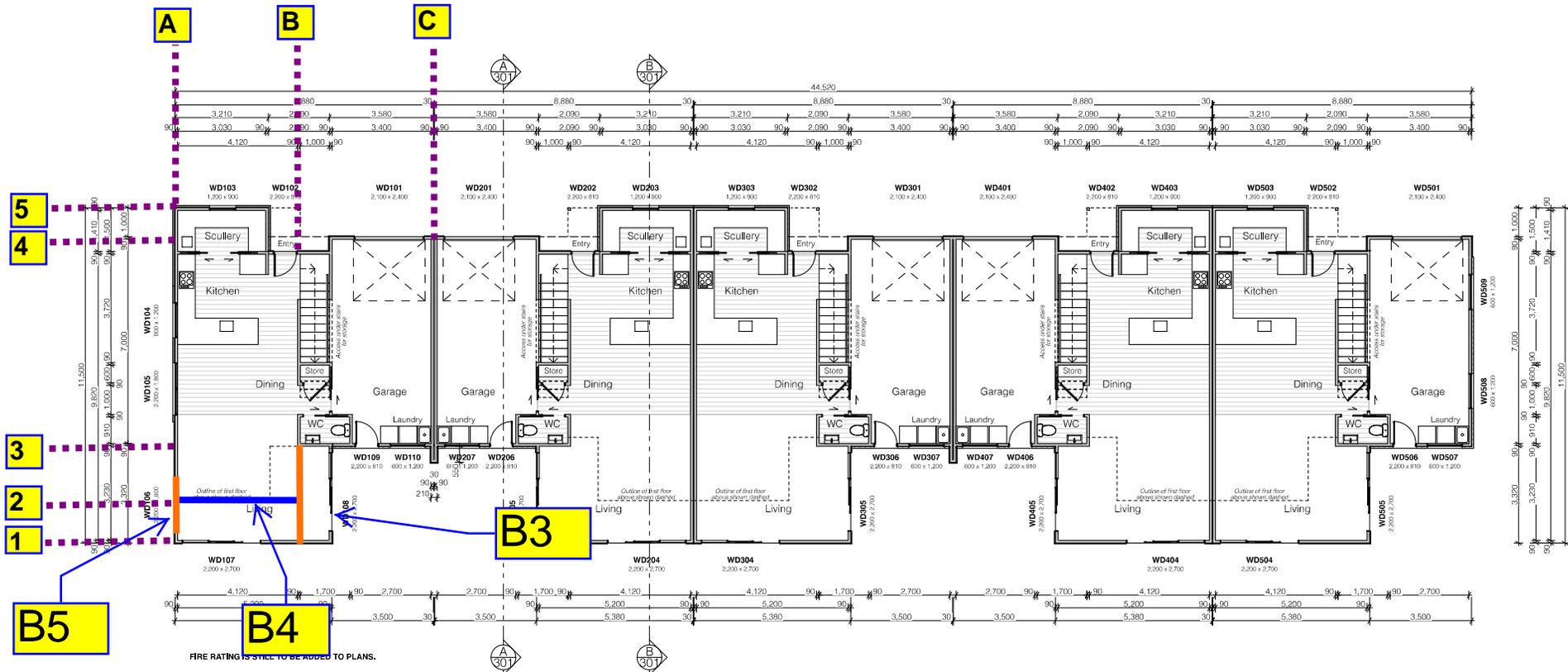
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General Notes:
 DO NOT SCALE OFF DRAWINGS, use figured dimensions only.
 It is the responsibility of the Contractor to verify on site all dimensions, prior to fabrication and construction. This drawing is to be read in conjunction with project specification, schedules and contract documents. Before commencing works on site please ensure you are aware of all variations and revisions. IF IN DOUBT, CONTACT THE OWNER IMMEDIATELY.

REVISION	GT Homes Townhouse Development 76 Pererika Street Rotorua	SHEET	105	SHEET TITLE:	Mid-Floor Framing Plan	SCALE:	1:100 @ A2	ISSUED:	16/03/21	PROJECT:	235-2020	melissa@alterarchitecture.co.nz PO Box 1448 Waikato Mail Centre PHONE: 021 337 340	Alter. ARCHITECTURE
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DRAFT
 BUILDING CONSENT ISSUE

Ground Floor Layout



Wall Framing Type:

- Indicates timber framed walls to be constructed with 90x45/111,2/338 studs @ 600mm ctrs.
- Nogs: Nogs to exterior walls to be at 600mm ctrs. Nogs to interior walls to be at 600mm ctrs.

Cladding Type Location:

- 50mm E2Panel exterior cladding with plaster finish on 50mm cavity over wall underlay.
- Vertically installed 16mm James Hardie Stria exterior cladding on 20mm cavity over wall underlay. Paint finished.

Refer to elevations for location of claddings.

Stairs:

Stair Type: Secondary Private Stairway
 200mm riser height maximum/250mm tread width minimum
 Floor to Floor Height: 2764mm
 Actual Stairs Provided:
 16x 173mm high risers/280mm wide treads

Construction Notes:

- Dwelling designed in accordance with NZS 3604:2011
- All timber to be SGR unless otherwise noted.
- Stud height to both stories is 2455mm to underside of floor joists to ground floor and underside of trusses to first floor.
- Wall Underlay:** Thermakraft Watergate Plus (including gable end framing)
- Roof Underlay:** Thermakraft Coverlok 407
- DPC:** Thermakraft Supercourse 500
- Bottom Plate Fixing - CONCRETE SLAB:** Proprietary anchors set within 150mm of each end of the plate, that spaced at 300mm ctrs max.
- Bottom Plate Fixing - TIMBER FLOOR:** 3/30x3/5 power driven nails @ 600mm ctrs.

Finishing Notes:

- All interior doors to be 1980mm in height.
- 90mm GIB Cove to ceilings.
- 32 x 10mm paint quality pine skirting
- 65 x 10mm paint quality pine architraves

Insulation Notes:

Wall Insulation: R2.4 Pink Batts insulation to all exterior wall cavities.

Ceiling Insulation: R5.2 Pink Batts Classic insulation to entire ceiling cavity.

Midfloor Insulation: Pink Batts Slopover to entire mid floor cavity.

Interferency Wall: R2.4 Pink Batts Classic insulation.

Wet Area Finishes:

Kitchen/Guest Toilet:
 Floor - Laminate flooring.
 Walls - 10mm GIB Standard lining, paint finished
 Ceiling - 13mm GIB Standard lining, paint finished

Laundry:
 Floor - Concrete flooring (garage).
 Walls - 10mm GIB Aqualine lining, paint finished
 Ceiling - 13mm GIB Aqualine lining, paint finished

Bathroom:
 Floor - Vinyl flooring.
 Walls - GIB Aqualine lining, paint finished.
 Ceiling - 13mm GIB Aqualine lining, paint finished
 Proprietary acrylic shower enclosures.

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REVISION	GT Homes Townhouse Development 76 Pererika Street Rotorua
SHEET	102

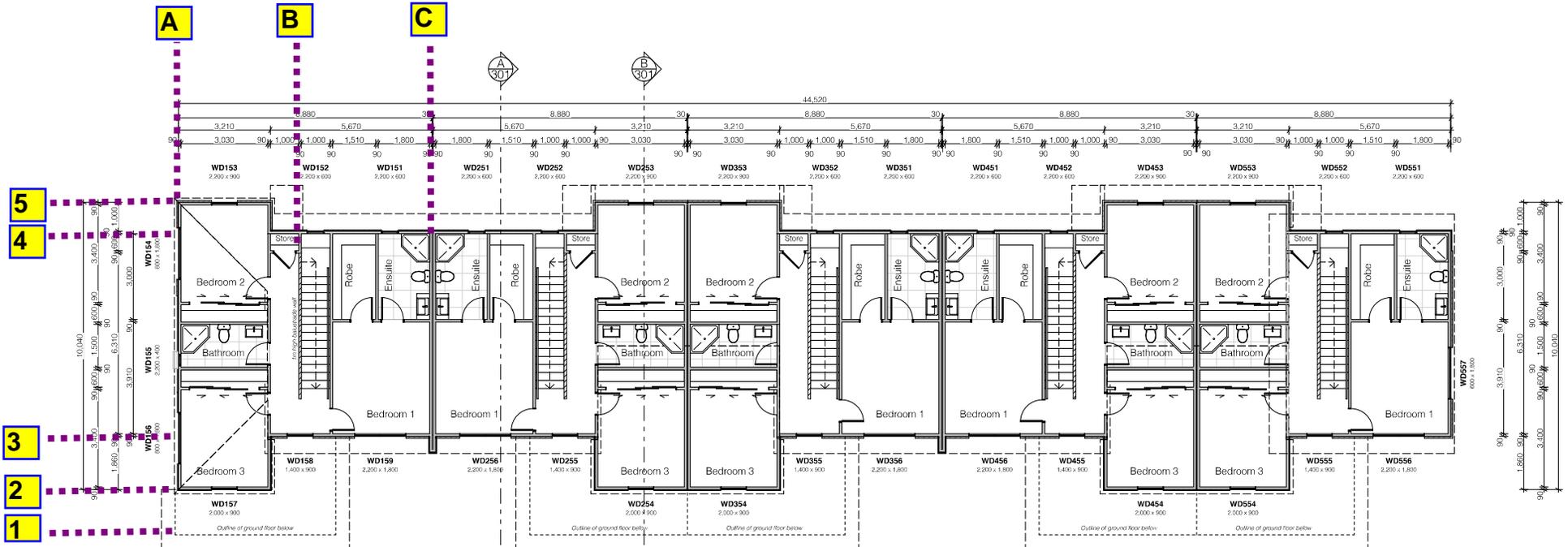
SHEET TITLE:	Ground Floor Plan
SCALE:	1:100 @ A2
ISSUED:	16/03/21
PROJECT:	235-2020

melissa@alterarchitecture.co.nz
 PO Box 1448 Waikato Mail Centre
 PHONE: 021 337 340



DRAFT
BUILDING CONSENT ISSUE

First Floor Layout



IMPORTANT:
FIRE RATING IS STILL TO BE ADDED TO PLANS.

Wall Framing Type:
 - Indicates timber framed walls to be constructed with 90x45 H1.2 SGB studs @ 600mm ctrs.
 - Nogs: Nogs to exterior walls to be at 600mm ctrs. Nogs to interior walls to be at 800mm ctrs.

Cladding Type Location:
 - 50mm E2Panel exterior cladding with plaster finish on 50mm cavity over wall underlay.
 - Vertically installed 16mm James Hardie Stria exterior cladding on 20mm cavity over wall underlay. Paint finished.

Refer to elevations for location of claddings.

