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Approved Building Consent Documents

Please note: A copy of the stamped, approved documents must be available onsite for **all** inspections.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

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Identifier **1120004**

Land Registration District **North Auckland**

Date Issued 18 July 2023

Prior References
990199

Estate Fee Simple
Area 1408 square metres more or less
Legal Description Lot 12 Deposited Plan 579625
Registered Owners
S. Lambert Limited

Interests

5752463.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 6.10.2003 at 9:00 am

5752463.7 Encumbrance to Northpower Limited - 6.10.2003 at 9:00 am

Land Covenant (in gross) in favour of Modern Merchants Limited created by Covenant Instrument 12251235.1 - 29.11.2021 at 8:08 am

12539177.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 18.7.2023 at 5:32 pm

Subject to a right (in gross) to drain water over part marked AG on DP 579625 in favour of Kaipara District Council created by Easement Instrument 12539177.7 - 18.7.2023 at 5:32 pm

The easements created by Easement Instrument 12539177.7 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Covenant Instrument 12539177.10 - 18.7.2023 at 5:32 pm

Land Covenant (in gross) in favour of Mangawhai Central Limited created by Covenant Instrument 12539177.14 - 18.7.2023 at 5:32 pm

Land Covenant (in gross) in favour of Mangawhai Central Limited created by Covenant Instrument 12539177.17 - 18.7.2023 at 5:32 pm

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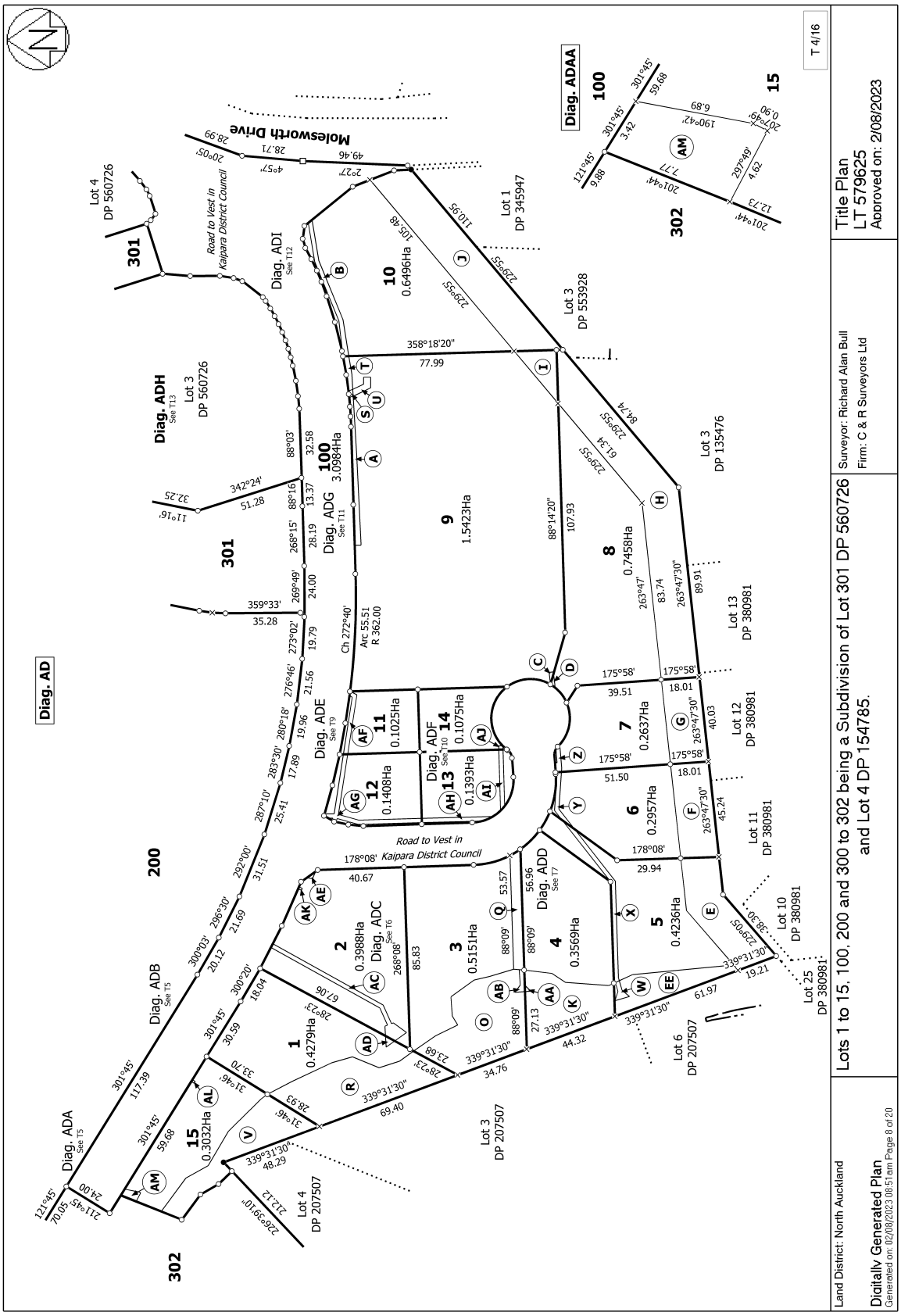

View Instrument Details

Instrument No	12539177.5
Status	Registered
Date & Time Lodged	18 July 2023 17:32
Lodged By	Waterhouse, Tracie Jane
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Affected Records of Title	Land District
1076567	North Auckland
1119995	North Auckland
1119996	North Auckland
1119997	North Auckland
1119998	North Auckland
1119999	North Auckland
1120000	North Auckland
1120002	North Auckland
1120003	North Auckland
1120004	North Auckland
1120005	North Auckland
1120006	North Auckland
1120014	North Auckland
1120001	North Auckland

Annexure Schedule Contains 3 Pages.

Signature

Signed by Nadine Alice Hopkins as Territorial Authority Representative on 17/07/2023 07:20 AM

***** End of Report *****

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IN THE MATTER of the Resource Management Act 1991 ("**Act**")

A N D

IN THE MATTER of the subdivision of land shown in Deposited Plan 579625 (North Auckland Registry) ("**Plan**")

CONSENT NOTICE
(Section 221 of the Act)

KAIPARA DISTRICT COUNCIL ("**Council**") being the territorial authority of the district within which the land described in the First Schedule below ("**Land**") is located has consented to the subdivision of the Land as shown in the Plan subject to the conditions of the Second Schedule below to be complied with on a continuing basis by the Owner (as defined in the Act).

FIRST SCHEDULE
(Land)

ALL of that land being Lot 301 Deposited Plan 560726 and Lot 4 Deposited Plan 154785 described in Computer Freehold Register as Record of Title 990199 and Record of Title NA92C/38 respectively.

SECOND SCHEDULE
(Conditions)

The Owner (as defined in the Act) must, on a continuing basis, to the satisfaction of the Council, comply with the following conditions of the Council's Subdivision Consent RM190283C ("**Resource Consent**"), namely:

1. In respect of Lots 1-8, and 10-15 on the Plan (each a "Lot" and together the "Lots"):

1.1. Any development shall comply with the restrictions and recommendations identified in the McKenzie&Co Engineering Report dated September 2019, Wiley Geotechnical Ltd

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(Reference No:18108_RV dated July 2019, and 18108_SZ dated July 2019) and Geotechnical Completion Report for Service and Retail Zones, Mangawhai Central, 83 Molesworth Dr. submitted to MCL on the 18/07/2022 (reference number 18108_GCR_Service&Retail), unless an alternative engineering report prepared by a suitably qualified and experienced Chartered Professional Engineer is approved in writing by Council.

1.2. At the time of building consent, the owner of any Lot shall connect to stormwater and wastewater reticulation available on the Lot, and submit a Stormwater assessment report which details proposed stormwater devices to Council for approval.

1.3. The private stormwater management system (re-use tanks and any other onsite devices situated on each Lot for treatment of contaminants) outlined in the McKenzie & Co Limited Engineering Report dated September 2019 ("**System**") shall be installed at the time of building consent. The installation, replacement and ongoing maintenance of the System are the responsibility of the owner of each Lot. A copy of the operation and maintenance procedures for onsite stormwater management measures shall be submitted to Council at building consent stage.

1.4. At the time of building consent, the owner of any Lot obtaining access directly from a vested road, shall construct the vehicle entrance crossing (including those over swales), and the associated stormwater infrastructure in accordance with Council's Engineering Standards 2011 and the McKenzie & Co Engineering Report dated September 2019 (with the exception of the location of crossings for Lots 4, 5, 6, 7, 8, and 11 of which shall be constructed in accordance with the engineering design plans certified by condition 1, 7, 8 and 9 of resource consent RM190283 and approved Engineering Design Plans of RM 190283 certified by KDC on 14 May 2020. Entrance crossings are to be designed and constructed in such a manner that will control stormwater run-off entering a property from the road, and that likewise prevent stormwater and detritus, including gravel, dirt and other materials, migrating onto the road reserve from a property.

1.5. The owner of each Lot is responsible for ensuring the Lot complies with the NZ Fire Safety (NZFS) check list for the water supply requirement in accordance with NZFS water supply requirements at the time of Building consent.

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1.6. Development on the Lots shall be implemented in accordance with the Urban Design Guidelines, referenced 'Local Service Activity Design Guidelines – Version 1' prepared by Ian Munro dated June 2019, as amended by condition 130 of the Resource Consent.

2. In respect of Lots 3-8, 10 and 15 on the Plan:

2.1. The landscape planting within the 2.5m front yard setback as per the approved planting plan ('RM190283C Mangawhai Central Local Service Activity Subdivision Landscape Development Plan Package prepared by LA4 dated 25th May 2023 plan reference PP03') shall be implemented prior to the issue of a Code of Compliance Certificate associated with any building consent for each Lot.

2.2. The landscape planting within covenant areas V", "R", "O", "K", "W", "EE", "E", "F", "G", "H", and "J" on the Plan shall be protected in perpetuity as per the approved planting plan 'RM190283C Mangawhai Central Local Service Activity Subdivision Landscape Development Plan Package prepared by LA4 dated 25th May 2023 plan reference PP04-PP06, CS01-CS04'.

2.3. Earthworks, new buildings or storage of goods or materials shall not be undertaken or permitted, or be built, placed, erected or established within covenant areas V", "R", "O", "K", "W", "EE", "E", "F", "G", "H", and "J" on the Plan.

2.4. The façade of any building adjacent to and facing the planted bund shall be finished in a dark recessive colour.

DATED the 6th day of June 2023

SIGNED by the Council)
by its authorised signatory)

Dina Tetzner

CONO 5752463.2 Cor
Cpy - 01/01, Pgs - 001, 03/10/03, 10
DocID: 311087230

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IN THE MATTER of the Resource Management Act 1991 ("the Act")

AND

IN THE MATTER of a subdivision consent as evidenced by Land Transfer Plan No. 314200

AND

IN THE MATTER of a Consent Notice issued pursuant to Section 221 of the Act by THE KAIPARA DISTRICT COUNCIL ("the Council")

I, ALAN JOHN McKERCHAR Chief Executive Officer for the Council HEREBY CERTIFY that the following condition to be complied with on a continuing basis was imposed by the Council as a condition of approval for the subdivision as effected by Land Transfer Plan No. 314200 ("the plan").

The registered proprietor for the time being of Lot 6 on the plan will notify any prospective purchaser of such allotment that the area of Manuka bush must remain fenced off and protected in perpetuity.

DATED at Dargaville this 8th day of October 2002.

SIGNED by the said ALAN JOHN McKERCHAR, Chief Executive Officer for THE KAIPARA DISTRICT COUNCIL pursuant to the authority of the Council given pursuant to Sections 252(1)(a) and 715 of the Local Government Act 1974

A.J. McKerchar

DGW/dgw

STRATA

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11.04.2025

Agent Authorisation
7 Eagle Ray Road, Mangawhai

To whom it may concern,

I/we authorise Strata Architects to act as the client's agent for the purposes of achieving a building consent/ amendment to building consent / variations to consented plans on site for works at the address identified above.

Name .....Chris Warren.....

Signature .....

Date 18/04/25

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Memorandum from licensed building practitioner: Certificate of design work

Section 45 and section 30C, 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: 7 Eagle Ray Road	
Suburb:	
Town/City: Mangawhai	Postcode:

THE OWNER(S)

Name(s): St Lambert Limited	
Mailing address: 34 Ironbark Road	
Suburb: Waipapa	PO Box/Private Bag:
Town/City: Waipapa	Postcode: 0295
Phone number: 027 387 4389	Email address: chris@nzsgroup.co.nz

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BASIS FOR PROVIDING THIS MEMORANDUM

I am providing this memorandum in my role as the: Please tick the option that applies ✓

○	**sole** designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design work myself – no other person will be providing any additional memoranda for the project
○	**lead** designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and **no other** person will be providing any additional memoranda for the project
☑	**lead** designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the **other** designers will provide their own memorandum relating to their specific RBW design
○	**specialist** designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work

IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)

I Jack O'Neill carried out / supervised the following design work that is restricted building work

PRIMARY STRUCTURE: B1

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ☒ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
All RBW design work relating to B1 ☒		○ Carried out ○ Supervised	
Foundations and subfloor framing ○		○ Carried out ○ Supervised	

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Walls ◯		◯ Carried out ◯ Supervised	
Roof ◯		◯ Carried out ◯ Supervised	
Columns and beams ◯		◯ Carried out ◯ Supervised	
Bracing ◯		◯ Carried out ◯ Supervised	
Other ◯		◯ Carried out ◯ Supervised	

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ☑	Refer architects plans	○ Carried out ◉ Supervised	Refer architects plans
Damp proofing ○		○ Carried out ○ Supervised	
Roof cladding or roof cladding system ○		○ Carried out ○ Supervised	
Ventilation system (for example, subfloor or cavity) ○		○ Carried out ○ Supervised	
Wall cladding or wall cladding system ○		○ Carried out ○ Supervised	
Waterproofing ○		○ Carried out ○ Supervised	
Other ○		○ Carried out ○ Supervised	

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
FIRE SAFETY SYSTEMS: C1 - C6			
Emergency warning systems Evacuation and fire service operation systems ✓ Suppression or control systems Other	Systems per fire report	○ Carried out ◉ Supervised	Systems per fire report

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.

WAIVERS AND MODIFICATIONS

Waivers or modifications of the Building Code are required. ○ Yes ◉ No

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

Clause	Waiver/modification required
List relevant clause numbers of building code	Specify nature of waiver or modification of building code required

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ISSUED BY

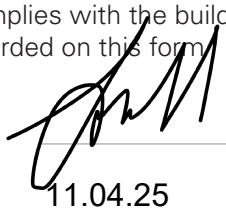
Name and contact details of the licensed building practitioner who is licensed to carry out or supervise design work that is restricted building work.

Name: Jack O'Neill	LBP or Registration number: 6440
The practitioner is a: ○ Design LBP ◉ Registered architect ○ Chartered professional engineer	
Design Entity or Company (optional): Strata	
Mailing address (if different from below):	
Street address/Registered office: 478 Karangahape Road	
Suburb: Auckland	Town/City: Auckland
PO Box/Private Bag:	Postcode: 1010
Phone number:	Mobile: 021 263 2282
After hours:	Fax:
Email address: jack@strata-architects.nz	Website:

DECLARATION

I Jack O'Neill LBP, state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW:

- Complies with the building code, or
- Complies with the building code subject to any waiver or modification of the building code recorded on this form.