Stairs:
 - Stair Type: Secondary Private Stairway
 - 200mm riser height maximum/250mm tread width minimum
 - Floor to Floor Height: 2764mm
 - Actual Stairs Provided: 16x 173mm high risers/280mm wide treads

Construction Notes:
 - Dwelling designed in accordance with NZS 3804:2011
 - All timber to be SGB unless otherwise noted.
 - Stud height to both stories is 2455mm to underside of floor joists to ground floor and underside of trusses to first floor.

Wall Underlay: Thermakraft Watergate Plus (including gable end framing)
Roof Underlay: Thermakraft CoverTek 407
DPC: Thermakraft Supercourse 500

Bottom Plate Fixing - CONCRETE SLABS:
 - Proprietary anchors set within 150mm of each end of the plate, then spaced at 900mm ctrs max.
Bottom Plate Fixing - TIMBER FLOOR:
 - 3/ 90x3.15 power driven nails @ 600mm ctrs.

Top Plate Fixing:
 - Refer to truss manufacturers documentation attached for information on top plate fixings and type locations.

Finishing Notes:
 - All interior doors to be 1980mm in height.
 - 90mm GIB Cove to ceilings.
 - 90 x 10mm paint quality pine skirting
 - 65 x 10mm paint quality pine architraves

Insulation Notes:
Wall Insulation: R2.4 Pink Batts insulation to all exterior wall cavities.
Ceiling Insulation: R3.2 Pink Batts Classic insulation to entire ceiling cavity.
Mid/Floor Insulation: Pink Batts insulation to entire mid floor cavity.
Intercourse Wall: R2.4 Pink Batts Classic insulation.

Wet Area Finishes:
Kitchen/Guest Toilet:
 - Floor - Laminite flooring.
 - Walls - 10mm GIB Standard lining, paint finished
 - Ceiling - 13mm GIB Standard lining, paint finished
Laundry:
 - Floor - Concrete flooring (garage)
 - Walls - 10mm GIB Aqualine lining, paint finished
 - Ceiling - 13mm GIB Aqualine lining, paint finished
Bathroom:
 - Floor - Vinyl flooring.
 - Walls - GIB Aqualine lining, paint finished.
 - Ceiling - 13mm GIB Aqualine lining, paint finished
 - Proprietary acrylic shower enclosures.

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REVISION	GT Homes Townhouse Development 76 Pererika Street Rotorua
SHEET	103

SHEET TITLE:	First Floor Plan
SCALE:	1:100 @ A2
ISSUED:	16/03/21
PROJECT:	235-2020

melissa@alterarchitecture.co.nz
 PO Box 1448 Waikato Mail Centre
 PHONE: 021 337 340

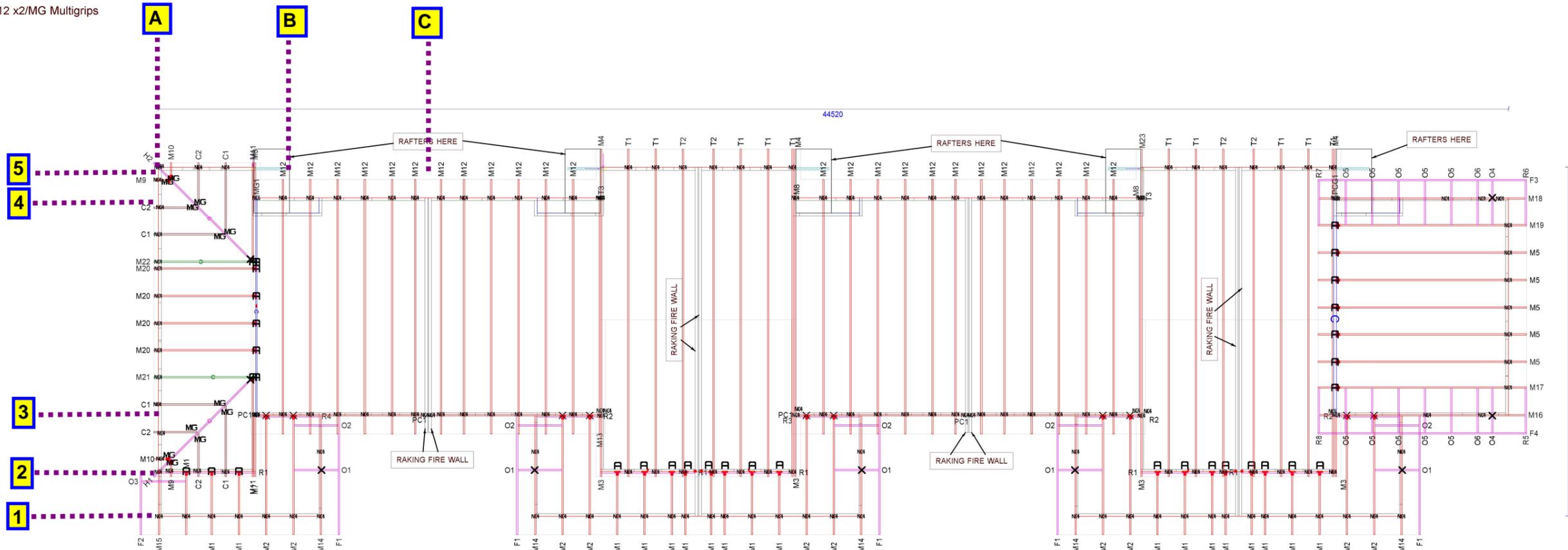


DRAFT
BUILDING CONSENT ISSUE

- Trusses need to be fixed at each timber support with 2/90x3.15 dia Skew Nails unless otherwise noted.

Roof truss Layout

- NG4 168 x 1/NPPC4 Purlin cleat
- X 19 x 1/MGL Multigrip (long)
- F 34 x 1/FB4590 Joist hanger
- NG5 3 x 1/NPPC6 Purlin cleat
- NG4 1 x 2/NPPC4 Purlin cleat
- MG 12 x2/MG Multigrips



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TIMBER GRADE IS MINIMUM 45 KDH1.2, MSG8/LVL8 OR BETTER

LAYOUT GENERATED OFF PLANS SUPPLIED BY OUR CLIENT. THIS LAYOUT IS FOR BUILDING CONSENT APPROVAL ONLY. THERE WILL BE AN "AS MADE LAYOUT" SUPPLIED TO COUNCIL ONCE THE TRUSSES ARE MANUFACTURED.

SCALE: 1:150



Customer : PRODUCER STATEMENT
Job Name : GT HOMES LTD
 : 73 PEREIKA STREET
 : ROTORUA
Job Ref : PS21034

Wind Speed : 32.00 m/s (Ult.)
Roofing : Longrun
Ceiling Lining : 13mm Gib-board (8.5 kg/sq.m.)
Roof Pitch : 8.00 Deg.
Detailer : Anthony Fernandes

ALL CARE HAS BEEN TAKEN BY POHUTUKAWA FRAME & TRUSS LTD TO FOLLOW SUPPLIED PLANS ACCURATELY.
 BUILDABLE TRUSS LAYOUT TO BE READ IN CONJUNCTION WITH THE ARCHITECTURAL PLANS SUPPLIED.
 IT IS THE RESPONSIBILITY OF THE CLIENT TO CHECK PLAN CONTENT IS CORRECT.



DESIGN CALCULATIONS FOR TIMBER BEAMS

BEAM IDENT : **Beam 4** - Mid floor beam
SPAN = **4.12** m

UNIFORM DIST.LOADING 1

Load description **floor**
G = **0.45** kPa
Q = **1.50** kPa
Tributary width = **0.20** m
G = 0.23 kN/m
Q = 0.30 kN/m
1.35G = 0.30 kN/m
1.2G + 1.5Q = 0.72 kN/m

UNIFORM DIST.LOADING 2

Load description **Wall**
G = **0.45** kPa
Q = **0.00** kPa
Tributary width = **2.50** m
G = 1.13 kN/m
Q = 0.00 kN/m
1.35G = 1.52 kN/m
1.2G + 1.5Q = 1.35 kN/m

PARTIAL UDL

Load description **Roof**
G = **0.45** kPa
Q = **0.25** kPa
trib width = **5.7** m
dist a = **1** m
length load = **3.12** m
G = 2.57 kN/m
Q = 1.43 kN/m
1.35G = 3.46 kN/m
1.2G + 1.5Q = 5.22 kN/m

M(1.35G) = 0.64 kNm
M(1.2G+1.5Q) = 1.53 kNm

M(1.35G) = 3.22 kNm
M(1.2G+1.5Q) = 2.86 kNm

M(1.35G) = 6.51 kNm
M(1.2G+1.5Q) = 9.80 kNm

APPLIED ACTIONS

M(1.35G) = 10.37 kNm
M(1.2G+1.5Q) = 14.19 kNm

V(1.35G) = 10.47 kN
V(1.2G+1.5Q) = 14.38 kN

V(G) = 7.75 kN
V(Q) = 3.38 kN

TRIAL SIZE

Depth **300**
Width **90**
self weight = 0.135 kN/m
As = 18000 mm²
I = 203 E6 mm⁴
Z = 1350 E3 mm³

hyoist
øMx = **20.4** kNm As per hyoist properties table
øVx = **11.1** kN As per hyoist properties table
fp = **12** MPa
EI = **1639** E6 x N/mm² As per hyoist properties table

ULS

FLEXURE DESIGN

1.2G + 1.5Q ø = **0.80** Clause 2.5
k1 = **0.80** Table 2.4
k4 = **1.00** Table 2.7
k5 = **1.00** Clause 2.9.2
k8 = **1.00** Table 2.8

M* = 14.19 kNm

øMn = 20.40 kNm **OK**

1.35G k1 = **0.60**

M* = 10.37 kNm
øMn = 20.40 kNm **OK**

SHEAR DESIGN

SHEAR STRESS 1.2G+1.5Q
1.35G

V* = 14.38 kN
V* = 10.47 kN
øVn = 11.10 kN **NG**

BEARING STRESS

Ap = 4600 mm²
k3 = 1.3 Table 2.6
øNnb = 45.93 kN **OK**

DEFLECTION

G UDL1: Δ = 0.52 mm
UDL2: Δ = 2.58 mm
Part UDL: Δ = 5.46 mm

Q UDL: Δ = 0.69 mm
UDL2: Δ = 0.00 mm
Part UDL: Δ = 3.03 mm

Short term

Ψ = **0.7** NZS 1170 Table 4.1
Δ = 11.15 mm L/400 =

10.30 mm **NG**

Long term

Ψ = **0.4** NZS 1170 Table 4.1
K2 = **2**

Δ = 20.08 mm L/300 = 13.73 mm **NG**

SELECT: 300x90 hyJoist is not ok

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DESIGN CALCULATIONS FOR STEEL BEAMS

BEAM IDENT : **Beam 4 /6** - Mid floor beam
SPAN = **4.12** m

UNIFORM DIST.LOADING 1

Load description **Floor**

G = **0.45** kPa
Q = **1.50** kPa
Tributary width = **0.20** m
G = **0.31** kN/m
Q = **0.30** kN/m
1.35G = **0.42** kN/m
1.2G + 1.5Q = **0.82** kN/m

M(1.35G) = **0.89** kNm
M(1.2G+1.5Q) = **1.74** kNm

UNIFORM DIST.LOADING 2

Load description **wall**

G = **0.45** kPa
Q = **0.00** kPa
Tributary width = **2.50** m
G = **1.13** kN/m
Q = **0.00** kN/m
1.35G = **1.52** kN/m
1.2G + 1.5Q = **1.35** kN/m

M(1.35G) = **3.22** kNm
M(1.2G+1.5Q) = **2.86** kNm

PARTIAL UDL

Load description **Roof**

G = **0.45** kPa
Q = **0.25** kPa
trib width = **5.7** m
dist a = **1** m
length load = **3.12** m
G = **2.57** kN/m
Q = **1.43** kN/m
1.35G = **3.46** kN/m
1.2G + 1.5Q = **5.22** kN/m

M(1.35G) = **6.51** kNm
M(1.2G+1.5Q) = **9.80** kNm

APPLIED ACTIONS

M(1.35G) = **10.62** kNm
M(1.2G+1.5Q) = **14.41** kNm
V(1.35G) = **10.70** kN
V(1.2G+1.5Q) = **14.59** kN

TRIAL SIZE

200 PFC

self weight = **0.22** kN/m
Aw = **1200** mm²
Zex = **221** E3 mm³
I x = **19.1** E6 mm⁴
I y = **1.65** E6 mm⁴
I w = **10.6** E6 mm⁴
J = **101** E3 mm⁴
Fy = **300** MPa
E = **200** GPa
G = **80** GPa

Restraints

PP

kt = **1** Table 5.6.3(1)
kl = **1** Table 5.6.3(2)
kr = **1** Table 5.6.3(3)
Le = **0.45** m
Msx = **66.30** kNm
Mo = **1338.59** kNm
alpha s = **1.010**
alpha m = **1** table 5.6.1

for Le=1m
Eq 5.6.1.1(3)

FLEXURE DESIGN

ø = **0.90**
øMsx = **59.67** kNm
øMbx = **59.67** kNm
øVw = **194.40** kN

60.263
OK
OK

SHEAR DESIGN

DEFLECTION

G UDL1: Δ = **0.30** mm
UDL2: Δ = **1.10** mm
Part UDL: Δ = **3.09** mm

Q UDL: Δ = **0.29** mm
UDL2: Δ = **0.00** mm
Part UDL: Δ = **1.72** mm

Short term

Ψ = **0.7** NZS 1170; Part 0; Table 4.1
Δ = **5.91** mm L/400 =

10.3 mm **OK**

Long term

Ψ = **0.4** NZS 1170; Part 0; Table 4.1
Δ = **5.31** mm L/300 =

13.7 mm **OK**

SELECT: **200 PFC**

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DESIGN CALCULATIONS FOR STEEL BEAMS

BEAM IDENT : **Beam 3 - Midfloor Beam**
SPAN = **3.3 m**

LOADING

	Wall Above	POINT LOAD - From Beam 4	PARTIAL UDL - Floor
G =	0.45 kPa	G = 9.18 kN	G = 0.45 kPa
Q =	0.00 kPa	Q = 4.15 kN	Q = 1.50 kPa
Tributary width =	2.50 m	dist x = 1.65 m	trib width = 2.1 m
G =	1.38 kN/m		dist a = 1.3 m
Q =	0.00 kN/m		length load = 2 m
1.35G =	1.86 kN/m	1.35G = 12.39 kN	G = 0.95 kN/m
1.2G + 1.5Q =	1.65 kN/m	1.2G + 1.5Q = 17.24 kN	Q = 3.15 kN/m
			1.35G = 1.28 kN/m
			1.2G + 1.5Q = 5.86 kN/m
M(1.35G) =	2.53 kNm	M(1.35G) = 10.22 kNm	M(1.35G) = 1.24 kNm
M(1.2G+1.5Q) =	2.25 kNm	M(1.2G+1.5Q) = 14.22 kNm	M(1.2G+1.5Q) = 5.69 kNm

APPLIED ACTIONS

M(1.4G) =	13.99 kNm	V(1.35G) =	11.04 kN
M(1.2G+1.5Q) =	22.16 kNm	V(1.2G+1.5Q) =	19.51 kN

TRIAL SIZE

230 PFC	Restraints	PP	
self weight = 0.25 kN/m	kt =	1 Table 5.6.3(1)	
Aw = 1495 mm ²	kl =	1 Table 5.6.3(2)	
Zex = 271 E3 mm ³	kr =	1 Table 5.6.3(3)	
Ix = 26.8 E6 mm ⁴	Le =	1.5 m	
Iy = 1.76 E6 mm ⁴			
Iw = 15 E6 mm ⁴	Msx =	81.30 kNm	
J = 108 E3 mm ⁴	Mo =	183.46 kNm	
Fy = 300 MPa			
E = 200 GPa	alpha s =	0.807	Eq 5.6.1.1(3)
G = 80 GPa	alpha m =	1 table 5.6.1	

FLEXURE DESIGN

ø =	0.90	
øMsx =	73.17 kNm	59.035
øMbx =	59.04 kNm	OK
øVw =	242.19 kN	OK

**SHEAR DESIGN
DEFLECTION**

G	UDL:	Δ =	0.40 mm	
	Pt Load:	Δ =	1.76 mm	
	Part UDL:	Δ =	0.37 mm	
Q	UDL:	Δ =	0.00 mm	
	Pt Load:	Δ =	0.80 mm	
	Part UDL:	Δ =	1.23 mm	
Short term	Ψ =	0.7 NZS 1170.0:2002 Table C1		
	Δ =	3.94 mm L/500 =	6.6 mm	OK
Long term	Ψ =	0.4 NZS 1170.0:2002 Table C1		
	Δ =	3.34 mm L/300 =	11.0 mm	OK

SELECT: 230 PFC

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DESIGN CALCULATIONS FOR TIMBER BEAMS

BEAM IDENT : **Beam 5** - Mid floor beam
SPAN = **1.8** m

UNIFORM DIST.LOADING

Loading description **Wall above**

G = **0.45** kPa
Q = **0.00** kPa
Tributary width = **2.50** m

G = 1.22 kN/m
Q = 0.00 kN/m
1.35G = 1.52 kN/m
1.2G + 1.5Q = 1.35 kN/m
M(1.35G) = 0.62 kNm
M(1.2G+1.5Q) = 0.55 kNm

POINT LOAD

From beam 4

G = **9.18** kN
Q = **4.15** kN
dist x = **0.90** m

1.35G = 12.39 kN
1.2G + 1.5Q = 17.24 kN
M(1.35G) = 5.58 kNm
M(1.2G+1.5Q) = 7.76 kNm

PARTIAL UDL

Floor

G = **0.45** kPa
Q = **1.50** kPa
trib width = **2.1** m
dist a = **1.0** m
length load = **0.8** m

G + Q = 4.10 kN/m
1.35G = 1.28 kN/m
1.2G + 1.5Q = 5.86 kN/m
Ra = 0.73 kN
Rb = 2.55 kN
M(1.35G) = 0.25 kNm
M(1.2G+1.5Q) = 1.13 kNm

DESIGN ACTIONS

M(1.35G) = 6.44 kNm
M(1.2G+1.5Q) = 9.44 kNm

V(1.35G) = 8.36 kN
V(1.2G+1.5Q) = 13.48 kN
V(G) = 6.19 kN
V(Q) = 4.04 kN

TRIAL SIZE

Depth **200**
Width **90**
self weight = 0.090 kN/m
As = 12000 mm²
I = 60 E6 mm⁴
Z = 600 E3 mm³

fb = **48** MPa
fs = **5.3** MPa
fp = **12** MPa
E = **13.2** GPa

hySPAN

ULS

FLEXURE DESIGN

1.2G + 1.5Q $\phi =$ **0.90** Clause 2.5
k1 = **0.80** Table 2.4
k4 = **1.00** Table 2.7
k5 = **1.00** Clause 2.9.2
k8 = **1.00** Table 2.8

M* = 9.44 kNm

$\phi M_n = 20.74$ kNm

OK

1.35G k1 = **0.60**

M* = 6.44 kNm
 $\phi M_n = 15.55$ kNm

OK

Shear Design

SHEAR STRESS 1.2G+1.5Q
1.35G

V* = 13.48 kN
V* = 8.36 kN
 $\phi V_n = 45.79$ kN

OK

BEARING STRESS

A_p = 4600 mm²
k₃ = 1.3 Table 2.6
 $\phi N_{nb} = 51.67$ kN

OK

SLS

DEFLECTION CHECK

G $\Delta =$ 1.72 mm
Q $\Delta =$ 0.99 mm

Short term

$\Psi =$ **0.7** NZS 1170 Table 4.1
 $\Delta =$ 2.42 mm L/400 = 4.5 mm

OK

Long term

$\Psi =$ **0.4** NZS 1170 Table 4.1
k₂ = **2** Table 2.5
 $\Delta =$ 4.24 mm L/300 = 6.00 mm

OK

SELECT **hySPAN 200X90** timber beams

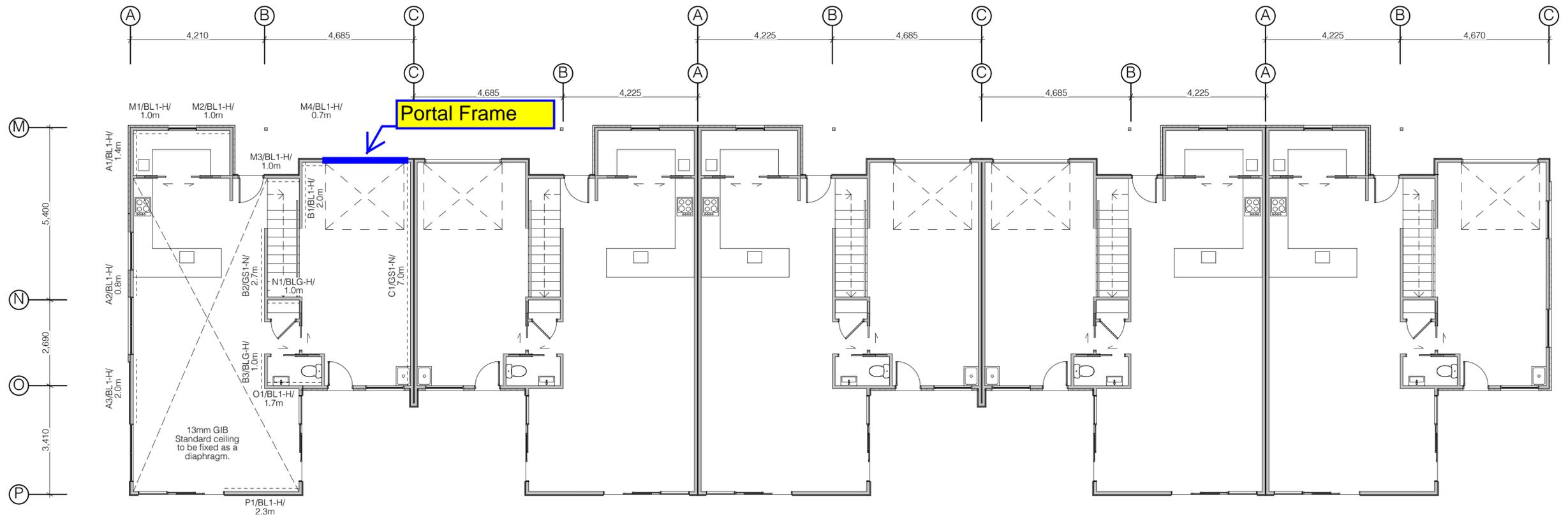
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Section 8.2 – Portal frame