Signature: 

Date: 11.04.25

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WILEY GEOTECHNICAL

Geotechnical Investigation Report

7 Eagle Ray Road
Mangawhai Central
Mangawhai

Submitted to:
Chris Warren
October 2024

Reference Number: 24116

Unit 8, 6 Molesworth Drive, Mangawhai
PO Box 401172, Mangawhai Heads, 0541

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Figures

Figure 1: Mapped Site Geology & Faults

Figure 2: Approximate Subsurface Exploration Locations

Tables

Table 1: Scala Penetrometer Results

Appendices

Appendix 1: Hand Auger Borehole Logs

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1 Introduction

Wiley Geotechnical Limited (WGL) was requested by Chris Warren to provide a geotechnical investigation report for a proposed 400 m^2 building and 677 m^2 carpark. The proposed structure is located within Lot 12 of the Mangawhai Central Service Zone development with a street address of 7 Eagle Ray Road, Mangawhai. WGL has received and reviewed a proposed site plan produced by Marc Vale Architecture (Ref: Draft Concept Proposal, dated: 21/08/2024).

Site investigations have been previously carried out for the overall site by both WGL and others, as discussed in Section 2 (below). As part of this current investigation WGL has undertaken additional field testing consisting of hand auger boreholes, shear vane testing and scala penetrometer tests.

Geotechnical analysis design for the proposed development of the proposed structure is outlined in this report; and design inputs and foundation design recommendations provided.

2 Previous Reports and Testing

WGL has previously provided an area wide Geotechnical Investigation Report (Ref 18108, dated August 2018) for the overall Mangawhai Central development with test pits and hand auger boreholes carried out. This was followed by an Earthworks Plan Review (Ref 18108_EPR, dated December 2018) for the proposed bulk earthworks across the proposed development WGL then carried out a Geotechnical Investigation Report (Ref 18108_Service Zone, dated July 2019) for the proposed service zone which Lot 12 is located within. Test pits were carried out across the service zone area with associated Scala Penetrometer Tests.

3 Earthworks

Earthworks have been carried out upon the subject site (Lot 12) as part of the service zone subdivision development. The site was initially stripped of topsoil and unsuitable material to expose the insitu soil which consisted of medium dense SAND. WGL monitored and tested the engineered fill that was placed which varied in height up to a maximum of approximately 1.0 m across the subject Lot.

4 Area Wide Geotechnical Data

4.1 Geology

The GNS map for the site indicates five geological layers across the entire Mangawhai Central development as illustrated in Figure 1. The map indicates that the eastern and southern area of the site, where the proposed development is located, is underlain by alluvium of the Tauranga Group (TG) comprising “partly consolidated mud, sand, gravel and peat or lignite of alluvial, colluvial, lacustrine, swamp and estuarine origins”.

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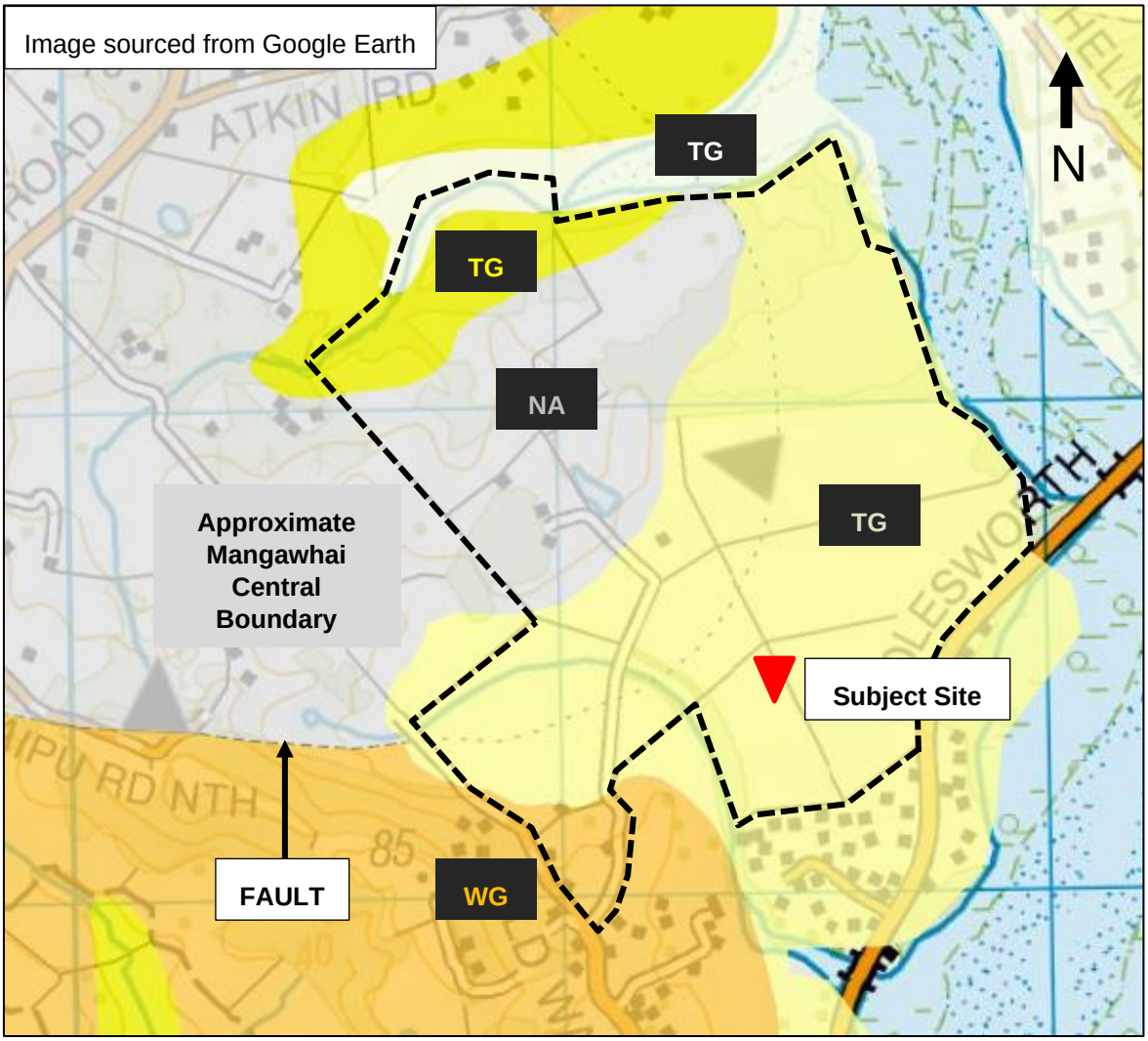
The southern corner of Mangawhai Central is illustrated as being underlain by sedimentary rocks of the Pakiri Formation of the Waitemata Group (WG) comprising “alternating thick-bedded, volcanic rich, graded sandstone and siltstone with volcaniclastic grit beds”, while the western side is underlain by undifferentiated melange of the Northland Allochthon Group (NA) comprising “melange, comprising a matrix of sheared mudstone with included tectonic blocks of Northland Allochthon, Te Kuiti Group and Waitemata”. The north western side is shown to be underlain by alluvial/colluvial deposits of the Tauranga Group (TG) comprising “partly consolidated mud, sand, gravel and peat or lignite of alluvial, colluvial, lacustrine, swamp and estuarine origins”.

Figure 1: Mapped Site Geology & Faults



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5 Geotechnical Investigation

WGL visited the site on the 14th of October 2024 and carried out a field investigation consisting of three hand auger boreholes with shear vane testing across the proposed building area and seven scala penetrometer tests across the building area and carpark.

5.1 Site Observations

The site is situated towards the south eastern side of the overall Mangawhai Central development. The site is bound by Eagle Ray Road to the north and Northbase Drive to the west. The building site is situated upon level ground. Undeveloped lots are located to the east and south of the subject site.

5.2 Hand Auger Boreholes

WGL carried out three hand auger boreholes with shear vane testing and seven scala penetrometer tests within the proposed building area and carpark. The approximate testing locations are illustrated Figure 1 below.

The hand augers were carried out to depths of 2.3 m and 2.5 m. The subsurface material encountered in our hand auger investigation generally consisted of topsoil underlain by moderately clayey silt engineered fill material with occasional angular gravels. Beneath the clayey silt fill medium dense to dense yellow brown sand material was encountered. Poor retrieval due to saturated soil was encountered in each of the boreholes at depths of 2.3 m in HA1 and HA2 and 2.5 m in HA3. Engineered fill material was encountered to a depth of 1.0 m in HA1 and HA2 and 0.8 m in HA3, beneath which dense light brown sand material was encountered. The measured undrained shear strengths generally all exceeded 100 kPa. The results of the individual Scala tests are shown below.

Groundwater was encountered at 1.8 m in HA2 and HA3, and at 2.0 m in HA1 during our testing. The groundwater level may vary from the depth measured at the time of exploration, as a result of seasonal change, recent precipitation and/or irrigation practices.

Based on this, it is our opinion that the material encountered in our subsurface investigation is broadly consistent with published geologic mapping. The bore logs are presented as an appendix to this report and are written in general accordance with the New Zealand Geotechnical Society field classification guidelines (NZGS, 2005).

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Figure 2: Approximate Subsurface Exploration Locations

Table 1: Scala Penetrometer Results

Scala blows/100mm at 7 Eagle Ray Road, Mangawhai				
(m)	Scala 1 (SP1)	Scala 2 (SP2)	Scala 3 (SP3)	Scala 4 (SP4)
0.1	2	2	5	2
0.2	2	2	5	3
0.3	2	3	4	3
0.4	3	2	5	2
0.5	2	4	8	3
0.6	5	4	7	3
0.7	4	4	8	8
0.8	4	11	9	8
0.9	10	15	10	10
1.0	9	13	6	8
1.1	12	11	13	16
1.2	15	11	18	20
1.3	19	11	15	
1.4		15		
1.5		15		

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(m)	Scala 5 (SP5)	Scala 6 (SP6)	Scala 7 (SP7)	
0.1	3	3	3	
0.2	3	4	3	
0.3	4	3	3	
0.4	8	4	5	
0.5	8	3	4	
0.6	7	7	4	
0.7	8	8	7	
0.8	11	7	8	
0.9	10	11	7	

6 Geotechnical Considerations

6.1 Seismic Hazards

Since there are no known active faults crossing the property, it is our opinion that ground rupture is unlikely at the subject property. Granular soils, such as sand, are susceptible to liquefaction in the event of future earthquakes. This may result in settlement or lateral deformation. Based on the regional earthquake risk (discussed further below), depth to groundwater and previous reporting on site, it is our opinion that there is a relatively low risk of liquefaction induced settlement or lateral movement such that specific liquefaction design is not required.

We recommend that the future structures and improvements are designed to account for seismic shaking and ground motions. For seismic design at the site and in line with NZS 1170.5:2004 the corresponding design peak ground accelerations (PGA) for the site have been calculated from NZS 1170.5:2004 using the recommendations of the New Zealand Geotechnical Society as follows:

a_h = Z R C

In which:

Z = base PGA called “Hazard factor” and is given by Table 3.3 and Figures 3.3 and 3.4 of NZS 1170.5:2004. Z = 0.13 for areas north of Auckland.

R = “Return period factor” and is given by Table 3.5 of NZS 1170.5:2004 (R = 1.0 for 500 year return period and R = 0.25 for a 25 year return period)

C = Site response factor called “Spectral shape factor” in NZS 1170.5:2004 and is based on the seismic site classification. We consider this site to be **Class D**, based on soil depth and therefore C = 1.33.

The design PGA at the site is given as:

ULS: a_h = 0.13 x 1.00 x 1.12 = 0.15 (i.e. PGA = 0.15 g)

SLS: a_h = 0.13 x 0.25 x 1.12 = 0.04 (i.e. PGA = 0.04 g)

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6.2 Slope Stability

The proposed building footprint, and surrounding area, is located upon relatively level ground with proposed earthworks generally keeping in line with this. Slope instability is not considered to be a considerable risk factor over the proposed development area.

6.3 Settlement & Consolidation

It is our opinion that long term static settlement of the engineered fill and deep soil layers is not likely for the proposed development. Provided fill material is engineered to the required standard, settlement of a limited magnitude occurring within a relatively short timeframe would be expected without any adverse risks to future buildings.

6.4 Expansive Soil

Expansive clay and silt soils are common in the wider Northland region and have the tendency to shrink and swell, particularly with seasonal fluctuations of soil water content. This behaviour has implications for foundation design and surface structures and should be incorporated during foundation design.

The Expansive Site Class of the soil material for design purposes is considered to be “M – moderate”, as per in AS 2870, due to the engineered fill which comprises clayey silt. This overlies the insitu soil which predominantly comprises sand material.

6.5 Flooding

We have reviewed the Northland Regional Council (NRC) GIS maps in relation to the subject site. There were no hazards indicated by the maps in the vicinity to the subject site.

7 Conclusions and Recommendation

It is our opinion that the proposed development is feasible from a geotechnical point of view, provided the recommendations presented in this report and standard development practices are incorporated in the design and construction of the project.

7.1 Site Preparation

The building site and areas to receive fill should be stripped of all topsoil, soil with heavy roots or an organics content greater than 5 percent, desiccated material or debris. At this time, we anticipate that site preparation will involve stripping of organic top soil, loose fill and any water softened surficial material. The depth of uniform over-excavation may vary based on the conditions encountered during earthworks.

7.2 Earthwork Operations

Following site preparation (as outlined in Section 7.1) the subgrade should be clean and unyielding over proposed development areas. Any fill material should be placed in lifts no greater than 250 mm and compacted using a vibrating roller compacter. The level of compaction may be assessed by determining the percentage of maximum dry density (MDD), by determining the California Bearing Ratio (CBR) with

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a Clegg Hammer or incorporating a combination of both. We recommend testing in accordance with NZS 4431:1989. At this stage it is anticipated that compaction should achieve 95% of the MDD of the material as outlined in the lab results section if a nuclear density meter (NDM) is being used. Otherwise, Clegg Hammer testing of the engineered hardfill material at each lift should reach a minimum value of 15 CBR. It is not envisaged that fill material shall be placed on or create significant sloping ground as part of this stage of the development. It is recommended that a maximum of 200 mm of topsoil is placed across finished engineered fill areas where planned.

Unless otherwise specified or approved, material to be used as structural fill and backfill should be non-expansive with the following properties:

- predominantly granular material and well-graded, and;
- particles should be less than 100 mm in any dimension, and;
- free of organic and inorganic debris, and;
- contain less than 40 percent of mostly non-plastic fines passing the No. 200 sieve.

We would recommend AP40/AP65, or an equivalent approved product, is utilised for the engineered hardfill across the development infrastructure areas. Earthworks monitoring and certification is required prior to proceeding with construction of building foundations or other improvements. Test results of any imported fill material should be submitted to the geotechnical engineer prior to delivery to site, to confirm that they meet the required criteria.

We recommend WGL, or a suitably qualified Geotechnical Engineer familiar with the project, inspect all excavations prior to the placing of the fill material, and continuously monitor and strength test the engineered fill.

7.5 Site Drainage

Ponding of storm water should not be permitted near or under the building or footings during prolonged periods of inclement weather. We recommend that the building pad is positively graded at all times to provide for rapid removal of surface water runoff from around the foundation elements and to prevent ponding of water or seepage toward the foundation systems at any time during or after construction. As a minimum requirement, finished grades in landscaped areas should have downslopes of at least 5 percent within 3 m from the exterior walls to allow surface water to drain positively away from the structures. For hardscape areas, the slope gradient can be reduced to 2 percent. Storm water from roof downspouts should be directed to a solid pipe. We recommend that drains are sloped at a minimum of 5 percent towards an engineered drain system.