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Bracing & Portal Layout

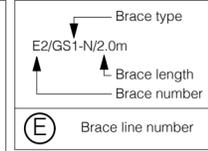
Ground Floor Bracing Plan



Bracing Plan Notes:

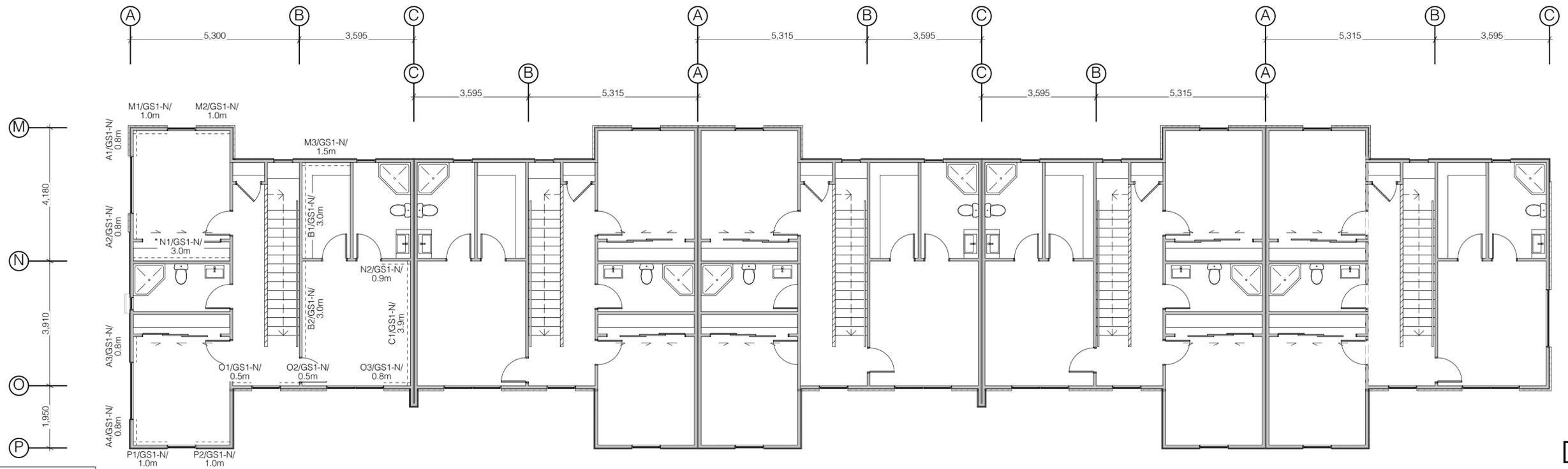
WIND ZONE - LOW
 Refer to Engineer documents for bracing calculations and portal frame calculations.
 Refer to GIB details on sheet 411 for further information.
Note: GIB Braceline is the same product as GIB Noiseline and may be substituted for each other.
 10mm GIB Standard bracing panels may be substituted for 10mm GIB Noiseline or Fyreline where required.
 10mm GIB Braceline/Noiseline bracing panels **must not** be substituted with another product.

Bracing Legend



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First Floor Bracing Plan



General Notes:

DO NOT SCALE OFF DRAWINGS, use figured dimensions only.
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 Before commencing works on site please ensure you are aware of all variations and revisions.
 IF IN DOUBT, CONTACT THE OWNER IMMEDIATELY.

DRAFT
 BUILDING CONSENT ISSUE

REVISION	GT Homes Townhouse Development 76 Pererika Street Rotorua	SHEET	107	SHEET TITLE:	Bracing Plans	SCALE:	16/03/21	ISSUED:	16/03/21	PROJECT:	235-2020	melissa@alterarchitecture.co.nz PO Box 1448 Waikato Mail Centre PHONE: 021 337 340	



Lower Level Across Resistance Sheet

									Wind	EQ
									Demand	
									595	1206
									Resistance	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1055 177%	913 Check
M	1	1.0		2.455	BL1-H	GIB®	116	101		
	2	1.0		2.455	BL1-H	GIB®	116	101		
	3	1.0		2.455	BL1-H	GIB®	116	101		
	4	0.7		2.455	BL1-H	GIB®	71	69		
External Length = 8.9									418 OK	372 OK
N	1	1.0		2.455	BLG-H	GIB®	137	135		
O	1	1.7		2.455	BL1-H	GIB®	213	173		
	External Length = 3.4									
P	1	2.3		2.455	BL1-H	GIB®	288	234		
	External Length = 5.4									

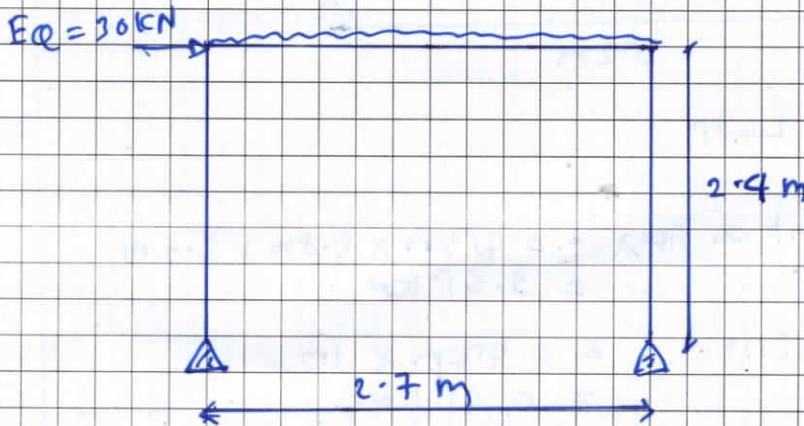
Remaining 300 Bu's to be taken by the portal

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Design of Portal Frame

From Dwelling

Eq Load - $300 \text{ Bur} \times 2 = 600 \text{ Bur} = 30 \text{ kN}$ } GIB Analysis
 ↑
 Utility Factor adjustment



Dead Roof = $0.45 \text{ kPa} \times 4.2 \text{ m} = 1.89 \text{ kN/m}$

Dead Wall = $0.45 \text{ kPa} \times 3.5 \text{ m} = 1.58 \text{ kN/m}$

Total Dead = 3.47 kN/m

Live Roof = $0.25 \text{ kPa} \times 4.2 \text{ m} = 1.05 \text{ kN/m}$

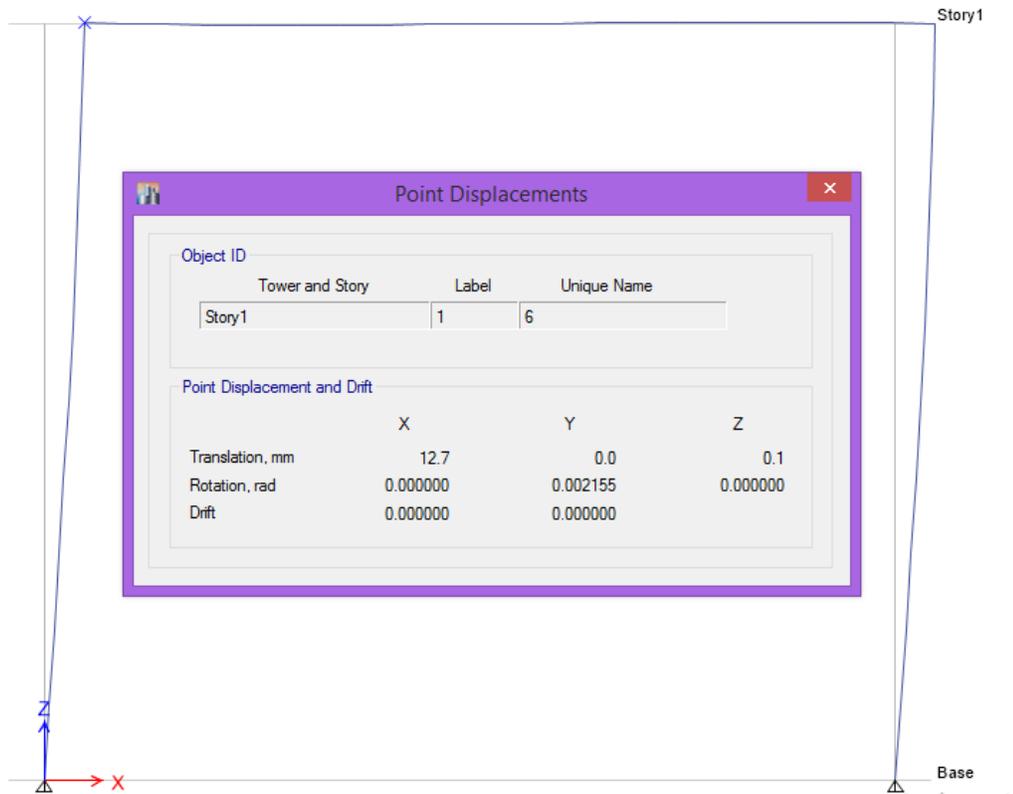
Total Live = 1.05 kN/m

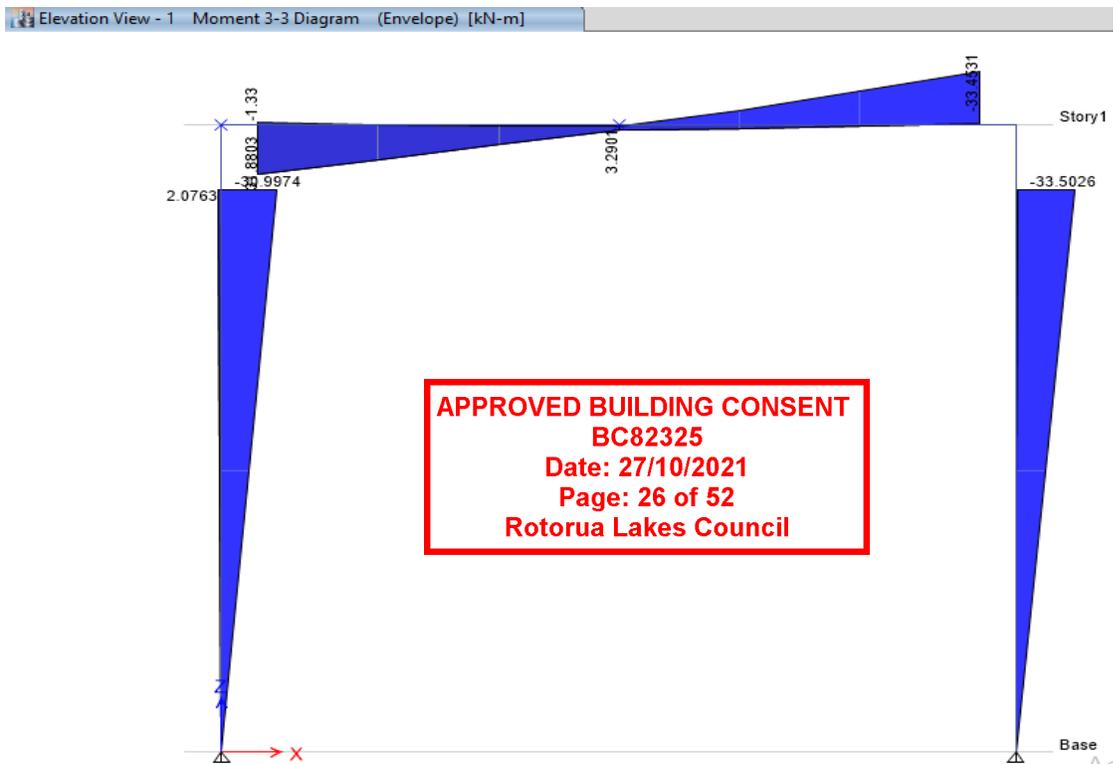
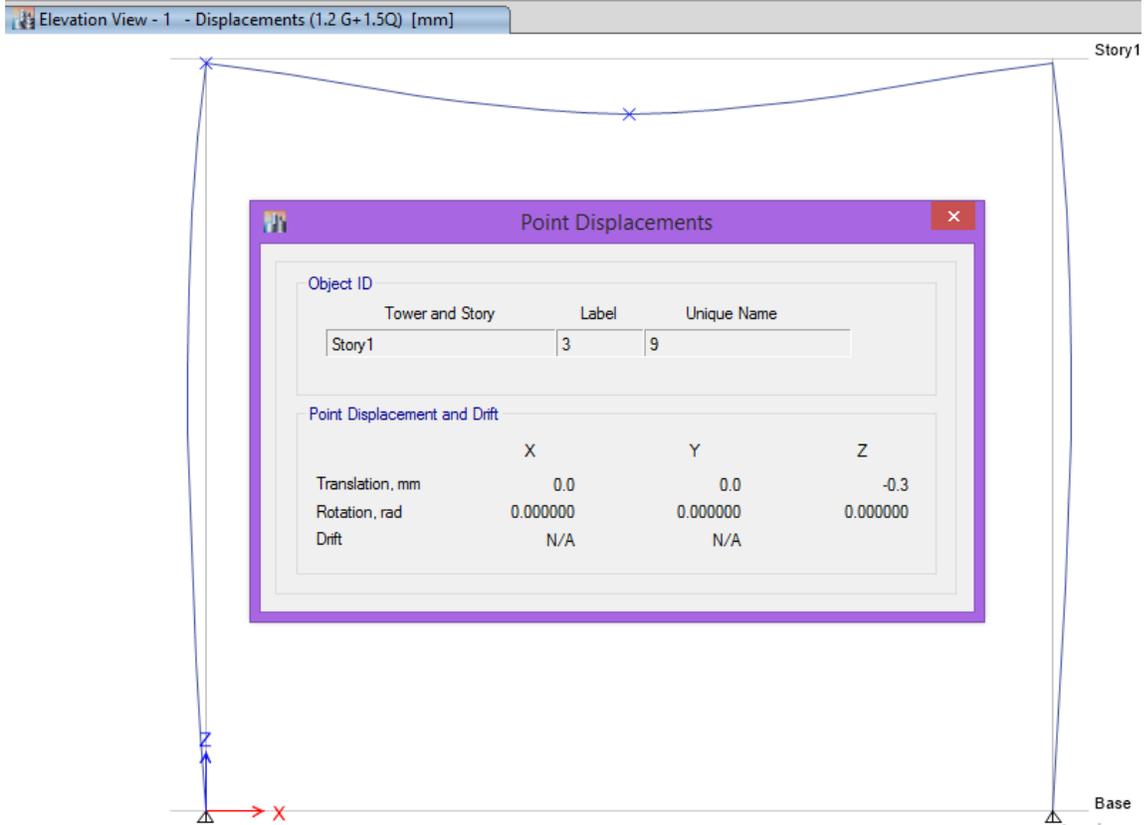
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Elevation View - 1 Joint Loads (EQ)

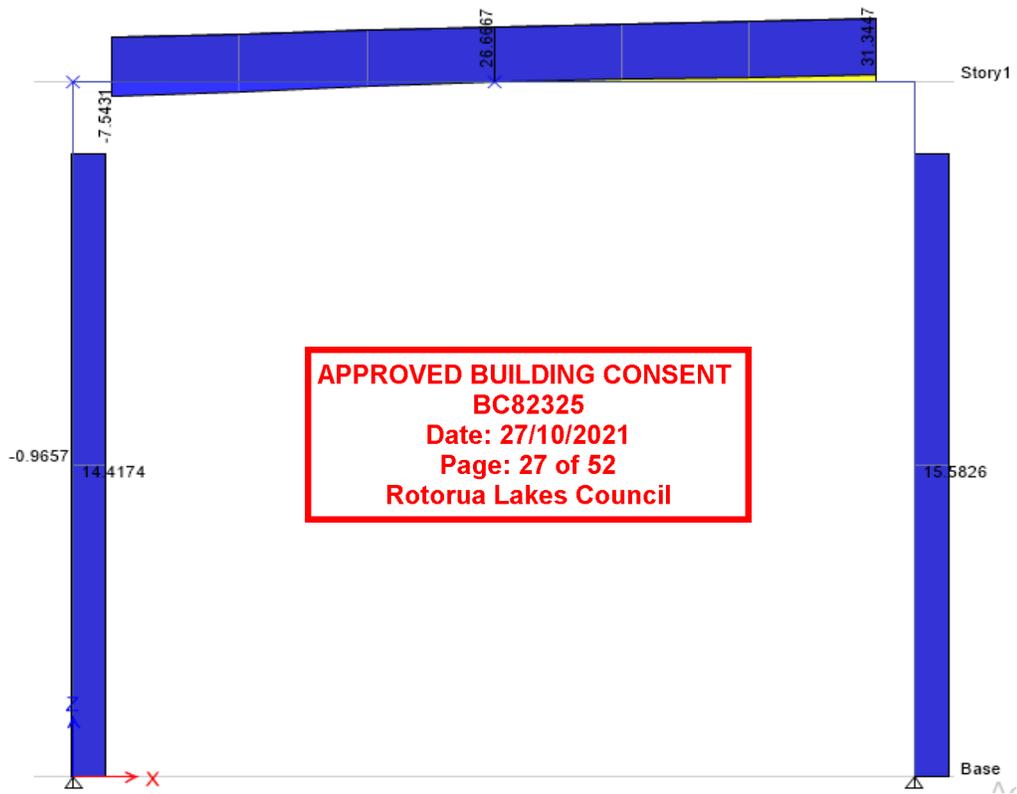


Elevation View - 1 - Displacements (G+EQ) [mm]

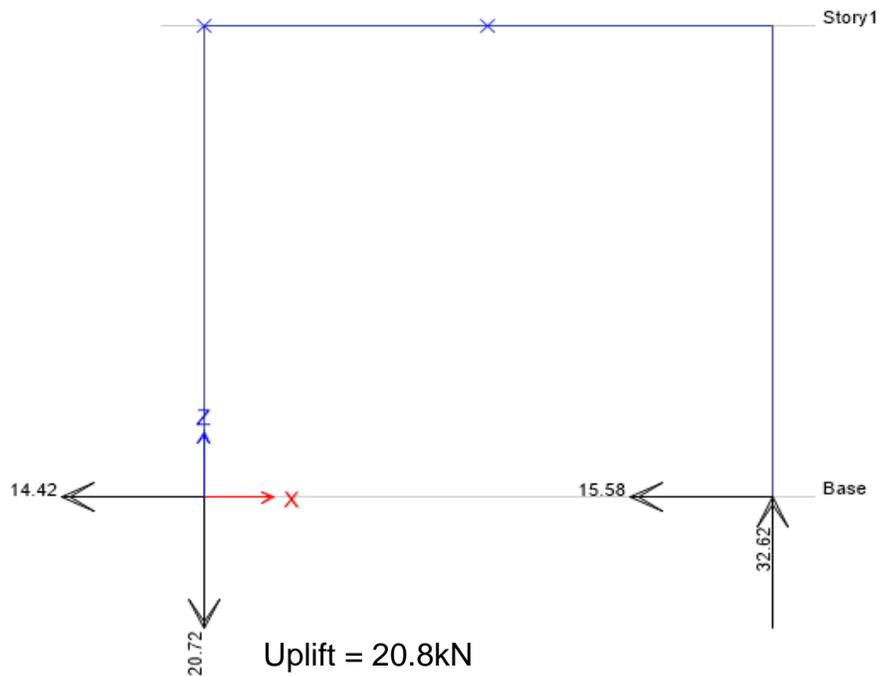




Elevation View - 1 Shear Force 2-2 Diagram (Envelope) [kN]



Elevation View - 1 Restraint Reactions (G+EQ) [kN, kN-m]



Uplift = 20.8kN
 For uplift provide Cast-in bolts with EA
 Provide a U bar to transfer shear force to slab

Section 8.3 – Foundation

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the NZBC Clause B1 Structure, Appendix B1/VM4, Section B1.0.2.

It is important we are given the opportunity to perform in-situ testing at the base of the foundations in order to confirm our design assumptions, given the previous structure has surcharged the underlying subsoils where a portion of the proposed building is to be located. In addition, the original testing was undertaken outside of the existing building platform, and demolition of the previous structure may have disturbed the underlying soils.

8.10 Effluent Disposal

We understand that effluent disposal shall be via reticulated sewerage council system.

8.11 Stormwater Disposal

Stormwater from roof and hard surfaces should be collected and piped to a suitable disposal location. The onsite soakage system should be designed in accordance with the New Zealand Building Code prior to the building consent application.