7.6 Foundation Recommendations

We recommend that a minimum 200 mm layer of compacted hard fill is placed prior to applying blinding sand for any reinforced concrete slab and foundation elements have a minimum embedment depth of 0.6 m. We recommend a minimum 200 mm layer of compacted hard fill is placed for a waffle slab (i.e Rib-Raft) with the foundation being designed for expansive site class ‘M – Moderate’, as per AS 2870.

A geotechnical ultimate bearing capacity of 300 kPa may be used in the design of a reinforced concrete slab or a waffle slab (i.e. Rib Raft). The ultimate bearing capacity should be available provided that the

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hard fill has been placed and certified according to the construction specification. We recommend WGL, or a qualified geotechnical engineer, inspect any excavations prior to the placing of any fill or foundation elements.

7.7 Pavement Design

We recommend that all development areas, including sealed and paved areas, are excavated back to expose clean insitu soil or engineered fill. Engineered hardfill is then to be brought back up to design levels. Any loose fill or water softened material present on site is not considered suitable to support pavement design loads. For the purpose of pavement design a preliminary subgrade design strength value of 5 CBR may be utilised for the insitu soil. Pavement areas would need to be monitored during construction to confirm design assumptions.

7.9 Plan Review

We recommend that WGL review development plans once finalised prior to submittal to council for building consent to ensure our recommendations have been interpreted and implemented correctly.

LIMITATIONS

(i) This report has been prepared for the use of our client, Chris Warren and their professional advisers and the relevant Regional Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

(ii) Assessments made in this report are based on the ground conditions indicated from published sources, site inspections and subsurface investigations described in this report based on accepted normal methods of site investigations. Variations in ground conditions may exist between test locations and therefore have not been taken into account in the report. If variations are found during excavation or at foundation preparation stage WGL should be notified immediately so we can amend our recommendations.

(iii) This Limitation should be read in conjunction with the ENZ/ACENZ Standard Terms of Engagement.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned at richard@wileygeotechnical.co.nz or matt@wileygeotechnical.co.nz if you require any further information.

Richard Tichborne - BSc, PgDip, MEngNZ
Senior Geotechnical Engineer

Matt Wiley, MSc(Hons), MEngNZ
Principal Engineer

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Reviewed By:

Raymond Su - BE(Hon), MEngSc(Geotechnical), CMEngNZ, CPEng

Principal Engineer

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APPENDIX 1

Hand Auger Boreholes

WILEY GEOTECHNICAL LTD

BOREHOLE No. 1

SITE: 7 Eagle Ray Road, Mangawhai

REF: 24116

Sheet 1 of 1

REDUCED LEVEL (RL)	INFERRED GEOLOGY	DESCRIPTION OF SOIL	SOIL SYMBOL	DEPTH (m)	SAMPLE TYPE	WATER CONTENT (%	WATER LEVEL	CORRECTED VANE SHEAR STRENGTH (kPa) ● Peak Field Vane ○ Remoulded Field vane 50 100 150	SCALA PENETROMETER BLOWS / 100 mm 5 10 15
		TOPSOIL dark brown sandy to 200mm							
	Engineered Fill	SILT intermixed orange brown, red brown, gret, slightly to moderately clayey, slightly to moderately plastic, occasional angular gravels						60 ○ 168 ●	
		brown, friable sandy layer						200	
	Alluvium of the Tauranga Group	SAND light brown with orange brown streaks, slightly silty, very dense		1				200	
		moist to wet						200	
		water at 2.0m		2			V	200	
		E.O.B: 2.3 m						200	
				3					
				4					
				5					

NOTES Groundwater was encountered at 2.0 m

Hand auger encountered poor retrieval at 2.3 m due to saturated soil.

LOGGED BY: MD & AM

DATE DRILLED: 14-Oct-24

DRILL METHOD: 50 mm Hand Auger

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WILEY GEOTECHNICAL LTD

BOREHOLE No. 2

SITE: 7 Eagle Ray Road, Mangawhai

REF: 24116

Sheet 1 of 1

REDUCED LEVEL (RL)	INFERRED GEOLOGY	DESCRIPTION OF SOIL	SOIL SYMBOL	DEPTH (m)	SAMPLE TYPE	WATER CONTENT (%	WATER LEVEL	CORRECTED VANE SHEAR STRENGTH (kPa) ● Peak Field Vane ○ Remoulded Field vane 50 100 150	SCALA PENETROMETER BLOWS / 100 mm 5 10 15
		TOPSOIL dark brown, sandy, to 200mm							
	Engineered Fill	SILT intermixed orange brown, grey, and light brown, slightly to moderately clayey, slightly to moderately plastic							
		red brown							
	Alluvium of the Tauranga Group	SAND light brown with orange brown staining, fine grained, verry dense		1					
		water at 1.8m		2			V	○57 ●87 ○47 ●104	
		E.O.B: 2.3m		3					
				4					
				5					

NOTES Groundwater was encountered at 1.8m

Hand auger encountered poor retrieval at 2.3 m due to saturated soil.

LOGGED BY: MD & AM

DATE DRILLED: 14-Oct-24

DRILL METHOD: 50 mm Hand Auger

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WILEY GEOTECHNICAL LTD

BOREHOLE No. 3

SITE: 7 Eagle Ray Road

REF: 24116

Sheet 1 of 1

REDUCED LEVEL (RL)	INFERRED GEOLOGY	DESCRIPTION OF SOIL	SOIL SYMBOL	DEPTH (m)	SAMPLE TYPE	WATER CONTENT (%	WATER LEVEL	CORRECTED VANE SHEAR STRENGTH (kPa) ● Peak Field Vane ○ Remoulded Field vane 50 100 150	SCALA PENETROMETER BLOWS / 100 mm 5 10 15
-	-	TOPSOIL dark brown, to 200mm							
-	Engineered Fill	SILT intermixed orange brown, grey, red brown, slightly clayey, slightly plastic						200 ○ 200 ○	
-	Alluvium of the Tauranga Group	SAND light brown with orange brown staining, fine to meduim grade, dense		1				50 ○ 175 ● 200 ○ 200 ○	
		becoming wet						34 ○ 101 ●	
		water at 1.8m		2			V	50 ○ 101 ●	
		saturated						54 ○ 101 ●	
		E.O.B: 2.5 m		3					
				4					
				5					

NOTES Groundwater was encountered at 1.8 m

Hand auger encountered poor retrieval at 2.5 m due to saturated soil.

LOGGED BY: MD & AM

DATE DRILLED: 14-Oct-24

DRILL METHOD: 50 mm Hand Auger

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Design Navigator H1 Compliance Report

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Project Summary

H1 Report created by:	
Project Name:	Eagle Ray
Client:	MAROTERE & ST LAMBERT
Lot No:	Lot12, DP579625
Comment:	
Project Id:	193526
Report Date:	10/04/2025

Compliance Result

This report shows compliance of the design with Clause H1 AS2 First Edition from 4 August 2022.

This building **complies with Clause H1 AS2 Edition 1 Amendment 1 for buildings over 300m²**.

In order to comply with Clause H1 the building needs to comply with at least one of the three compliance paths for thermal performance (Schedule, Calculation or Modelling Method), with the lighting power density requirements and with the eneregy efficiency requirements for HVAC systems.

* Note that all floor, wall and roof R-values are rounded to 1 decimal point, window and skylight R-values are rounded to 2 decimal points.

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H1 Compliance Details

H1 AS2 Edition 1 - Schedule Method Compliance - Thermal

The use of the Schedule Method is **permitted** .

Criteria	Proposed Value	
Solar Aperture < 50%	9.4%	✓

In order to comply the R-values for all the construction elements must be the same or larger than the permitted minimum R-values. This design **complies** with the Schedule Method of Clause H1.

Element Type	Minimum permitted R-value	Minimum proposed R-value	
Roof	3.5	3.9	✓
Ceiling Perimeter	3.3		✓
Wall	2.2	2.3	✓
Floor	2.2	4.3	✓
Window and Door	0.33	0.46	✓
Skylight	0.42	0.46	✓

H1 AS2 Edition 1 - Calculation Method Compliance - Thermal

The use of the Calculation Method is **permitted** .

In order to comply the combined wall, window and door heat loss of the proposed building must not be larger than the reference building heat loss AND the R-values of the floor, roof and skylights meet the R-values shown in the table below. This design **complies** with the H1 Calculation Method.

HeatLoss:

Maximum permitted Heat Loss	Proposed Building Heat Loss	
496 W/°C	416 W/°C	✓

The reference building wall and windows/door areas and R-values are shown below. The last column shows the element areas of the proposed building.

Element	Reference Building Area	Reference Building R-value	Proposed Building Area
Wall	518.7 m²	2.2	518.7 m²
Window and Door	86.0 m²	0.33	86.0 m²

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Minimum R-values:

Element Type	Minimum permitted R-value	Minimum proposed R-value	
Roof	3.5	3.9	✓
Ceiling Perimeter	3.3		✓
Floor	2.2	4.3	✓
Skylight	0.42	0.46	✓

Lighting Power Density Compliance

In order to comply the proposed lighting power density for the building must not be larger than the permitted lighting power density for the same building type and function.

The lighting power density assessment is not part of this report.

Compliance with Clause E3

The performance requirements of Clause E3 Second Edition Amendment 7 from November 2020 do not apply to Communal Non-residential, Commercial, Industrial, Outbuildings or Ancillary buildings.

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Design Details

Climate		
Location	Kaipara District	
Climate Zone	1	
External Building Dimensions		
Floor Area	543.9	m²
Gross Wall Area	604.7	m²
Net Wall Area	518.7	m²
Window Area	86.0	m²
Gross Roof Area	573.1	m²
Net Roof Area	540.8	m²
Skylight Area	32.3	m²
Glazing Areas		
Total Window Percentage	14.2	%
Solar Aperture	9.4	%
Solar Aperture over 50%	no	

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Heat Loss Details

ID	Name	Orient.	Width	Height	Gross Area	Net Area	R	Heat Loss	Type	Heated	Construction
Floors											
F1	7.1				543.9	543.9	4.25	--- *	slab		Ground Floor
Walls											
W1	WL7.01	N	21.25	6.40	136.0	136.0	2.25	60.4			Metal cladding
W2	WL7.02	N	6.33	3.00	19.0	5.0	2.56	2.0			Plaster Wall
Wi2-1	W.7.01		4.01	3.00		12.0	0.46	26.2			Glazing 2
Wi2-2	W.7.05		0.80	2.46		2.0	0.46	4.3			Glazing 2
W3	WL7.01	S	21.25	6.40	136.0	112.0	2.25	49.8			Metal cladding
Wi3-1	W.7.03		8.00	3.00		24.0	0.46	52.2			Glazing 2
W4	WL7.01	W	27.85	4.00	111.4	87.4	2.25	38.8			Metal cladding
Wi4-1	W.7.02		8.00	3.00		24.0	0.46	52.2			Glazing 2
W5	WL7.01	E	27.85	6.40	178.2	154.2	2.25	68.6			Metal cladding
Wi5-1	W.7.04		8.00	3.00		24.0	0.46	52.2			Glazing 2
W6	WL7.02	E	8.03	3.00	24.1	24.1	2.56	9.4			Plaster Wall
Roofs											
R1	7.1 Roof				573.2	540.8	3.89	--- *			RF.01
Sky1-1			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-2			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-3			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-4			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-5			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-6			3.20	1.58		5.1	0.46	11.0			Glazing 2
Sky1-7			1.00	1.00		1.0	0.46	2.2			Glazing 2
Sky1-8			1.00	1.00		1.0	0.46	2.2			Glazing 2
Total Heat Loss								486.2			

* The floor and roof heatlosses are not included in the heatloss equation for commercial buildings (H1/AS2).

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Floor Construction Details

Name: Ground Floor — Slab on ground Floor ☒ — heated ☐ — 4.25 m²°C/W

Type: Floor: Slab Floor - only for Clause H1/AS1 Edition 4

internal surface 0.09

Flooring : generic - none (Example: polished surface of a concrete floor)
R-value: 0.00

Slab Insulation

Slab floor area [m²]:	562.76		
Perimeter length [m]:	97.66		
External wall thickness [mm]:	422		
Soil conductivity [W/m °C]	1.2		
Underslab insulation:	Total slab	Expol SLABX200 R-1.5 (50mm)	1.5
Piles Footings:	Number: 13	Penetration Diameter [mm]:	750
Slab edge insulation:	none	Insulation :	0

Wall Construction Details

Name: Metal cladding — heated ☐ — 2.25 m²°C/W

Type: Wall: Steel Frame with vented Cavity and internal Strapping (Counterbattens)

external surface 0.03

Cladding : generic - Metal sheet without airgaps (any thickness, i.e trapezoidal)
R-value: 0.01

Air Barrier : generic - Building paper
R-value: 0.01

Steel Frame & Cavity : 120x75x0.5mm tophat wall girts @ 800mm

Wall Frame Area: 9.4%	*Cavity Area: 90.6%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Thermal Break : generic - none *R-value: 0.00*	Insulation :
Framing : *R-value: 0.24*	still Airgap: 20-90mm airgap (non-reflective) *R-value: 0.16*

Strapping : Timber batten, 90mm x 45mm on edge @ 600mm/1200mm grid

Strapping Area: 12.7%	*Cavity Area: 87.3%*
Strapping : *R-value: 0.75*	Pink(c)Batts(c) R2.2 90mm Wall 2.2

Wall Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

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Name: Plaster Wall heated ☐ 2.56 m²°C/W

Type: Wall: Steel Frame with vented Cavity and internal Strapping (Counterbattens)

external surface 0.03

Cladding : Resene Construction Systems Graphex 20mm
R-value: 0.63

Air Barrier : generic - Building paper
R-value: 0.01

Steel Frame & Cavity : 120x75x0.5mm tophat wall girts @ 800mm

Wall Frame Area: 9.4%

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Thermal Break : generic - none
R-value: 0.00

Framing :
R-value: 0.24

Cavity Area: 90.6%

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Insulation :

still Airgap: 20-90mm airgap (non-reflective)
R-value: 0.16

Strapping : Timber batten, 90mm x 45mm on edge @ 600mm/1200mm grid

Strapping Area: 12.7%

Strapping :
R-value: 0.75

Cavity Area: 87.3%

Pink(c)Batts(c) R2.2 90mm Wall 2.2

Wall Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Roof Construction Details

Name: RF.01 Ceiling Perimeter ☐ heated ☐ 3.89 m²°C/W

Type: Roof: Steel Frame without Roof Space

external surface 0.03

Roofing : generic - Metal trapezoidal Iron with building paper
R-value: 0.01

Steel Frame & Cavity :
200/18DHS (200x75x1.75) rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 8.3%

Framing :
R-value: 0.23

Thermal Break : Thermax B 20mm
R-value: 0.74

Cavity Area: 91.7%

still Airgap : 10-30mm airgap (non-reflective)
R-value: 0.13

Pink(c)Batts(c) Skillion Superbatts Roof R5.0 5

Ceiling Lining : generic - none
R-value: 0.00

internal surface 0.09

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Glazing Details

Name: Glazing 2 Opaque Door ☐ 0.46 m²°C/W

Type: generic Windows and Skylights

Joinery: Thermally Broken Aluminium Frame

Glass: Double Pane: Low E3/Clear - Argon - Thermally improved Spacer (Ug 1.30)

R-value: 0.46

Solar Heat Gain Coefficient (SHGC):
0.57

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Commercial or Industrial PIM / Building Consent Application Checklist
Form 2 (C) (in conjunction with Form 2)