A soakage test was conducted on 11 January 2021 in accordance with Department of Building and Housing (2000) "Acceptable Solutions and Verification Methods for New Zealand Building Code Clause E1 – Surface Water" Section 9.0.2 and in accordance with guidelines outlined in RCEIS8. The soakage test indicates that the soakage rate is around 5.63 litres/m²/min. Soakage test location and soakage test results are presented in **Appendix D**.

9 Foundation Recommendation

Based on our geotechnical hazard assessment, it is recommended that a rib raft or NZS3604:2011 shallow foundation can be constructed after ground improvement.

Ground Improvement:

We recommend a geogrid gravel raft for ground improvement to create a stable building platform.

The geogrid gravel raft foundation is considered to be the best solution based on the following:

- Eliminates the effects of long-term differential settlement due to the pre-consolidation history of the site and ability to distribute loads over a larger area;
- Mitigates the effect of immediate settlements incurred by the elastic response of the soil to loading;
- Provides increased resistance to liquefaction induced settlements in a ULS level seismic event; and
- Mitigates the effect of cyclic softening within sensitive cohesive strata in a seismic event.

For construction of a gravel raft, we recommend the following:

- Excavate to 1.0 m below the existing ground level. The excavation should extend 1m beyond the footprint, where practicable, to allow an even spread of

the load and limit the creation of voids beneath the foundation in a ULS earthquake;

- The trimmed subgrade should be proof rolled in the presence of a geotechnical engineer before any filling of the site commences to identify any soft spots and to decide their treatment and any undercutting;
- A layer of Bidim A29 or similarly approved geotextile should be placed in the excavation base;
- The geogrid reinforced raft should be 1.0m thick and constructed in 300mm thick lifts compacted to 98% of maximum dry density (95% for the first lift) at $\pm 2\%$ of optimum water content.
- A single layer of StrataGrid High Strength PET Geogrid (SG500 or equivalent) should be placed at 300mm above the excavation base.
- All fill material should be Light weight Pumice or equivalent.

Ultimate Bearing Capacity:

We can assume ultimate bearing capacity of soil 300kPa after ground improvement. In accordance with the recommendations contained with the NZBC, Appendix B1/VM4, the design bearing capacity includes the following strength reduction factors:

- Load combinations involving earthquake overstrength: 0.8
- All other load combinations: 0.5

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Geothermal Gas Prevention:

As described in Section 8.7, the site is located inside the Rotorua Geothermal Area. While no signs of elevated temperatures of gases were encountered, geothermal gases can be corrosive, which could be taken into account when specifying concrete mix types and steel reinforcement for building structures.

It is recommended that a gas proof DPM is used. If additional mitigation is required, all concrete members for structural elements in the development can use Concrete Grade XA1 concrete (NZS 3101:2006, Table 3.3).

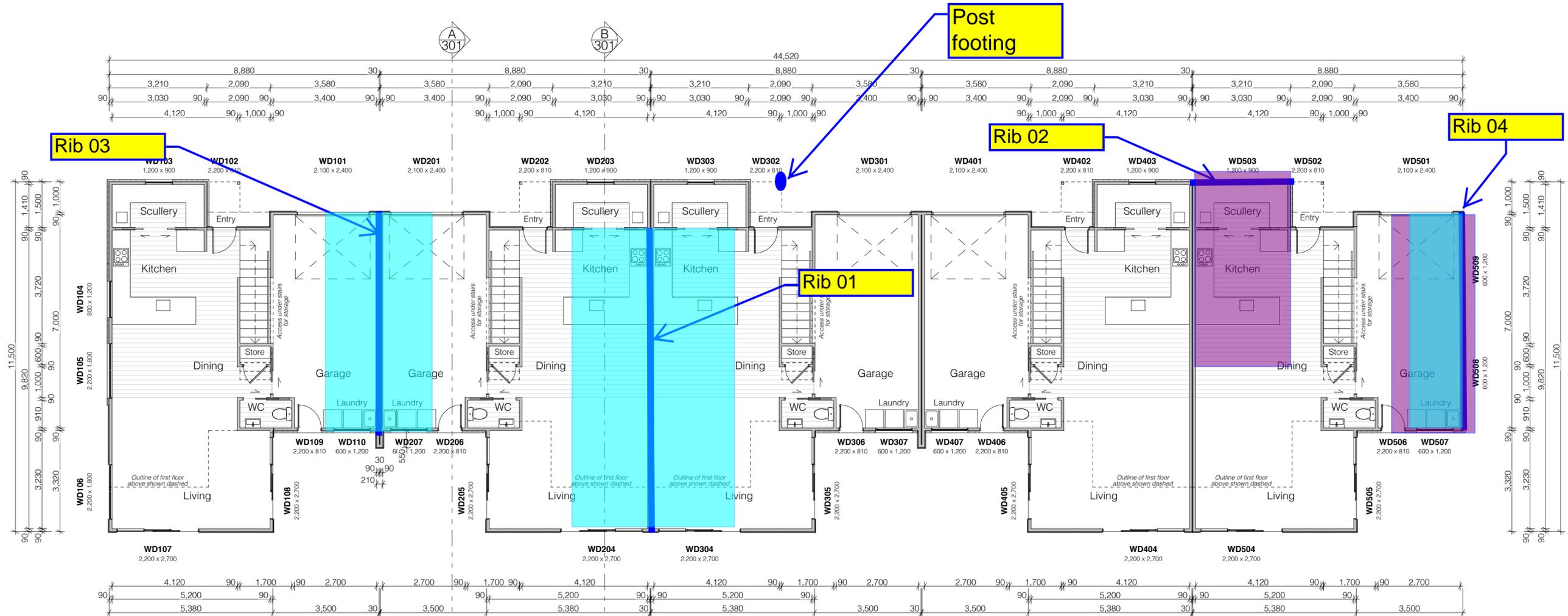
10 Further work

We recommend that a geotechnical review of the final building plans is carried out to ensure the requirements and recommendations given in this report have been interpreted as intended.

During excavation for foundations, it is prudent we are given the opportunity to undertake site observations and perform any necessary additional in-situ testing as required. If ground conditions vary from those assumed within design, we would also be on hand to recommend the most appropriate design or construction modifications.

Any earthworks comprising cutting and filling operations within the zone of influence of the proposed building structure shall be completed once the appropriate resource or building consent has been obtained, and be observed, tested and certified by a Chartered Professional Geotechnical Engineer as per NZS4431.

Rib & Footing Layout



IMPORTANT:
FIRE RATING IS STILL TO BE ADDED TO PLANS.

Wall Framing Type:

- Indicates timber framed walls to be constructed with 90x45 H1.2 SG8 studs @ 600mm ctrs.
- Nogs: Nogs to exterior walls to be at 600mm ctrs. Nogs to interior walls to be at 800mm ctrs.

Cladding Type Location:

- 50mm EzPanel exterior cladding with plaster finish on 50mm cavity over wall underlay.
 - Vertically installed 16mm James Hardie Stria exterior cladding on 20mm cavity over wall underlay. Paint finished.
- Refer to elevations for location of claddings.

Stairs:

- Stair Type: Secondary Private Stairway
- 200mm riser height maximum/250mm tread width minimum
- Floor to Floor Height: 2764mm
- Actual Stairs Provided: 16x 173mm high risers/280mm wide treads

Construction Notes:

- Dwelling designed in accordance with NZS 3604:2011 - All timber to be SG8 unless otherwise noted.**
- Stud height to both stories is 2455mm to underside of floor joists to ground floor and underside of trusses to first floor.**
- Wall Underlay:** Thermakraft Watergate Plus (including gable end framing)
- Roof Underlay:** Thermakraft Covertek 407
- DPC:** Thermakraft Supercourse 500
- Bottom Plate Fixing - CONCRETE SLAB:** Proprietary anchors set within 150mm of each end of the plate, then spaced at 900mm ctrs max.
- Bottom Plate Fixing - TIMBER FLOOR:** 3/ 90x3.15 power driven nails @ 600mm ctrs.
- Top Plate Fixing:** Refer to Truss manufacturers documentation attached for information on top plate fixings and type locations.

Finishing Notes:

- All interior doors to be 1980mm in height.
- 90mm GIB Cove to ceilings.
- 90 x 10mm paint quality pine skirting
- 65 x 10mm paint quality pine architraves

Insulation Notes:

- Wall Insulation:** R2.4 Pink Batts insulation to all exterior wall cavities.
- Ceiling Insulation:** R3.2 Pink Batts Classic insulation to entire ceiling cavity.
- Midfloor Insulation:** Pink Batts Silencer to entire mid floor cavity.
- Intertency Wall:** R2.4 Pink Batts Classic insulation.

Wet Area Finishes:

- Kitchen/Guest Toilet:** Floor - Laminate flooring. Walls - 10mm GIB Standard lining, paint finished. Ceiling - 13mm GIB Standard lining, paint finished.
- Laundry:** Floor - Concrete flooring (garage). Walls - 10mm GIB Aqualine lining, paint finished. Ceiling - 13mm GIB Aqualine lining, paint finished.
- Bathroom:** Floor - Vinyl flooring. Walls - GIB Aqualine lining, paint finished. Ceiling - 13mm GIB Aqualine lining, paint finished. Proprietary acrylic shower enclosures.

Roof tributary area

Floor tributary area (1st floor)

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General Notes:

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REVISION	GT Homes Townhouse Development 76 Pererika Street Rotorua	SHEET 102	SHEET TITLE: Ground Floor Plan SCALE: 1:100 @ A2 ISSUED: 16/03/21 PROJECT: 235-2020	melissa@alterarchitecture.co.nz PO Box 1448 Waikato Mail Centre PHONE: 021 337 340	Alter. ARCHITECTURE
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DRAFT
BUILDING CONSENT ISSUE

KGW Consulting Engineers Ltd

Job No: J001027

Page No:

Made by:

SJ

Date:

5/20/2021

300mm Internal rib (dwelling)

-

RIB 1

** 1st Floor + Wall framing

Design Loads

Dead loads

- Beam self weight	[m]	0.30	x	0.22	x	24.00	=	1.58	[kN/m]
- Wall framing	[m]	6.00	x	2.00	x	0.45	=	5.40	"
- Brick Veneer	[m]	0.00	x			0.00	=	0.00	"
- Roof Light	[m]	0.00	x			0.45	=	0.00	"
- Flooring - 1st Floor	[m]	4.30	x			2.00	=	8.60	"
- Flooring - Ground slab	[m]	1.00	x			2.40	=	2.40	"
						G	=	17.98	[kNm]

Imposed loads

- Roof	[m]			0.00	x	0.25	=	0.00	[kN/m]
- First Floor	[m]			4.30	x	1.50	=	6.45	"
- Ground Floor	[m]			1.00	x	1.50	=	1.50	"
						Q	=	7.95	[kNm]