NB: The following is required on application in sufficient detail to show compliance with all aspects of the District Plan and the New Zealand Building Code. Additional information may be requested during processing of the application.	**Supplied**	**N/A**	**Council**
PIM			
Online application form 2: COMPLETED (ensure mandatory fields are completed)	☐		☐
Plans and specifications: PIM only – Site plan, floor plan and elevations	☐		☐
Application fee: For any type of Commercial Application in this category **please refer** to the Kaipara District Council's current Fees and Charges on our website.	☐		☐
Certificate of Title (full copy, not more than 6 months old) plus any Consent Notices listed thereon This must be supplied with all applications without exception.	☐	☐	☐
Site plan size, showing:			
All new and existing buildings, and swimming pools in relation to all buildings and boundaries	☐	☐	☐
Legal and notional boundaries (existing and proposed), easements, waterways, shared access ways/other areas with building setbacks dimensioned	☐	☐	☐
Any heritage buildings/trees or archaeological site information known	☐	☐	☐
Building and site areas (including floor areas (m²) for all floors)	☐	☐	☐
Vehicle access, crossing location, manoeuvre, parking area	☐	☐	☐
Any hard-standing (sealed or concrete) areas with proposed drainage	☐	☐	☐
Any significant trees on the site	☐	☐	☐
All activities on a site indicated	☐	☐	☐
Outline floor plans (for all floors)	☐	☐	☐
Outline elevations	☐	☐	☐
Outline cross sections: (if required) to show recession plane/daylight plane and height compliance	☐	☐	☐
Hazardous substances: storage location and capacity (i.e. LPG, diesel, heating oil etcetera)	☐	☐	☐
Health licensing: surface finishes, sinks, dishwashers, food storage	☐	☐	☐
Liquor licensing: wash basins, sinks, glass washing machine	☐	☐	☐

Evacuation Scheme Assessment (required for PIM):	**Yes**	**No**	**Building Sprinkled? Yes**	**No**	**Council Use 2x Yes = Yes**
Can 100 or more people gather for different purposes or activities?	☐	☐	☐	☐	☐
Are there facilities for more than 10 employees?	☐	☐	☐	☐	☐
Is accommodation provided for more than 5 people?	☐	☐	☐	☐	

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Evacuation Scheme Assessment (required for PIM):	Yes	No
Are hazardous substances stored?	☐	☐
Are early childhood facilities provided?	☐	☐
Is specialised care for people with disabilities provided?	☐	☐
Is specialised nursing, medical, or geriatric care provided?	☐	☐
Are people in lawful detention?	☐	☐
Can 100 or more people gather in a common venue?	☐	☐
Council Use Only - Evacuation Scheme required?	☐	☐

STOP HERE IF THIS IS A PIM ONLY APPLICATION

See Pages 2 and 3 for Building Consent

(in addition to the above application information)

Fire Service Assessment:	Yes	No	Council Use
Is this a fit out of an existing building?	☐	☐	
Is a change of use involved?	Minor alts?		Yes ☐ No ☐
Are alternative solutions, or any application for a modification or waiver to the Building Code for means of escape from fire and fire fighting used (Clauses C1-C6, D1, F6 or F8)	☐	☐	

Building Consent (in addition to the above)			
Note: A Certificate of Public use may be required if public are to have access to the building prior to the issue of the Code Compliance Certificate.	**Supplied**	**N/A**	**Council**
Project information memorandum: (if already issued) plus all attached forms	☐	☐	☐
Building code assessment: showing means of compliance, e.g. AS1, AS2, Alternative Solution	☐	☐	☐
Fully detailed foundation plans	☐	☐	☐
Levels			
proposed and existing site levels	☐	☐	☐
existing and proposed contours	☐	☐	☐
drive gradients and pedestrian access	☐	☐	☐
floor levels and finished paving levels	☐	☐	☐
Drainage plans: full design details for both foul water and storm water to approved outfalls	☐	☐	☐
Detailed floor plans: drawn to scale, fully dimensioned and with rooms identified	☐	☐	☐
Detailed elevations: including door and windows showing opening sashes	☐	☐	☐
Hazardous substances: storage location and capacity of Hazardous Substances (i.e. LPG, diesel, heating oil etc.)	☐	☐	☐
Cross sections: show **all** relevant construction details, particularly for complex sections of the construction	☐	☐	☐

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Building Consent (in addition to the above)			
Note: A Certificate of Public use may be required if public are to have access to the building prior to the issue of the Code Compliance Certificate.	**Supplied**	**N/A**	**Council**
Timber treatment: the species, grading and treatment of **all** timber specific to the project is to be **specified on the drawings,** ideally on the cross section, in addition to any specification references	☐	☐	☐
Insulation: R-values on drawings, method of compliance identified (Schedule/Calculation/Modelling)	☐	☐	☐
Electrical plan: showing all lighting and electrical outlets including fitting types	☐	☐	☐
Framing details: including floor joist layout plans if applicable	☐	☐	☐
Construction details: with **all** materials, fixings etc noted	☐	☐	☐
Weathertightness details: all relevant flashing details	☐	☐	☐
Internal waterproofing details: including **all** wet areas and surface finishes	☐	☐	☐
Plumbing details: including layout plan with full schematics of water supply, including HWC location, valving and all associated systems connected to the HWC (e.g. solar, wetback etc.) plus water supply details, gas bottle, location and restraints if applicable	☐	☐	☐
Non-reticulated wastewater system: KDC producer statement for effluent system, elected system specifications and site suitability report.	☐	☐	☐
Specifications: information limited to and relevant to this project only	☐	☐	☐
Bracing design: calculations, schedule and layout plans showing specific locations in building	☐	☐	☐
Roof truss design: including layout plan, all fixings and specific design for lintels where required	☐	☐	☐
Ground conditions report: this will be either a report to show why it is assumed that the ground is “good ground” according to the Building Code, or a specific ground assessment and foundation design by a Chartered Engineer or qualified Geotechnical Engineer	☐	☐	☐
Engineers details and design calculations: where any specific design has been carried out (e.g. steel beams)	☐	☐	☐
Access and facilities for people with disabilities: for a new building all details of compliance are required including access to and within the building, for an existing building a report is required to determine what can be reasonably upgraded to comply	☐	☐	☐
Fire report: a fire design statement is required to show compliance with the “C” clauses of the Building Code, and the drawings must reflect the detail in the report	☐	☐	☐
Compliance schedule: fill in the last page if any of the systems are, or are to be, included or modified in the building. If any Compliance Schedule items are identified provide full details of the proposed procedures for inspections and routine maintenance and to which standard those systems will be monitored and maintained to. Provide a plan identifying the locations of all specified systems.	☐	☐	☐
Approvals from other authorities: approvals for discharges to land, air, or water from NRC. Food and Health Approval for food or liquor outlets. MAF approval for meat works, etc.	☐	☐	☐

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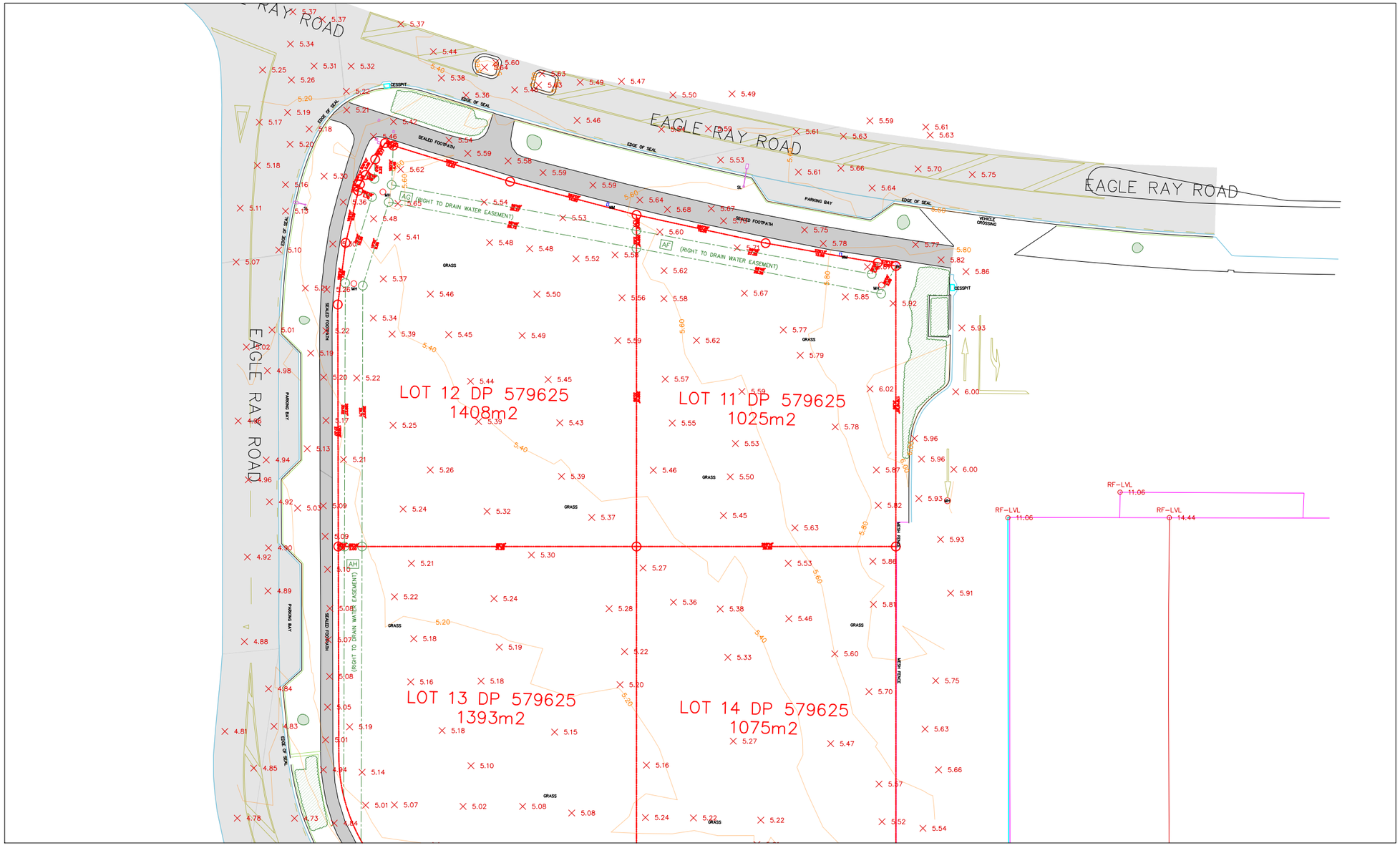
Legend

Lot Boundaries		Downpipe	DP	Ground Spot Level (LiDAR)	0.00
Overhead Powerline		Gully Trap	GT	Ground Spot Level (Total Station)	0.00
Power Pylon	PP	Buried Cables	BC	Roof Level / Soffit Level / Gutter	0.00
Heat/Ventilation Extract	HVAC	Vent Pipe	VE	Hedge / Vegetation	
		Water Meter	WM	Trunk / Dripline	

Disclaimer

DISCLAIMER: THIS DRAWING SHALL ONLY BE USED FOR THE PURPOSES AGREED BY ARCLAB LIMITED AND ITS CLIENT. ARCLAB LIMITED ACCEPTS NO LIABILITY OR RESPONSIBILITY WHATSOEVER FOR, OR IN RESPECT OF, ANY USE OF, OR RELIANCE UPON THIS DRAWING BY ANY THIRD PARTY. SCALE WITH CAUTION. THIS DRAWING MAY HAVE DEFORMED DURING REPRODUCTION. IF CLARITY IS REQUIRED, REFER TO SURVEYOR. THE CONCEPTS AND INFORMATION CONTAINED IN THIS DRAWING ARE THE COPYRIGHT OF ARCLAB LIMITED. USE OR COPYING OF THIS DRAWING IN WHOLE OR PART WITHOUT WRITTEN PERMISSION OF ARCLAB LIMITED CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.



ARCLAB

3D Surveying
/ Documentation

contact@arclab.works
+64 21 251 3205

Notes

SURVEY ORIGIN:

DY00

REDUCED LEVEL: 17.73m
DATUM: NEW ZEALAND VERTICAL DATUM 2016 (NZVD16)

COORDINATES: 885741.829mN, 383709.070mE
DATUM: MOUNT EDEN CIRCUIT 2000 (ME2000)

TITLE BOUNDARIES & DIMENSIONS ARE CALCULATED FROM PLANS & RECORDS OBTAINED FROM LAND & PROPERTY INFORMATION FILES. BOUNDARIES ARE DRAWN TO BEST-FIT TRAVERSE & BEARINGS REFLECT ORIGINAL SURVEY PLAN AND EXISTING GROUND SURVEY MARKERS.

EASEMENTS, COVENANTS AND OTHER LEGAL INSTRUMENTS PERTAINING TO THIS SITE MAY NOT BE REPRESENTED ON THIS PLAN. A FULL INVESTIGATION OF LEGAL RECORDS SHOULD BE UNDERTAKEN.

IN AREAS OF HEAVY VEGETATION, CONTOURS MAY REFLECT TOP OF VEGETATION AND MAY NOT BE A DIRECT REPRESENTATION OF TRUE GROUND LEVEL.. ADDITIONAL LEVELS HAVE BEEN SURVEYED USING TOTAL STATION IN AREAS SIGNALLED FOR DESIGN EXTENSION OR HEAVY VEGETATION (REFER TO LEGEND FOR SPOT LEVEL TYPE). CRITICAL LEVELS SHOULD BE CHECKED ON-SITE PRIOR TO DESIGN.

BUILDING OUTLINES REFLECT SURVEYED EXTENT AT LOWEST VISIBLE CONNECTION TO GROUND.

NOT ALL PUBLIC & PRIVATE DRAINAGE INFORMATION MAY BE SHOWN ON THIS PLAN. DESCRIPTION OF DOMESTIC DRAINAGE SERVICES ARE ESTIMATED. UNDERGROUND SERVICE UTILITIES (WHERE SHOWN) ARE DRAFTED BASED ON COUNCIL GIS RECORDS UNLESS OTHERWISE NOTED. VISIBLE UTILITIES ARE SHOWN. PRECISE LOCATION OF UNDERGROUND UTILITIES MUST BE VERIFIED AND INVESTIGATED ON-SITE PRIOR TO THE COMMENCEMENT OF ANY DETAILED DESIGN DEMOLITION, EXCAVATION OR CONSTRUCTION WORKS.

FOR FURTHER DETAIL REFER TO PRECISION 3D POINT CLOUD DATA, OR CONTACT THE SURVEYOR.

5 EAGLE RAY ROAD, MANGAWHAI

LOT 12 DP 579625 1408m2 &
LOT 11 DP 579625 1205m2

ARCLAB	DATE OF SURVEY 25.11.2024	Prepared for	**STRATA ARCHITECTS**	Surveyed By **JH**	Drawing By **SS**	Reviewed By **NW**	Project no	AL-0413	NOV 2024
				Drawing	**Existing Site Plan A**	Scale 1:500 @ A3	Drawing no	**AL-01**	Rev. A

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FIRE DESIGN REPORT

PROPOSED NEW GYM

MANGAWHAI CENTRAL FITNESS

REVISION 4

7 EAGLE RAY ROAD, MANGAWHAI

PREPARED FOR: STRATA STUDIO LIMITED

DATE PREPARED: 10TH JULY 2025

45 Fairfax Avenue, Penrose, Auckland | Ph: 09 633 0830 | Fx: 09 633 0266 | www.assetcare.co.nz

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Fire Design Report prepared by:

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Shane@assetcare.co.nz
Fire Engineer
ASSETCARE

Fire Design Report reviewed by:

Peter Clark
AIFireE, Cert. Fire Safety Design, MEngNZ
Peter@assetcare.co.nz
Director/Principal Fire Engineer
ASSETCARE

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Section	Subject
	Summary of Fire Requirements
1	Purpose of Fire Design Report
2	Introduction of Fire Design Report
3	Risk Groups and Occupancy Calculations
4	Firecells, Fire Safety Systems & Fire Resistance Ratings
5	Means of Escape
6	Control of Internal Fire & Smoke Spread
7	Control of External Fire & Smoke Spread
8	Firefighting
9	Prevention of Fire occurring
10	Disabled Access and Facilities
11	Construction Monitoring
12	Design Documentation
-	Appendix 1 (Compliance Schedule Information)
-	Appendix 2 (Fire Drawings and information)
-	Appendix 3 (Technical information)
	Appendix 4 (Information provided by the client)

DOCUMENT CONTROL

Date	Name	Revision	Changes
13th March 2025	Original Fire Report	-	-
10th April 2025	Revision	1	Text/ Drawings
15th May 2025	RFI	2	Text
9th July 2025	Revision + RFI	3	Compliance Sch
10th July 2025	Revision + RFI	4	Drawings

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SUMMARY OF FIRE REQUIREMENTS

AssetCare Ltd. is not responsible for any work carried out before the issuing of the Building Consent or any other Council approvals. The Fire Report is to be read in conjunction with the Fire Drawings attached in Appendix 2. Please note, the Fire Drawings are to be printed out in colour.

As we do not select/specify the product(s) that have been proposed for the construction of this project we are unable to provide specification/manufacturers information. All products and materials shall meet the standards as required by The New Zealand Building Code.

It is the responsibility of the architect, structural, mechanical and electrical engineer and other design experts to include the requirements of the fire safety requirements as detailed in the fire report into their specifications and drawings.

The main requirements of the report are summarised below however the entire report needs to be read in its entirety to ensure all the requirements are met.

- All exit doors locking devices should be clearly visible, located where such a device would normally be expected and designed to be operated/opened from the inside without the use of keys or other security device during times of lawful occupancy and allow the door to open in the normal manner.
- If the operation of a locking device is unusual, such as the pressing of a button close to the door, it shall have signage in compliance with F8/AS1, and

— Not prevent or override the direct operation of panic fastenings fitted to any door, and

— If they are of an electromechanical type, they shall, in the event of a power failure or door malfunction, either:
i) automatically switch to the unlocked (fail-safe) condition, or
ii) be readily opened by an alternative method satisfying the requirements as above.

- If fitted, access control doors shall meet the following requirements:

a) Not be allowed across an escape route at any point leading into or within an exitway, but

b) Be allowed in an open path or at a final exit, provided that in the event of a power failure or malfunction, the doors or access control systems continue to provide a safe means of escape from fire without reducing the required width by automatically opening and remaining open, or being readily pushed to the outward open position by the building occupants in an emergency.

c) Every door which is locked in the direction of egress in any part of an escape route shall have a means of manually overriding the lock by the use of an Emergency Door Release (EDR).

- Doors on escape routes shall be hung to open in the direction of escape however this is not required if the number of occupants of spaces with egress using the door is no greater than 50.
- A Type 2 manual fire alarm system shall be installed throughout the entire building. An approved fire systems installation company shall install the Type 2 manual fire alarm system and this shall be certified and comply with NZS 4512:2021 by an approved certifying agent on the completion of work. A direct connection to Fire & Emergency NZ is not required.
- The location of the fire alarm panel shall be the responsibility of the fire alarm contractor and agreed with Fire & Emergency NZ as per NZS 4512.
- It is the responsibility of the fire alarm contractor to provide as-built drawings to the BCA showing the design and layout of the system.
- Visibility in escape routes to comply with the requirements of F6/AS1.
- Illuminated exit signs to comply with the requirements of F8/AS1.

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- In accordance with C/AS2, the Life Rating for the building is 60 minutes. The single level structure with a limited area intermediate floor consists of a single firecell therefore, there are no internal fire or smoke separations proposed or required.
- Intermediate floors including their supporting primary elements and stairs shall have a Fire Resistance Rating of no less than FRR 30/30/30.
  - Light fittings in or on fire rated ceilings or walls are to be surface mounted or if recessed housed in a fire rated enclosure maintaining the integrity and insulation of the surrounding construction.
  - Structural framing members connected to building elements with an FRR shall be rated no less than the elements to which they are connected, or alternatively their connections and supports shall be designed so that their collapse during fire will not cause collapse of the fire rated elements.
- Structural framing members connected to building elements with an FRR shall be rated at no less than the elements to which they are connected, or alternatively their connections and supports shall be designed so that their collapse during fire will not cause collapse of the fire rated elements. This shall be referred to a structural engineer who shall provide the necessary calculations to verify where structural stability during a fire is to be provided.
- It is understood that the architectural and structural designers will address any items of a structural nature this will include any requirement under Code Clause B1 and B2 for structural stability.
- Surface finishes shall comply with Table 4.3 as detailed in the report.
- The south elevation wall of the Gym firecell is located 9.4 m from the relevant boundary therefore in accordance with Table C2(f), of C/VM2, the south elevation wall of the Gym firecell is required to be fire rated FRR 120/120/120. The south elevation wall of the Gym firecell is more than 1 m from the relevant boundary therefore a one (1) way internal fire rating is acceptable. 64% of the south elevation wall of the Gym firecell can be made up of unprotected areas and do not need to be fire rated – the unprotected areas calculated are within 64% as permitted.
- The largest individual unprotected area within the south elevation walls of the Gym firecell is within the requirements of C/VM2.
- The continuity and effectiveness of fire separations shall be maintained around penetrations, and in gaps between or within building elements, by the use of fire stops. All penetrations passing through fire rated walls or floors shall be rated using mastics, sealants and or collars providing the necessary fire resistance rating.

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1. PURPOSE OF FIRE DESIGN REPORT

The purpose of this report is to demonstrate compliance with the New Zealand Building Code & the New Zealand Building Act 2004 for the construction of a new building under Section 17 of the New Zealand Building Act 2004.

The Fire Report is based on the Acceptable Solutions C/AS2 (Acceptable Solution for buildings other than Risk Group SH) to meet The New Zealand Building Protection from Fire Clauses C1 – C6, Amendment 3 dated 2nd November 2023.

- C1 – Objectives of Clauses C2 to C6 (Protection from Fire)
- C2 – Prevention of fire occurring
- C3 – Fire affecting areas beyond the fire source
- C4 – Movement to place of safety
- C5 – Access and safety for firefighting operations
- C6 – Structural stability

As the Fire Report is based on The Acceptable Solutions of the New Zealand Building Code a Producer Statement is not required for this design.

The report is specific to the building and client, it is not to be used by any third party and no responsibility is taken for any third party who uses this report.

Issues that may arise under the Fire Safety and Evacuation Regulations 2018 should be discussed directly with the Fire & Emergency New Zealand.

This report is a performance document, intended to be used by the Architect and other consultants in implementing their detailed design and preparing their working drawings and specifications.

AssetCare have not been commissioned to carry out any Construction Monitoring of this project, any Specifications, reference to products and the provision of Producer Statements shall be the responsibility of the system/product suppliers.

The report does not refer to the storage of or the use of hazardous substances on site. If dangerous goods are stored on site, then these shall be addressed in accordance with the HASNO regulations for the safe operation of the building. The handling of any dangerous goods shall be in accordance with the HASNO requirements as specified by the certifier.

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2. INTRODUCTION OF FIRE DESIGN REPORT

The project is for the proposed construction of the new Mangawhai Central Fitness building located at 7 Eagle Ray Road, Mangawhai.

The building is a commercial public access building comprised of a single level structure with a limited area intermediate floor. The building has a rectangular floor plate being approximately 570 m2 on area and is used as fitness/gym space. The building has two (2) means of escape on either side of the building and will have a manual fire alarm system.

In accordance with Clauses C1-C6 Protection from Fire (Clause A3), the building has an Importance Level of 2.

The report will form the base building fire report for the building. Any future internal fit out of the fitness/gym building shall be subject to a separate Fire Report and separate Building Consent application.

The Fire Report will be based on the information, drawings provided by Strata Studio Limited.

The New Zealand Building Act 2004 Section 17: New Building

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

Location: 7 Eagle Ray Road, Mangawhai

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3. RISK GROUPS AND OCCUPANCY CALCULATIONS

Location	Risk Group	Escape Height	Building Height
Mangawhai Central Fitness	CA	3.06 m	6.40 m

Location	Floor area (m^2)	Occupant Density	Occupancy calculations
Mangawhai Central Fitness	-	-	-
Ground Floor	-	-	-
Reception	14 m^2	10	1 Occupant
Office	8 m^2	10	1 Occupant
Changing Room (east)	25 m^2	Intermittently occupied	Not counted twice
Changing Room (west)	26 m^2	Intermittently occupied	Not counted twice
Gym	431 m^2	5	86 Occupants
Intermediate Floor	-	-	-
Fitness Studio	54 m^2	5	11 Occupants
Total Occupancy	**-**	**-**	**99 Occupant Calculated**

Notes

- Risk Group: CA (Crowd Areas)
- The occupant loads are calculated from occupant densities taken from Table 1.2 of C/AS2.
- The definite occupancy numbers for this building are not known. The client may confirm their likely occupancy numbers if they are less than the total building occupancy calculated above.
- Duplication of occupancy numbers within the building shall be avoided therefore, occupant loads for storerooms, kitchens and sanitary facilities have not been counted twice as they have already been counted elsewhere in the building.

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4. FIRECELLS, FIRE SAFETY SYSTEMS AND FIRE RESISTANCE RATINGS

Fire Safety Systems

- Table: 2.2. of C/AS2
- Risk Group: CA
- Occupant Load: <100
- Escape Height: <4 metres

System Type	System Description	Relevant Standard
Type 2	Manual fire alarm system	NZS 4512
Type 18	Building fire hydrant system	NZS 4510

Type 2: Manual fire alarm system

A Type 2 manual fire alarm system shall be installed throughout the entire building. An approved fire systems installation company shall install the Type 2 manual fire alarm system and this shall be certified and comply with NZS 4512:2021 by an approved certifying agent on the completion of work. A direct connection to Fire & Emergency NZ is not required.

Notes

- The location of the fire alarm panel shall be the responsibility of the fire alarm contractor and agreed with Fire & Emergency NZ as per NZS 4512.
- It is the responsibility of the fire alarm contractor to provide as-built drawings to the BCA showing the design and layout of the system.

Type 18: Building fire hydrant system

Type 18 building fire hydrant system, unless the Fire Service hose run distance from the Fire & Emergency NZ vehicular access to any point on any floor is less than 75 m. Type 18 building fire hydrant system is not required for this project. The Fire Service hose run distance is less than 75 m.

Fire resistance ratings

Risk Group: CA	Fire Resistance Rating(s)
Life Rating	60 minutes
Property Rating	120 minutes

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5. MEANS OF ESCAPE

Width and escape heights required

- The clear height of the escape route shall be no less than that required by D1/AS1.
- Any door openings within or giving access to any escape routes shall have a clear height of no less than 1955 mm for the required width of the opening.
- The width of individual escape routes shall have a minimum width of 850 mm for horizontal travel and 1000 mm for vertical travel except in the following cases:

(i) If an escape route is within an exitway, its width shall be no less than 1000 mm and

(ii) If an escape route is within an open path and a single escape route is permitted, its width may be reduced to 700 mm for horizontal travel and 850 mm for vertical travel.

Escape Routes

Location	Escape routes provided
Mangawhai Central Fitness	-
Ground Floor	2 x escape routes provided
Intermediate Floor	1 x internal stair provided 2 x escape routes provided

Widths of Escape Routes

Location	Escape route width required (mm)
Mangawhai Central Fitness	-
Ground Floor	2 x 850 mm: escape route width required
Intermediate Floor	1 x 1000 mm: internal stair required 2 x 850 mm: escape route width required

Travel Distance calculations

Location	Permitted DEOP (m)	Permitted TOP (m)	Actual DEOP (m)	Actual TOP (m)
Mangawhai Central Fitness – Intermediate Floor	20 m	50 m	20 m: Point of split	34 m: Safe place 44 m: Safe place

Note: Refer to degree and width of openings for minimum clear opening width for doors on escape routes in accordance with Paragraph 3.15.5 of C/AS2.

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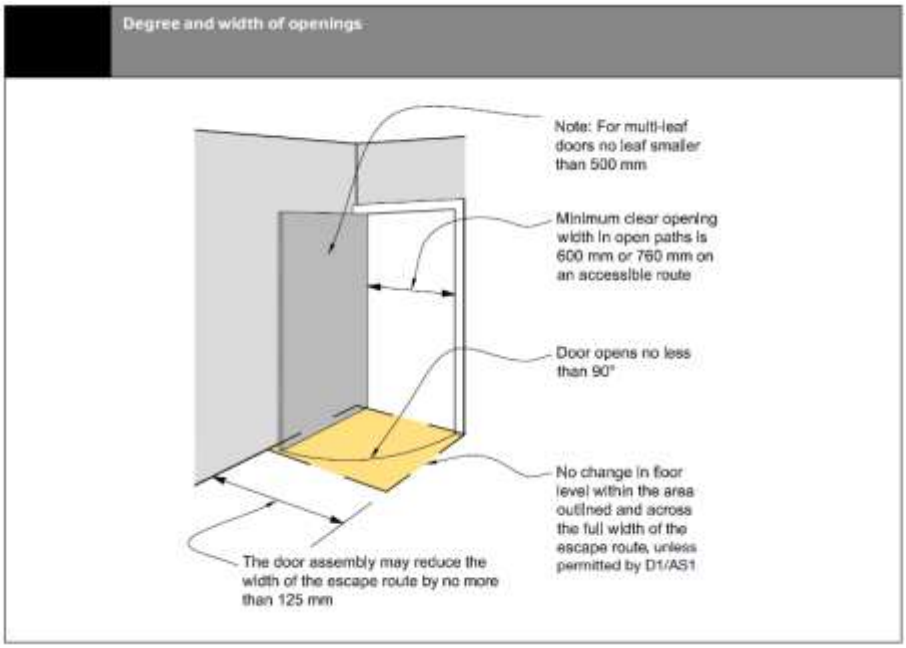
Degree and width of opening

Doors on escape routes shall satisfy the following requirements:

a) In open paths, provide an unobstructed opening width no less than 760 mm and, when multi-leaf, have no single leaf less than 500 mm wide. The minimum door opening width may be reduced to 600 mm if it is not required to be an accessible route, and
b) Within exitways (including entry and final exit doors), reduce the minimum exitway width required by no more than the 125 mm and in accordance with Table 3.1(a) of C/AS2 as below.
c) Open no less than 90°, and
d) Open onto a floor area which:
i. extends for a distance of no less than the arc of the door swing, and
ii. is at the same level on both sides of the door for the full width of the escape route, and
e) When opened, not cause the door swing to obstruct the minimum required width of any escape route. For example, doors which open onto a corridor used as an escape route shall not obstruct the minimum required width of that escape route.



Minimum clear width of escape routes & doors					
Risk Group	**Element**	**Dead End/Open path**		**Exitway**	
		Horizontal	**Vertical**	**Horizontal**	**Vertical**
CA	Escape route	850 mm	1000 mm	1000 mm	1000 mm
	Door	760 mm	760 mm	875 mm	875 mm

- Escape route: A continuous unobstructed route from any occupied space in a building to a final exit to enable occupants to reach a safe place and shall comprise one or more of the following: open paths and safe paths.
- Exitway: All parts of an escape route protected by fire or smoke separations, or by distance when exposed to open air, and terminating at a final exit.