Ultimate Loads

- Dead Loads	- G	=		17.98	x	1.2	=	21.58	[kN/m]
- Live Loads	- Q	=		7.95	x	1.5	=	11.93	[kN/m]
Total Loads		=		1.2 G + 1.5 Q			=	33.51	[kNm]

Total Pressure = **P** = **111.69 [kPa]** Ultimate

Allowable bearing pressure of soil = **100 [kPa]**

Dependable bearing pressure of soil = **150 [kPa]**

Okay

KGW Consulting Engineers Ltd

Job No: J001027

Page No:

Made by:
SJ

Date:
5/20/2021

300mm External rib (dwelling)

-

RIB 2

** Roof load + Wall framing+ Brick veneer

Design Loads

Dead loads

- Beam self weight	[m]	0.30	x	0.22	x	24.00	=	1.58	[kN/m]
- Wall framing	[m]	6.00	x	1.00	x	0.45	=	2.70	"
- Brick Veneer	[m]	6.00	x			1.40	=	8.40	"
- Roof Light	[m]	6.40	x			0.45	=	2.88	"
- Flooring - 1st Floor	[m]	0.00	x			2.00	=	0.00	"
- Flooring - Ground slab	[m]	1.00	x			2.40	=	2.40	"
						G	=	17.96	[kNm]

Imposed loads

- Roof	[m]			6.40	x	0.25	=	1.60	[kN/m]
- First Floor	[m]			0.00	x	1.50	=	0.00	"
- Ground Floor	[m]			1.00	x	1.50	=	1.50	"
						Q	=	3.10	[kNm]

Ultimate Loads

- Dead Loads	- G	=		17.96	x	1.2	=	21.56	[kN/m]
- Live Loads	- Q	=		3.10	x	1.5	=	4.65	[kN/m]
Total Loads		=		1.2 G + 1.5 Q			=	26.21	[kNm]

Total Pressure = **P** = **87.36 [kPa]** Ultimate

Allowable bearing pressure of soil = **100 [kPa]**

Dependable bearing pressure of soil = **150 [kPa]**

Okay

KGW Consulting Engineers Ltd

Job No: J001027
 Page No:
 Made by: SJ
 Date: 5/20/2021

300mm Internal rib (garage)	-	RIB 3
** 1st Floor + Wall framing		
Design Loads		
Dead loads		
- Beam self weight	[m]	0.30 x 0.22 x 24.00 = 1.58 [kN/m]
- Wall framing	[m]	6.00 x 2.00 x 0.45 = 5.40 "
- Brick Veneer	[m]	0.00 x 0.00 = 0.00 "
- Roof Light	[m]	0.00 x 0.45 = 0.00 "
- Flooring - 1st Floor	[m]	3.60 x 2.00 = 7.20 "
- Flooring - Ground slab	[m]	1.00 x 2.40 = 2.40 "
		G = 16.58 [kNm]
Imposed loads		
- Roof	[m]	0.00 x 0.25 = 0.00 [kN/m]
- First Floor	[m]	3.60 x 1.50 = 5.40 "
- Ground Floor	[m]	1.00 x 2.50 = 2.50 "
		Q = 7.90 [kNm]
Ultimate Loads		
- Dead Loads	- G =	16.58 x 1.2 = 19.90 [kN/m]
- Live Loads	- Q =	7.90 x 1.5 = 11.85 [kN/m]
Total Loads	=	1.2 G + 1.5 Q = 31.75 [kNm]
Total Pressure	=	P = 105.84 [kPa]
		Ultimate
Allowable bearing pressure of soil	=	100 [kPa]
Dependable bearing pressure of soil	=	150 [kPa]
Okay		

KGW Consulting Engineers Ltd

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300mm External rib (garage)

-

RIB 4

** Roof load + Wall framing+ Brick veneer

Design Loads

Dead loads

- Beam self weight	[m]	0.30	x	0.22	x	24.00	=	1.58	[kN/m]
- Wall framing	[m]	6.00	x	2.00	x	0.45	=	5.40	"
- Brick Veneer	[m]	6.00	x			1.40	=	8.40	"
- Roof Light	[m]	3.40	x			0.45	=	1.53	"
- Flooring - 1st Floor	[m]	1.80	x			2.00	=	3.60	"
- Flooring - Ground slab	[m]	1.00	x			2.40	=	2.40	"
						G	=	22.91	[kNm]

Imposed loads

- Roof	[m]			3.40	x	0.25	=	0.85	[kN/m]
- First Floor	[m]			1.80	x	1.50	=	2.70	"
- Ground Floor	[m]			1.00	x	2.50	=	2.50	"
						Q	=	6.05	[kNm]

Ultimate Loads

- Dead Loads	- G	=		22.91	x	1.2	=	27.50	[kN/m]
- Live Loads	- Q	=		6.05	x	1.5	=	9.08	[kN/m]
Total Loads		=		1.2 G + 1.5 Q			=	36.57	[kNm]

Total Pressure = **P** = **121.91 [kPa]** Ultimate

Allowable bearing pressure of soil = **100 [kPa]**

Dependable bearing pressure of soil = **150 [kPa]**

Okay

KGW Consulting Engineers Ltd

Job No: J001027

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Made by:

SJ

Date:

5/19/2021

SLAB DESIGN

Slab Input Parameters

Try	- Depth	=	100	mm	
	- Reinforcement	=	SE62	@	50 mm Centrally placed
	- Concrete strength	=	25	MPa	

Design Loads - Living Area

Dead loads

- Slab weight	m	0.10	x	1.00	x	24.00	=	2.40	[kN/m]
- Non load bearing wall	m	6.00				0.40	=	2.40	"
						G	=	4.80	[kN/m]

Live loads

- Dwelling							=	1.50	[kN/m]
------------	--	--	--	--	--	--	---	------	--------

Ultimate Loads Living

1.35G							=	6.48	[kN/m]
1.2G+1.5Q							=	8.01	[kN/m]
Two way spanning slab						Lx = Ly =		1.2	[m]
						M* =		0.721	[kNm/m]

Design Loads - Garage Area

Dead loads

- Slab weight	m	0.10	x	1.00	x	24.00	=	2.40	[kN/m]
- Non load bearing wall	m	6.00				0.40	=	2.40	"
						G	=	4.80	[kN/m]

Live loads

- Garage							=	2.50	[kN/m]
- Garage (P, Concentrated Load)							=	13.00	[kN]

Ultimate Loads (Garage)

1.35G							=	6.48	[kN/m]
1.2G+1.5Q							=	9.51	[kN/m]
Two way spanning slab						Lx = Ly =		1.2	[m]
Mult =	wl ² / 16							0.856	[kNm]
Mult =	1.2 x G x l ² / 16 + 1.5 x P x l / 16							1.895	[kNm]

Moment Capacity

SE62	As =	146	mm ² /m	Fy =	500	MPa			
	a =	2.86	mm						
	φM =	φ As fy (d - a/2)					=	2.84	kNm

OKAY

Post Footing Design

Gravity Loads on the Post

Dead Loads G

$$\begin{aligned}\text{Roof} &= 0.45 \text{ kPa} * 1 \text{ m} * 0.8 \text{ m} = 0.36 \text{ kN} \\ \text{Stone cladding} &= 0 \text{ kPa} * 0 \text{ m} * 0 \text{ m} = 0 \text{ kN} \\ \text{Footing self weight} &= 6 \text{ kPa} * 0.45 \text{ m} * 1 \text{ m} = 0.954 \text{ kN} \\ G &= 1.31 \text{ kN}\end{aligned}$$

Imposed Loads Q

$$\begin{aligned}\text{Roof Load} &= 0.25 \text{ kPa} * 1 \text{ m} * 0.8 \text{ m} = 0.2 \text{ kN} \\ \text{Floor} &= 0 \text{ kPa} * 0 \text{ m} * 0 \text{ m} = 0 \text{ kN} \\ Q &= 0.2 \text{ kN}\end{aligned}$$

$$1.2 G + 1.5Q = 1.88 \text{ kN}$$

Use 450 mm dia circular footing

$$\text{Ultimate bearing Pressure on soil} = \frac{1.88}{\text{Area}} = 11.8 \text{ kPa}$$

$$\text{Allowable bearing pressure on soil} = 100 \text{ kPa}$$

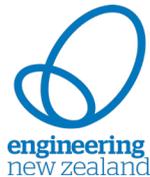
$$\text{Dependable bearing capacity of soil} = 150 \text{ kPa}$$

Hence Ok

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SECTION 9



association of
consulting and
engineering

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Building Code Clause(s)...B1.....

PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY: KGW Consulting Engineers Ltd.....
(Design Firm)

TO: GT Homes Limited.....
(Owner/Developer)

TO BE SUPPLIED TO: Rotorua Lakes Council.....
(Building Consent Authority)

IN RESPECT OF: Two Storey Townhouses.....
(Description of Building Work)

AT: 76 Pererika Street, Rotorua
(Address)

Town/City: Rotorua..... **LOT**..... 12..... **DP**..... 3016..... **SO**.....
(Address)

We have been engaged by the owner/developer referred to above to provide:

Bracing and review design + 1 portal, ribraft foundation design, beam design (6)
.....
(Extent of Engagement)

services in respect of the requirements of 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 the Ministry of Business, Innovation & Employment...B1/VM1/VM4.....or
(verification method/acceptable solution)

Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled:

.....New Dwelling.....and numbered... J001027 – 13 sheets.....;
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 ...100kpa allowable bearing pressure.
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) 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 and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

CM1 CM2 CM3 CM4 CM5 (Engineering Categories)

I,Keegan Williams.....am: CPEng #1010192
(Name of Design Professional)

I am a member of: Engineering New Zealand and hold the following qualifications:...MIPENZ, CPEng, IntPE(NZ).....