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Paragraph 3.3.2 (d): Provision for unusable escape routes

Except where dead ends and single escape routes are permitted, in unsprinklered firecells the total required width shall still be available should the widest of the escape routes be unusable due to the location of the fire or any other reason.

Escape width provided from the Mangawhai Central Fitness

- Escape route[1] – Main entrance/exit: 1 x 1720 mm
- Escape route[2] – Rear entrance/exit: 1 x 2120 mm

Total width of escape provided: 3840 mm – 2120 mm (largest exit) = 1720 mm
Calculation: 1720 mm/7 mm per person (horizontal travel) = 245 occupants permitted

Based on calculations above, the width of escape provided is sufficient to take the total occupancy calculated in Section 3 of the report (85 occupants).

Miscellaneous comments/requirements

- All exit doors locking devices should be clearly visible, located where such a device would normally be expected and designed to be operated/opened from the inside without the use of keys or other security device during times of lawful occupancy and allow the door to open in the normal manner.
- If the operation of a locking device is unusual, such as the pressing of a button close to the door, it shall have signage in compliance with F8/AS1, and

— Not prevent or override the direct operation of panic fastenings fitted to any door, and
— If they are of an electromechanical type, they shall, in the event of a power failure or door malfunction, either:
i) automatically switch to the unlocked (fail-safe) condition, or
ii) be readily opened by an alternative method satisfying the requirements as above.

- If fitted, access control doors shall meet the following requirements:

a) Not be allowed across an escape route at any point leading into or within an exitway, but
b) Be allowed in an open path or at a final exit, provided that in the event of a power failure or malfunction, the doors or access control systems continue to provide a safe means of escape from fire without reducing the required width by automatically opening and remaining open, or being readily pushed to the outward open position by the building occupants in an emergency.
c) Every door which is locked in the direction of egress in any part of an escape route shall have a means of manually overriding the lock by the use of an Emergency Door Release (EDR).

- Doors shall be hung to open in the direction of escape if the door serves a room or area with more than 50 occupants. This includes doors located on an open path, leading into, or within an exitway and at final exits. If escape is in either direction, doors shall be capable of swinging both ways.
- Manual sliding doors or bi-fold type doors may be used where the space, including an exitway, has an occupant load of less than 20 occupants.
- All escape routes shall have signs complying with F8/AS1.

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Visibility in escape routes

Visibility in escape routes shall be provided in the following locations:

- at every change of level in an escape route
- in an escape route from the point of where the initial open path travel distance exceeds 20 m

Visibility in escape routes shall be provided at the above locations. The report does not address visibility in escape routes. A suitably qualified person shall be responsible for the design of the system to comply with F6/AS1. Any work carried out on the emergency lighting system shall be carried out by a registered electrician. On the completion of the installation this shall be certified as complying by producer statement complying with The New Zealand Building Code F6/AS1.

Illuminated exit signs

Escape routes shall be identified by illuminated exit signs which are to be located:

- At each point in the open path where a door gives access to a final exit or an exit way is not visible in normal use
- To be clearly indicate each door giving access to a final exit or an exit way
- To clearly identify the route of travel through the exit way

Illuminated exit signs shall meet the requirements of the Clause F8/AS1.

6. CONTROL OF INTERNAL FIRE AND SMOKE SPREAD

Structural stability during fire

Structural framing members connected to building elements with an FRR shall be rated at no less than the elements to which they are connected, or alternatively their connections and supports shall be designed so that their collapse during fire will not cause collapse of the fire rated elements.

This shall be referred to a structural engineer who shall provide the necessary calculations to verify where structural stability during a fire is to be provided.

It is understood that the architectural and structural designers will address any items of a structural nature this will include any requirement under Code Clause B1 and B2 for structural stability.

Life Rating

The project is for the proposed construction of the new Mangawhai Central Fitness building located at 7 Eagle Ray Road, Mangawhai.

The building has a rectangular floor plate being approximately 570 m2 on area and is used as fitness/gym space. The building has two (2) means of escape on either side of the building.

In accordance with C/AS2, the Life Rating for the building is 60 minutes. The single level structure with a limited area intermediate floor consists of a single firecell therefore, there are no internal fire or smoke separations proposed or required.

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Intermediate floor(s)

intermediate floors including their supporting primary elements and stairs shall have a fire resistance rating of no less than RFF 30/30/30.

- Light fittings in or on fire rated ceilings or walls are to be surface mounted or if recessed housed in a fire rated enclosure maintaining the integrity and insulation of the surrounding construction.
- Structural framing members connected to building elements with an FRR shall be rated no less than the elements to which they are connected, or alternatively their connections and supports shall be designed so that their collapse during fire will not cause collapse of the fire rated elements.

Intermediate floor calculations

- Intermediate floor: 54 m^2
- Ground floor firecell: 570 m^2
- Calculations: 54 m^2/570 m^2 = 10%

The intermediate floor is a limited area intermediate floor in compliance with Paragraph 4.13.4 of C/AS2.

Passive systems

Passive systems shall be maintained in accordance with paragraphs below.

Fire Stopping

The continuity and effectiveness of fire separations shall be maintained around penetrations and in gaps between or within building elements by the use of fire stops. All penetrations passing through fire rated walls or floors shall be rated using mastics, sealants and or collars providing the necessary fire resistance rating. The material selected for use as fire stops shall have been tested for the type and size of the gap or penetration, and for the type of material and construction used in the fire separation.

Sealing of gaps

To avoid the passage of smoke through fire and smoke separations, gaps shall be sealed with fire resistant materials complying with AS 1530.4 in their intended application if they are located:

- In smoke separations and between smoke and fire separations
- Around glazing in smoke separations
- Between fire separations and unrated parts of external walls
- Between smoke separations and unrated parts of external walls

Junctions of fire separations

Where fire separations meet other fire separations or external walls they shall either be bonded together or have the junction fire stopped over its full length.

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Junctions with roof

Vertical fire separations and external walls shall either:

a) Terminate as close as possible to the external roof cladding and primary elements providing roof support, with any gaps fully fire stopped or
b) Extend not less than 450 mm above the roof to form a parapet

Additional notes for Passive Fire Stopping

General

All passive fire protection shall comply with AS 1530.4 and AS 4072.1 as detailed above.

It is recommended that a Passive Fire Specialist carries out any passive fire stopping around closures and penetrations in fire and smoke separations. It is understood that all installers are suitably qualified and experienced in passive fire stopping systems. It is also recommended that all passive fire stopping systems to be used are to be registered on the FPANZ Passive Product Register.

Consent Documentation

It is the responsibility of the architect or building consent applicant to demonstrate to the BCA (Building Consent Authority) that the design submitted when built will meet the requirements of the New Zealand Building Code.

It is also the responsibility of the architect or building consent applicant to make sure that the consent documents submitted to council includes the manufactures specification and relevant information for the products being used.

As the building has been designed for a simple Low and Medium Risk Design, confirmation of compliance with the Acceptable Solution (C/AS1-6) is expected as detailed above for fully compliant systems. The BCA (Building Consent Authority) will undertake the inspections without the need for 3rd party independent inspection.

Labelling

In accordance with Appendix B4 of AS 4072.1 state that all service penetrations and control of joints are to be clearly labelled. All service penetrations and control joints shall be provided with a label unless in not practical areas such as visible living spaces etc. Where labels are not provided there shall be evidence of the system installed to ensure identification and traceability.

Producer Statement & Construction Monitoring

As detailed in the Introduction of the fire report, the report is based on The Fire Report is based on the Acceptable Solutions to meet The New Zealand Building Protection from Fire Clauses C1 – C6 therefore a Producer Statement is not required from the Fire Engineer for any Passive Fire Stopping or Construction Monitoring.

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Surface Finishes requirements for walls and ceilings

Surface Finishes within the building shall comply with the requirements of the Table 4.3 as below. It is essential that the surface finishes group numbers comply. Interior surface finishes are classified from Group 1 (best) to Group 4 (worst) based on their measured time to flashover in the ISO 9705 fire test. The product manufacturer will provide guidance and product specifications on what group number their product meets.

Table 4.3 Location: As detailed	Maximum permitted Group Number
Exitways and Importance Level 4 buildings: Walls & Ceilings	1S
Sleeping spaces where care or detention is provided: Walls & Ceilings	1S
Other sleeping spaces and crowd spaces: Ceiling Surfaces	2S
Other sleeping spaces and crowd spaces: Wall Surfaces	2S
All other occupied spaces: Walls & Ceilings	3

**Occupied space: Any space within a building in which a person will be present from time to time during the intended use of the building.*

Surfaces of building services

Table 4.4 Building Services	Maximum permitted Group Number
Internal faces of ducts for HVAC systems & kitchen exhaust ducts	1S
External faces of ducts, acoustic treatment and pipe insulation within exitways	1S
Acoustic treatment and pipe insulation within sleeping uses	3
External faces of ducts for HVAC systems	3

Note: Surfaces of rigid and flexible ductwork for HVAC systems may be assigned a material Group Number of 1-S when the ductwork complies with the fire hazard properties set out in AS 4254.

Flooring

Flooring shall be either non-combustible or when tested to IS0 9239-1 shall have a critical radiant flux of no less than that specified in Table 4.5 below. This requirement applies to flexible finishes such as carpets, vinyl sheet or tiles and to finished or unfinished floor spaces.

Critical radiant flux requirements for flooring

Table 4.5 – Risk Group: CA Location (Area of Building)	Minimum Critical Radiant Flux When Tested to ISO 9239-1
Exitways in all building	2.2 kW/m2
Non-sleeping firecells accommodating more than 50 occupants	2.2 kW/m2
All other occupied spaces, other than household units	1.2 kW/m2

Note: From the Table 4.5 of C/AS2 above, higher CRF (critical radiant flux) figures provide better performance.

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Suspended flexible fabrics

Suspended flexible fabrics when tested to AS 1530 Part 2 within all occupied spaces including exitways shall have the following.

Location	Flammability Index
All occupied spaces including exitways	No greater than 12
When used as underlay to roofing or exterior cladding that is exposed to view	No greater than 5

Membrane structures

The fabric of structures such as tents, marquees or canopies shall be tested to AS 1530.2 and shall achieve a flammability index of no greater than 12.

Exceptions to Surface Finish requirements

Surface Finish requirements do not apply to:

- Small areas of non-conforming product within a firecell with a total aggregate surface area of not more than 5.0 m2
- Electrical switches, outlets, cover plates and similar small discontinuous areas
- Pipes and cables used to distribute power or services
- Handrails and general decorative trim of any material such as architraves, skirtings and window components, including reveals, provided these do no exceed 5% of the surface area of the wall or ceiling they are part of
- Damp-proof courses, seals, caulking, flashings, thermal breaks and ground moisture barriers
- Timber joinery and structural timber building elements constructed from solid wood, glulam or laminated veneer lumber. This includes heavy timber columns, beams, portals and shear walls not more than 3.0 m wide, but does not include exposed timber panels or permanent formwork on the underside of floor/ceiling systems
- Individual door-sets
- Continuous areas of permanently installed open-able wall partitions having a surface area of not more than 25% of the divided room floor area or 5.0 m2, whichever is less.
- In risk Group CA only, uniformly distributed roof lights where –
  - The total area does not exceed 15% of the ceiling area (in plan) and
  - The minimum floor to ceiling height is not less than 6 m and
  - The roof light achieves a group number no greater than 3

Foamed plastics and combustible insulating materials

If foamed plastics building materials or combustible insulating materials form part of a wall or ceiling system, the completed system shall achieve a Group Number as specified in Table 4.3 of C/AS2 and the foamed plastics shall comply with the flame propagation criteria as specified in AS 1366: Parts 1-4 for the material being used.

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7. CONTROL OF EXTERNAL SPREAD OF FIRE

Control of external spread of fire

In compliance with Paragraph 5.5.7 of C/AS2, as an alternative to the table method, the "Commentary of Building Code Clauses C1-C6 and Verification Method C/VM2 – Appendix A: Methodology for Horizontal Fire Spread (Tabular Data)" can be used.

Key for control of fire spread table

Exposure: Exposed external walls
Db: Minimum distance to relevant boundary
Wr: Width of unsprinklered fire cell
Dh: Height of enclosing rectangle
UPA: Unprotected areas

- Table C2 (d) & (f) – C/VM2
- FLED 400 MJ/m2 (Gym)

Exposure	Db	Wr	Dh	UPA Allowed	Elevation Area	UPA Area	UPA %	Comply
North	Facing Eagle Ray Rd	21.1 m	8.0 m	100 %	n/a	n/a	100 %	Yes
East	10.0 m	27.6 m	4.0 m	100 %	n/a	n/a	100 %	Yes
South	9.4 m	21.1 m	8.0 m	64 %	109 m^2	29 m^2	27 %	Yes
West	Facing Eagle Ray Rd	27.6 m	4.0 m	100 %	n/a	n/a	100 %	Yes

North elevation wall

The north elevation wall of the Gym firecell is facing Eagle Ray Road therefore, the north elevation wall of the Gym firecell can be made up of 100% unprotected areas.

East elevation wall

The east elevation wall of the Gym firecell is located 10.0 m from the relevant boundary therefore in accordance with Table C2(e), of C/VM2, the east elevation wall of the Gym can be made of 100% unprotected areas.

South elevation wall

The south elevation wall of the Gym firecell is located 9.4 m from the relevant boundary therefore in accordance with Table C2(f), of C/VM2, the south elevation wall of the Gym firecell is required to be fire rated FRR 120/120/120. The south elevation wall of the Gym firecell is more than 1 m from the relevant boundary therefore a one (1) way internal fire rating is acceptable.

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64% of the south elevation wall of the Gym firecell can be made up of unprotected areas (unprotected areas include non-fire rated windows, doors or other openings and non-fire rated external wall construction) and do not need to be fire rated – the unprotected areas calculated are within 64% as permitted.

Note: The largest single unprotected area must comply with Table 5.3 of C/AS2 as noted below.

West elevation wall

The west elevation wall of the Gym firecell is facing Eagle Ray Road therefore, the west elevation wall of the Gym firecell can be made up of 100% unprotected areas.

Largest single unprotected area check

Exterior Walls	Distance to boundary (Db)	Width of the enclosing rectangle	Height of enclosing Rectangle	In Compliance (Yes/No)
Mangawhai Central Fitness	-	-	-	-
South Elevation	9.4 metres	9.4 metres	3.0 metres	Yes

Largest individual unprotected area requirements

The largest individual unprotected area within the south elevation walls of the Gym firecell is within the requirements of C/VM2.

Small openings

In accordance with Paragraph 5.4.1 of C/AS2, small unprotected areas no greater than 0.1 m^2 are permitted in the south and west elevation walls to allow for small penetrations.

Notes

- Refer definition of "relevant boundary" – the relevant boundary is the nearest of a boundary of a freehold allotment, except that if the other property is a road, railway line or a public open space, the relevant boundary is the boundary on the far side of that other property.
- Unprotected areas include non-fire rated windows, doors or other openings and non-fire rated external wall construction.
- Exterior walls of the building more than 1 m from the relevant boundary only require a one (1) way internal fire rating.
- A structural engineer shall confirm the stability of the fire rated walls.

External cladding systems

As the building is located more than one (1) metre from the relevant boundaries and the building height is less than 10 metres in height, there are no external cladding requirements for this building.