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 ACE New Zealand:

SIGNED BYKeegan Williams.....(Signature).....
(Name of Design Professional)

ON BEHALF OFKGW Consulting Engineers Ltd.....Date.....
(Design Firm)

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.
THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACE NEW ZEALAND AND ENGINEERING NEW ZEALAND

Form 2A

Memorandum from licensed building practitioner: Certificate of Design Work

Section 30C or Section 45, Building Act 2004

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING

Street address of building:

76 Pererika Street, Rotorua

THE OWNER(S)

Name: GT Homes Limited

Address: 76 Pererika Street, Rotorua

Telephone number:

Email address:

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IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK

I Keegan Williams supervised the following design work that is restricted building work:

PRIMARY STRUCTURE

Design work that is restricted building work	Description of restricted building work	Carried out or supervised	Reference to plans and specifications
<input type="checkbox"/>	<i>If appropriate, provide details of the restricted building work</i>	<i>Specify whether you carried out this design work or supervised someone else carrying out this design work</i>	<i>If appropriate, specify references</i>
Foundations <input checked="" type="checkbox"/>	Ribraft +Gravel raft	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised	KGW drawings - J001027 13 sheets
Walls <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Roof <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Columns and beams <input checked="" type="checkbox"/>	Portal design (1) Beam design (6)	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised	KGW drawings - J001027 13 sheets
Bracing <input checked="" type="checkbox"/>	Bracing review/ design	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised	KGW drawings - J001027 13 sheets
Other <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

EXTERNAL MOISTURE MANAGEMENT SYSTEMS

Design work that is restricted building work	Description of restricted building work	Carried out or supervised	Reference to plans and specifications
<input type="checkbox"/>	<i>If appropriate, provide details of the restricted building work</i>	<i>Specify whether you carried out this design work or supervised someone else carrying out this design work</i>	<i>If appropriate, specify references</i>
Damp proofing <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Roof cladding or roof cladding system <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

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Ventilation system (for example, subfloor or cavity) <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Wall cladding or wall cladding system <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Waterproofing <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Other <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

FIRE SAFETY SYSTEMS

Design work that is restricted building work	Description of restricted building work	Carried out or supervised	Reference to plans and specifications
<input type="checkbox"/>	<i>If appropriate, provide details of the restricted building work</i>	<i>Specify whether you carried out this design work or supervised someone else carrying out this design work</i>	<i>If appropriate, specify references</i>
Emergency warning systems <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Evacuation and fire- service operation systems <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Suppression or control systems <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Other <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

Note: The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.

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WAIVERS AND MODIFICATIONS

Are waivers or modifications of the building code required? Yes No

If Yes, provide details of the waivers or modifications below:

Clause:

Waiver / Modification required:

List relevant numbers of building code

Specify nature of waiver or modification of building code

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ISSUED BY

Name and contact details of the licensed building practitioner who is licensed to carry out or supervise design work that is restricted building work

Name: Keegan Williams

LBP or Registration number: 1010192

The practitioner is: Design LBP Registered architect Chartered Professional Engineer

Mailing address (if different from below):

Street address / Registered office: 203 Oliver Road Cambridge

Suburb:

Town/City: Cambridge

Postcode: 3496

Phone number:

Landline:

Mobile: 0272025575

Daytime:

After hours:

Fax number:

Email address: keegan@kgwengineers.co.nz

Website: www.kgwengineers.co.nz

DECLARATION

I, Keegan Williams, [*name of practitioner*] certify that the design work that is restricted building work recorded on this form:

- a) Complies with the building code; or
- b) ~~Complies with the building code subject to any waiver or modification of the building code recorded on this form.~~

Signature: _____

Date: _____

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SECTION 10

June 2021

Job Ref: J001027

Rotorua Lakes Council
Private Bag 3029
Rotorua 3046

To Whom it may concern,

RE: 76 Pererika Street, Rotorua: B2 compliance for (Two Storey Townhouses)

You have requested a Producer Statement/other means of compliance for Design for Clause B2 of the Building Code – Durability

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

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

Timber

Timber treatment has been selected in accordance with Table 1A of B2/AS1

Concrete

Concrete covers have been selected in accordance with NZS 3101, Part 1, Section 3

Mild Steel

Steel protection has been specified in accordance with the “Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings” AS/NZS 2312. We note this is on a first time to maintenance basis. Steel coating design has been provided by the paint manufacturer.

We trust this provides the information you are seeking

Yours faithfully

Keegan Williams



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SPECIFICATION

of work to be done and materials to be used in carrying out the works shown on the accompanying drawings

New Dwelling for GTY Homes

Project Specification

76 Pererika Street , Rotorua, New Zealand

Project Ref:

Printed: 09 June 2021



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masterspec

Specification built using Masterspec software
Project ID: 225527 - 216727

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6745W WATTYL PROTECTIVE COATINGS - STEELWORK

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masterspec

Verified spec ID: **235550-216727**

This specification has been produced using Masterspec software and completed on 09/06/2021.
Scan to verify or go to masterspec.co.nz/verify

6745W WATTYL PROTECTIVE COATINGS - STEELWORK

1 GENERAL

This section relates to the preparation and painting of structural and miscellaneous steelwork items.

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

AS 1627	Metal finishing - Preparation and pre-treatment of surfaces, Parts 0 - 9
AS/NZS 2312.1	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Paint coatings
AS/NZS 2312.2	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Hot dip galvanizing
AS/NZS 2312:2002	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS 3894	Site testing of protective coatings
AS/NZS ISO 9001	Quality management systems - requirements
WorkSafe NZ	Guidelines for the provision of facilities and general safety in the construction industry
MPNZA	Health and Safety Programme
Health and Safety at Work Act 2015	

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Wattyl Paintworks® documents relating to work in this section are:

- Wattyl Coatings: Protective Coatings Manual
- Product Data Sheets
- Material Safety Sheets

Copies of the above documents are available from:

Web: www.wattyl.co.nz
 Email: david.fletcher@sherwin.com
 Telephone: 021 992 956

Further information is available by contacting the Wattyl PaintWorks technical and advisory service.

Requirements

1.3 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Wattyl systems.

1.4 QUALIFICATIONS

Painters to be experienced competent workers, familiar with the materials and the techniques specified.

1.5 DURABILITY

Refer to SELECTIONS.

Warranties

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1.6 WARRANTY

Warrant this work under normal environmental and use conditions against failure of materials and execution.

Warranty period: Minimum first maintenance period to [AS/NZS 2312.1](#) for paint coating or [AS/NZS 2312.2](#) for paint on hot dip galvanizing or [AS/NZS 2312:2002](#) for paint on zinc sprayed steel

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Performance

1.7 QUALITY ASSURANCE

Maintain quality assurance programmes to [AS/NZS ISO 9001](#) for both preparation and painting/coating, as necessary to assure that work is performed in accordance with this specification and the qualifying requirements of the contract documents.

1.8 NOTIFICATION POINT

The following notification points identify stages of construction that require the contractor to give notice to the contract administrator and identified consultants that a particular area of work is about to be carried out or will be complete.

Notification Point:	Provide notice to:	Required notice period:
~	Contract administrator ~	2 working days

The contractor shall continue to progress the work as planned.

1.9 MANUFACTURER'S INSPECTIONS

Permit the paint manufacturer to inspect the work in progress and to take samples of their products from site as requested.

1.10 HEALTH AND SAFETY

Refer to the requirements of the [Health and Safety at Work Act 2015](#) and [WorkSafe NZ: Guidelines for the provision of facilities and general safety in the construction industry](#). If the elimination or isolation of potential hazards is not possible then minimise hazards in this work on site by using the proper equipment and techniques as set out in the MPNZA Health and Safety Programme. Supply protective clothing and equipment. Inform employees and others on site of the hazards and put in place procedures for dealing with emergencies.

1.11 MATERIAL SAFETY DATA SHEETS

Obtain from each manufacturer the material safety sheet for each paint product used and comply with the required safety procedures. Keep sheets on site.

2 PRODUCTS

Materials

2.1 COATING SYSTEMS

Refer to SELECTIONS for coating systems.

3 EXECUTION

Conditions

3.1 CONDITIONS FOR PAINTING

Coat steelwork in conditions approved for the application of the specified coatings. If required, carry out off-site preparation and coating application under cover, in a suitable environment, with adequate lighting and with the air temperature as detailed in the specified coating technical datasheet.

Ensure prepared and painted surfaces are clean and dry. Do not carry out preparation or painting when the ambient relative humidity exceeds 85%, or when the steel surface temperature is within 3°C of the dew point.

<p style="text-align: center;">APPROVED BUILDING CONSENT BC82325 Date: 27/10/2021 Page: 50 of 52 Rotorua Lakes Council</p>

3.2 COATING APPLICATION

Apply coatings strictly in accordance with the manufacturer's stated requirements. Ensure that the manufacturer's latest product data sheets are available for reference during preparation and painting.

3.3 COMPATIBILITY

Ensure that materials are as required for the particular surface and conditions of exposure, and that materials used within each painting system are compatible with each other.

3.4 SEQUENCE OF OPERATIONS

Complete surface preparation before commencing painting. Apply paint in the specified sequence using the specified paint. Allow full drying time between coats to the manufacturer's stated requirements. Do not expose primers, undercoats and intermediate coats beyond the manufacturer's stated requirements before applying the next coat.

3.5 DRYING TIME

Before handling or applying the next coat of paint, give each coat the required drying time required by the manufacturer. Ensure that surfaces being painted are dry, free from any surface contaminant and that ambient conditions are such that condensation does not occur before the paint reaches surface-dry condition.

Application - surface preparation

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3.6 UNPAINTED SURFACES

Do not paint:

- Faying face of high strength friction grip (HSFG) bolted joints
- Areas for site welding keeping 75mm clear all round
- Surfaces for embedding in concrete.

Where steel is only partly encased, then extend priming 30mm minimum into the concrete encasement area.

3.7 DEGREASING

Ensure removal of all surface contaminants to AS 1627.1.

3.8 ABRASIVE BLASTING

Remove oil and grease and all other contaminants to AS 1627.4. Abrasive blast clean to a SA2½ finish specified by the coating system manufacturer and as specified in the product technical datasheet. Select grit type and equipment such that the cleaned surface profile between peaks and valleys does not exceed one third of the dry film thickness and conforms to the manufacturer's technical specification. Check that no burrs or sharp arrises remain which may prevent the full coating thickness being attained. Prime within four hours or before surface tarnishing occurs.

3.9 SHOP PRIMING

Apply primer coat according to the Wattyl coatings product data sheet.

3.10 PATCH PRIMING

Clean and repair areas of damaged priming and areas left clear for site jointing to a standard equivalent to the surface preparation specified. Wash off chemical deposits from welding fumes. Apply priming coats to same standard as shop primers, ensuring thorough coating of bolts, nuts and connection areas. Re-prime if the primer fails, or more than 4 weeks elapse before the final coating system is applied.

Application - general

3.11 EACH COAT

Each coat of paint and the completed paint system to have the following qualities and properties:

- Uniform finish, colour, texture, sheen and hiding power
- The proper number of coats applied
- Free of defects such as pinholing, alligatoring, blistering, staining, overspray, peeling, runs, sags and wrinkling
- Strip sharp edges, welds, corners, bolts, nuts, holes etc. and coat by brush, prior to full application
- Where coating is under immersion and/or buried, testing for pinholes is required to AS 3894.

Completion

3.12 LEAVE

Leave the whole of this work uniform in gloss, texture and colour, free from painting defects, clean and unmarked, and to the standard required by following procedures.

4 SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

Interior mild steel - Industrial protective coating systems

4.1 MEDIUM TERM WATTYL PRIMER COAT SYSTEM - INTERIOR MILD STEEL

Location:	Internal Structural Steel, Hidden from View
System:	Epoxy primer
Durability:	15 +years to first maintenance to AS/NZS 2312.1 , category C1
Surface prep:	SA 2½ to AS1627.4
1st coat:	100 microns DFT WattyI Epinamel PR250 epoxy primer

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