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8. FIREFIGHTING

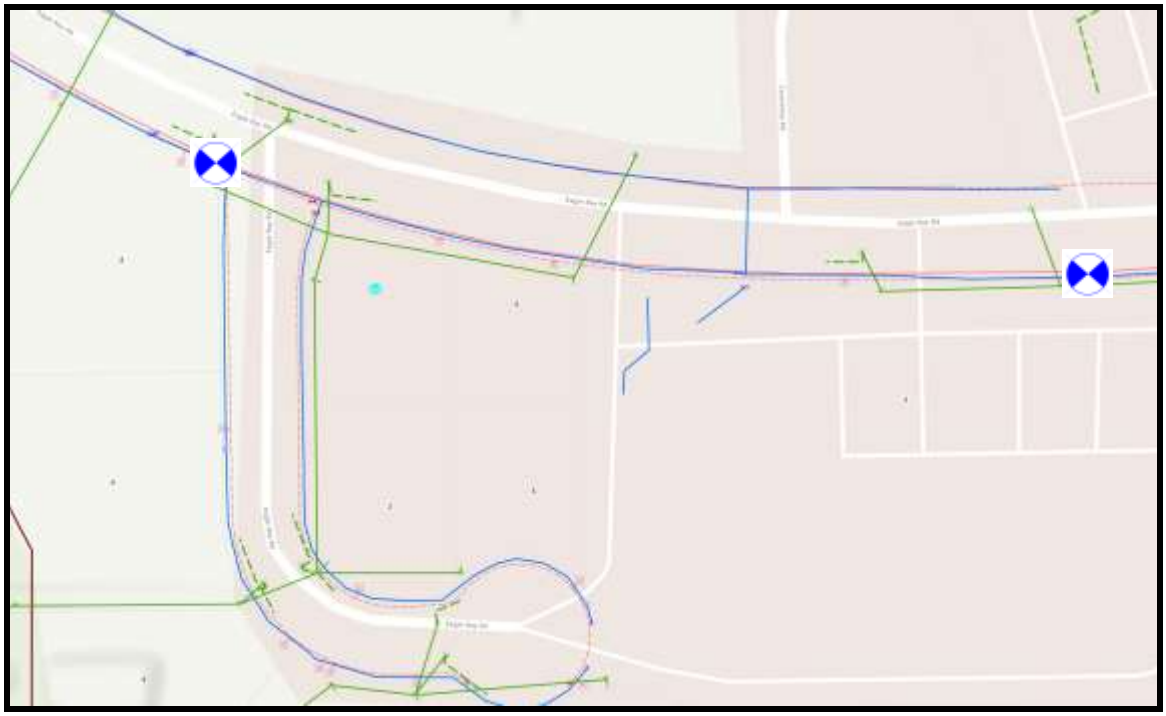
Fire & Emergency New Zealand vehicular access

If buildings are located remotely from the street boundaries of a property, pavements situated on the property and likely to be used by Fire and Emergency New Zealand vehicles to reach a hard-standing shall:

a) Be able to withstand a laden weight of up to 25 tonnes with an axle load of 8 tonnes or have a load-bearing capacity of no less than the public roadway serving the property, whichever is the lower, and
b) Be trafficable in all weathers, and
c) Have a minimum width of 4.0 m, and
d) Provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings, and
e) Provide access to a hard-standing from which there is an unobstructed path to the building within 20 m of:
(i) the firefighter access into the building, and
(ii) the inlets to fire sprinkler systems or building fire hydrant systems, where these are installed.

Firefighting access is available from Eagle Ray Road, Mangawhai. The existing access is to be maintained.

Location of existing street hydrants



9. PREVENTION OF FIRE OCCURRING

Electrical fire safety

In compliance with Paragraph 7.4.1 of C/AS2, electrical installations in buildings must be installed in accordance with the requirements of the New Zealand Building Code Clause G9.

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10. DISABLED ACCESS AND FACILITIES

This report does not cover the requirements for disabled access and facilities in accordance with NZS 4121:2011 and D1/AS1. These shall be addressed by others.

11. CONSTRUCTION MONITORING

The following construction documentations/Producer Statements must be provided by the individual contractors (where applicable to this project):

- Fire alarm system: The fire alarm contractor is responsible for the fire alarm system to comply with the requirements of NZS 4512. The fire alarm contractor shall issue a Producer Statement on the completion of work.
- Illuminated exit signs and emergency lighting systems: An electrical engineer is to design the system in compliance with F6/AS1 and F8/AS1. An electrician is responsible for the installation of the systems and shall issue a Producer Statement on the completion of work.
- Passive fire protection: A passive fire installer/specialist is responsible for all fire stopping systems installed. The passive installer/specialist shall issue a Producer Statement on the completion of work.
- Fire rated walls and construction: The builder/installer of each system is responsible for all work/systems installed. The builder/installed shall issue a Producer Statement on the completion of work.
- Surface Finish requirements: It is the responsibility of the architect/client to provide manufactures specifications to confirm that the selected Material Group Number(s) meets the requirements of the Fire Report. This also includes the flooring requirements.

Note: As the Fire Report is based on The Acceptable Solutions of the New Zealand Building Code a Producer Statement is not required from the author of this Fire Report.

Types of Producer Statements

Producer statement design (PS1) these statements are issued by design professionals as confirmation that the building work as designed and documented complies with the New Zealand Building Code.

Producer statement design review (PS2) these statements are issued by design professionals who have reviewed the work of the designer (sometimes on behalf of the Council) as confirmation that the building work that they have reviewed complies with the New Zealand Building Code.

Producer statement construction (PS3) this statement is issued by the contractor who has performed the building work as confirmation that the building work is in accordance with the consented plans and the New Zealand Building Code.

Producer statement construction review (PS4) this statement is issued by the design professional who has reviewed the work of the contractor as confirmation that the building work has been carried out in accordance with the consented plans and the New Zealand Building Code.

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12. DESIGN DOCUMENTATION

The Fire Report documentation is provided for at least two (2) purposes:

1. The design process – during the design process the documentation identifies what must be included in "construction documentation" (supplied for example by architects, engineers or the building owner) to meet the fire safety requirements.
2. Building Consent or other Council approval(s) – the documents provide the justification that the fire safety design complies with the New Zealand Building Code.

The Fire Report is used to demonstrate compliance with the New Zealand Building Code and is not to be used by the building trades "for construction".

It is the responsibility of the architect and other design disciplines to provide construction documentation which includes plans and specifications which must completely and accurately describe and detail as appropriate, all the fire protection measures required by the fire report.

APPENDIX 1: Compliance Schedule Information

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Compliance Schedule Information

Address: 7 Eagle Ray Road, Mangawhai
Compliance Schedule No: "NEW"

Testing, inspection and Maintenance Procedures

Specified System	**SS 2/1 Automatic or manual emergency warning systems for fire**	**New**
Possible Performance Standard	NZS 4512:2021 Fire detection and alarm systems in buildings.	✓
Possible IMR procedures	Part 6 of NZS 4512:2021 Fire detection and alarm systems in buildings.	
Specified System	**3/2 Access controlled doors**	**New**
Possible Performance Standard	Specific design required detailing level of performance Could reference C/AS2 - Acceptable Solution for Buildings other than Risk Group SH, Amendment 3 dated 2nd November 2023 (Paragraphs 3.15.2 & 3.15.7)	✓
Possible IMR procedures	Specific inspection, maintenance and reporting procedures would be required from the designer as dependent on type of system installed	
Specified System	**SS 4 Emergency lighting systems**	**New**
Possible Performance Standard	Acceptable Solution F6/AS1 (Amendment 4: 1 January 2017) (Paragraphs 1.3.1, 1.5.1 & 1.6.1)	✓
Possible IMR procedures	AS/NZS 2293.2:1995 Emergency evacuation lighting for buildings – Part 2: Inspection and maintenance	
Specified System	**SS 14/2 Signs relating to specified systems 1–13**	**New**
Possible Performance Standard	Generally Acceptable Solution F8/AS1 Amendment 4 (effective 1 January 2017) However individual standards such as NZS4541: 2013 may have additional signage requirements not shown in F8/AS1 where the below is not an exhaustive list ▪ SS 2/1: Sign showing how to operate a fire alarm call point (F8/AS1 Paragraph 5.1) ▪ SS 3/2: Sign showing location of an emergency door release on access control doors	
Possible IMR procedures	Specific inspection maintenance and reporting procedures required for the proposed system but generally: **Illuminated signs** a. continued effectiveness b. of the correct type c. present and in the right locations they are legible and illuminated	✓

Specified System	SS 15(b) Final exits	New
Possible Performance Standard	C/AS2 - Acceptable Solution for Buildings other than Risk Group SH, Amendment 3 dated 2nd November 2023 Section 3.15 & Paragraph 3.12	✓
Possible IMR procedures	Specific inspection maintenance and reporting procedures required for the proposed system that cover checking all aspects of the final exit doors	
Specified System	**SS 15(d) Signs for communicating information to facilitate evacuation**	**New**
Possible Performance Standard	Solution F8/AS1 Amendment 4 (effective 1 January 2017) (Section 4)	✓
Possible IMR procedures	Specific inspection maintenance and reporting procedures required for the proposed system that cover checking all exit signage	

The Specified Systems listed above are for this building at the above address as identified by the Fire Report. The Specified Systems identified above are not an inclusive list of system relating to the building. A comprehensive check for all possible systems shall be carried out by the client, designer, other design consultants or the IQP when completing the Compliance Schedule.

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APPENDIX 2: Fire Report Drawings & Documents

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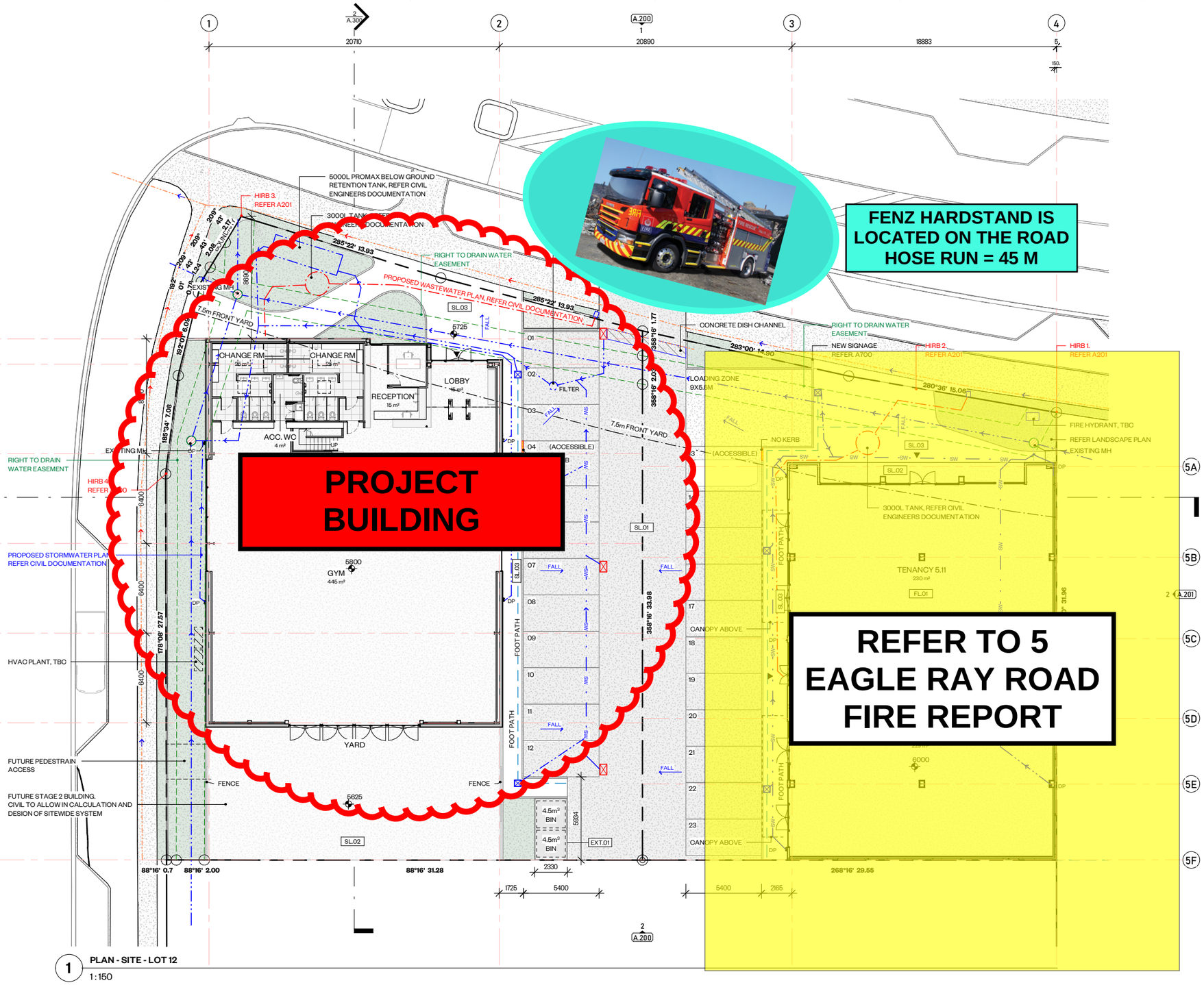
FENZ HARDSTAND IS LOCATED ON THE ROAD HOSE RUN = 45 M



1 PLAN - SITE - LOT 12
1 : 150

SL_SLAB

SL.01 IMPERMEABLE DRIVEWAY SYSTEM: 150MM PERMCON PERMEBALE CONCRETE DRIVEWAY / 150MM PERMCON BASE COURSE/ SUB BASE AND SUB-GRADE AS PER MANUFACTURERS SPEC
SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL
SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

EXT_EXTERIOR WORKS

EXT.01 BIN STORAGE: 75X75 STAINLESS STEEL FRAME / SELECTED TIMBER CLADDING / STAIN FINISH

PIPE TYPES AND SIZES

EXISTING WASTER WATER LINE
NEW WASTE WATER LINE
EXISTING STORM WATER LINE
NEW STORM WATER LINE
Ø160 NOVAFLO SUBSOIL DRAIN
TYPE 2 SUMP. REFER CIVIL DOCUMENTATION
uPVC SUMP, REFER CIVIL DOCUMENTATION

SITE IDENTIFICATION - 7 EAGLE RAY ROAD

ADDRESS	7 EAGLE RAY ROAD, MANGAWHAI
LOT	LOT 12
DP	DP 579625
CT	-
SITE AREA	1408m²
TA	KAIPARA DISTRICT COUNCIL
SITE ZONE	SUBZONE 7 - SERVICE
WINDZONE	HIGH
WIND REGION	REGION A
EARTHQUAKE ZONE	ZONE 1
EXPOSURE ZONE	ZONE D

SITE PLANNING CONTROLS

		COMPLIANCE
BOUNDARY OFFSET		
FRONT YARD	7.5 M	NO
REAR YARD	0 M	YES
SIDE YARD	0 M	YES
MAXIMUM HEIGHT	8.0 M	NO
HEIGHT IN RELATION TO BOUNDARY	3M+45°	YES

STRATA

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PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

ASSETCARE

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DRAWING DATE	10/04/2025
DRAWING NAME	SITE DWG
DRAWING NUMBER	FD 01 - REV 1
DRAWN BY	SHANE GALLICHAN FIRE ENGINEER

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

REVISIONS

DATE		DRAWN	Author
SHEET SIZE	A3	CHECKED	Checker

TITLE

PLAN - SITE

DRAWING

A7.101

REVISION

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DRAWING DATE	10/07/2025
DRAWING NAME	SITE DWG
DRAWING NUMBER	FD 02 - REV 4
DRAWN BY	SHANE GALLICHAN FIRE ENGINEER

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

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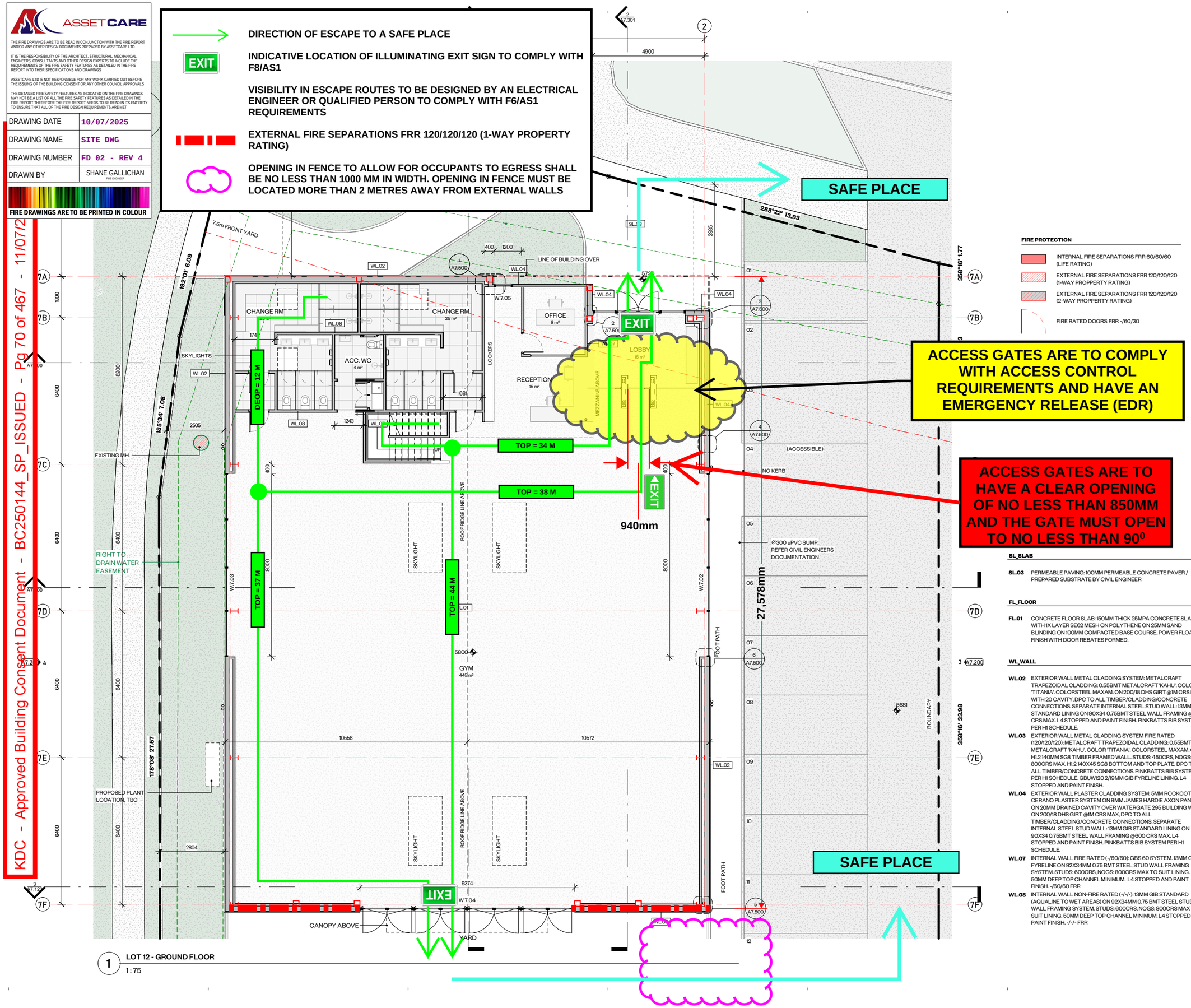
DIRECTION OF ESCAPE TO A SAFE PLACE

EXIT INDICATIVE LOCATION OF ILLUMINATING EXIT SIGN TO COMPLY WITH F8/AS1

VISIBILITY IN ESCAPE ROUTES TO BE DESIGNED BY AN ELECTRICAL ENGINEER OR QUALIFIED PERSON TO COMPLY WITH F6/AS1 REQUIREMENTS

EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (1-WAY PROPERTY RATING)

OPENING IN FENCE TO ALLOW FOR OCCUPANTS TO EGRESS SHALL BE NO LESS THAN 1000 MM IN WIDTH. OPENING IN FENCE MUST BE LOCATED MORE THAN 2 METRES AWAY FROM EXTERNAL WALLS



1 LOT 12 - GROUND FLOOR
1 : 75

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SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

N

SL_SLAB

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

FL_FLOOR

FL.01 CONCRETE FLOOR SLAB: 150MM THICK 25MPA CONCRETE SLAB WITH 1X LAYER SE62 MESH ON POLYTHENE ON 25MM SAND BLINDING ON 100MM COMPACTED BASE COURSE, POWER FLOAT FINISH WITH DOOR REBATES FORMED.

WL_WALL

WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU', COLOR 'TITANIA', COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.03 EXTERIOR WALL METAL CLADDING SYSTEM FIRE RATED (120/120/120): METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU', COLOR 'TITANIA', COLORSTEEL MAXAM. ON H1.2 140MM SG8 TIMBER FRAMED WALL. STUDS: 450CRS, NOGS: 800CRS MAX. H1.2 140X45 SG8 BOTTOM AND TOP PLATE. DPC TO ALL TIMBER/CONCRETE CONNECTIONS. PINKBATTS BIB SYSTEM PER H1 SCHEDULE. GBUW120 2/19MM GIB FYRELINE LINING. L4 STOPPED AND PAINT FINISH.

WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.07 INTERNAL WALL FIRE RATED (-/60/60): GBS 60 SYSTEM. 13MM GIB FYRELINE ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/60/60 FRR

WL.08 INTERNAL WALL NON-FIRE RATED (-/-/-): 13MM GIB STANDARD (AQUALINE TO WET AREAS) ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/-/- FRR

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

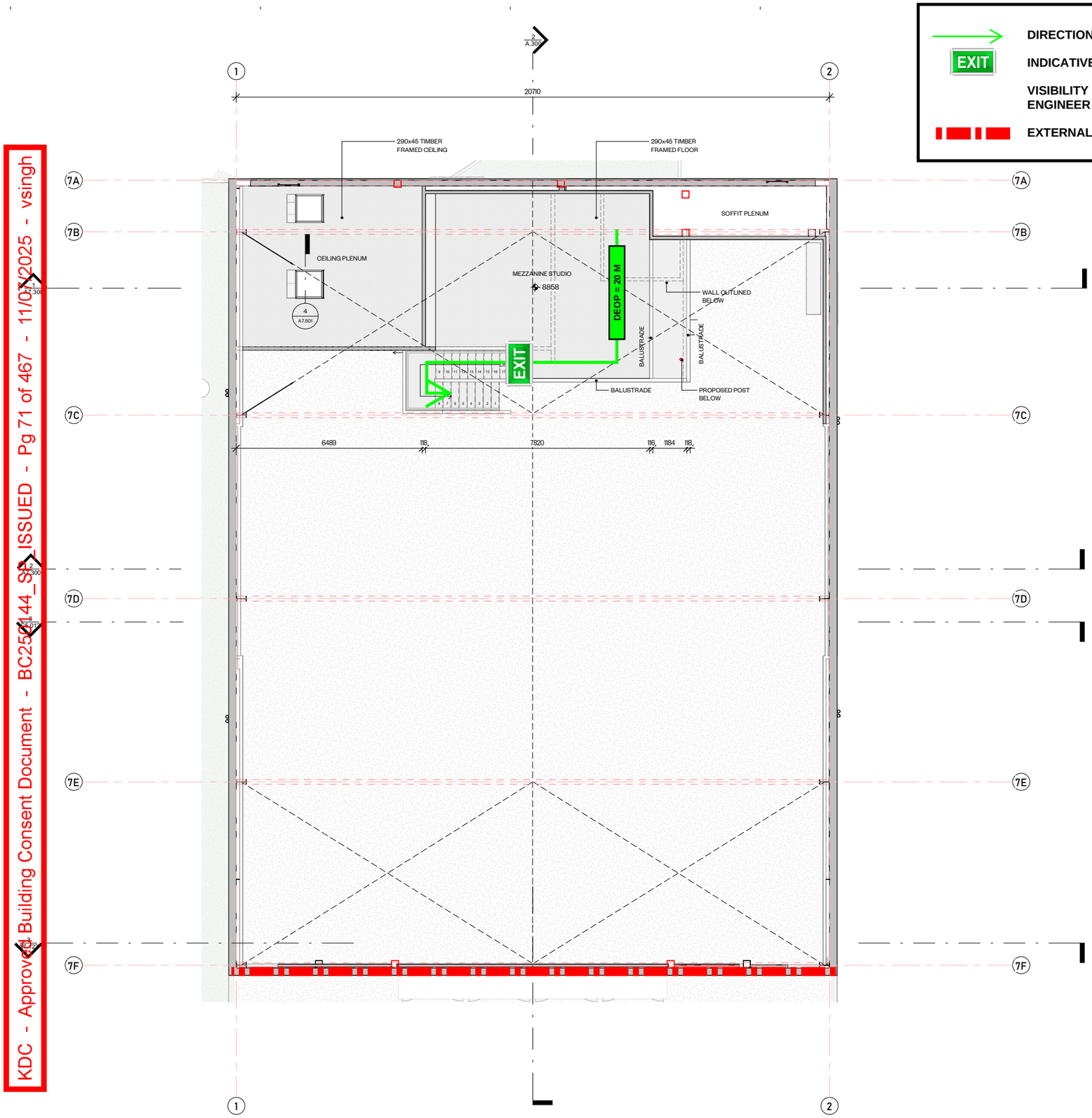
REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

PLAN - GROUND FLOOR

DRAWING **A7.102** REVISION **S5**



1 PLAN MEZZANINE - LOT 12
1:75

DIRECTION OF ESCAPE TO A SAFE PLACE

EXIT INDICATIVE LOCATION OF ILLUMINATING EXIT SIGN TO COMPLY WITH F8/AS1

VISIBILITY IN ESCAPE ROUTES TO BE DESIGNED BY AN ELECTRICAL ENGINEER OR QUALIFIED PERSON TO COMPLY WITH F6/AS1 REQUIREMENTS

EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (1-WAY PROPERTY RATING)

KDC - Approved Building Consent Document - BC250144_S5_ISSUED - Pg 71 of 467 - 11/04/2025 - vsingh

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OFFICE@STRATA-ARCHITECTS.NZ
09 827 7901

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PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MAROTERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

ASSETCARE

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DRAWING DATE	10/04/2025
DRAWING NAME	SITE DWG
DRAWING NUMBER	FD 03 - REV 1
DRAWN BY	SHANE GALLICHAN FIRE ENGINEER

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

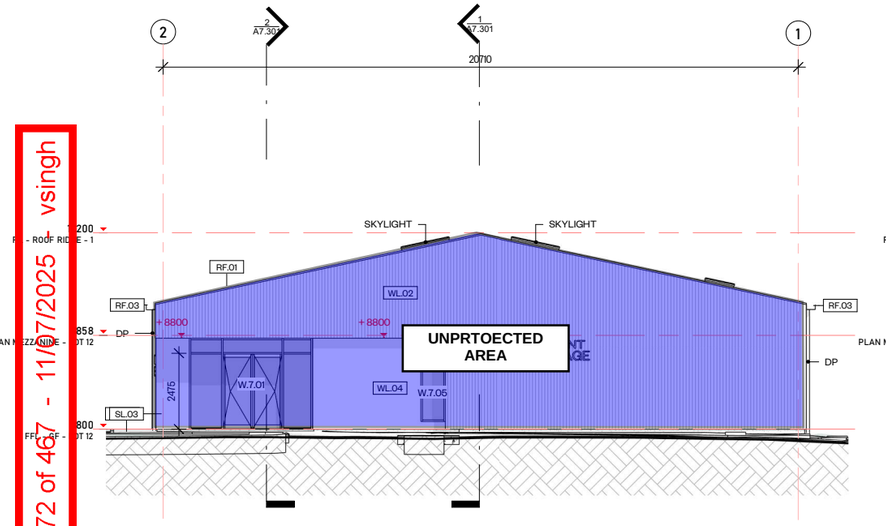
TITLE

PLAN - MEZZANINE FLOO

DRAWING A7.103

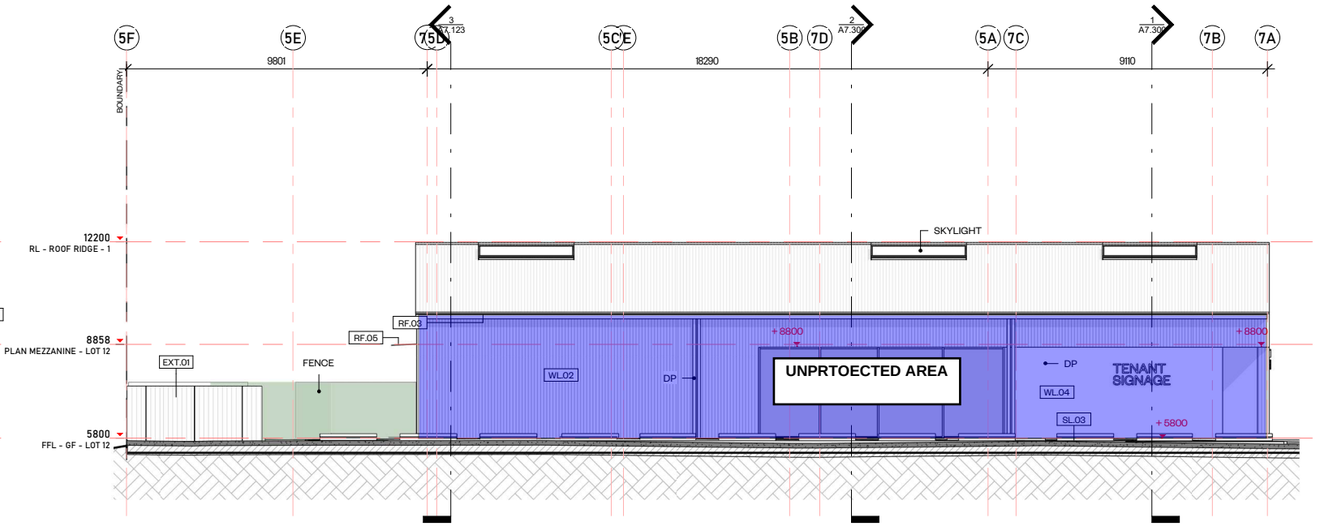
REVISION S5

KDC - Approved Building Consent Document - BC250144_SP_ISSUED - Pg 72 of 467 - 11/7/2025 vsingh



1 ELEVATION - NORTH - LOT 12

1 : 100



3 ELEVATION - EAST - LOT 12

1 : 100

SL_SLAB

SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

WL_WALL

WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY. DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.03 EXTERIOR WALL METAL CLADDING SYSTEM FIRE RATED (120/120/120): METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON H1.2 140MM SG8 TIMBER FRAMED WALL. STUDS: 450CRS, NOGS: 800CRS MAX. H1.2 140X45 SG8 BOTTOM AND TOP PLATE. DPC TO ALL TIMBER/CONCRETE CONNECTIONS. PINKBATTS BIB SYSTEM PER H1 SCHEDULE. GIBUW120 2/19MM GIB FYRELINE LINING. L4 STOPPED AND PAINT FINISH.

WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

RF_ROOF

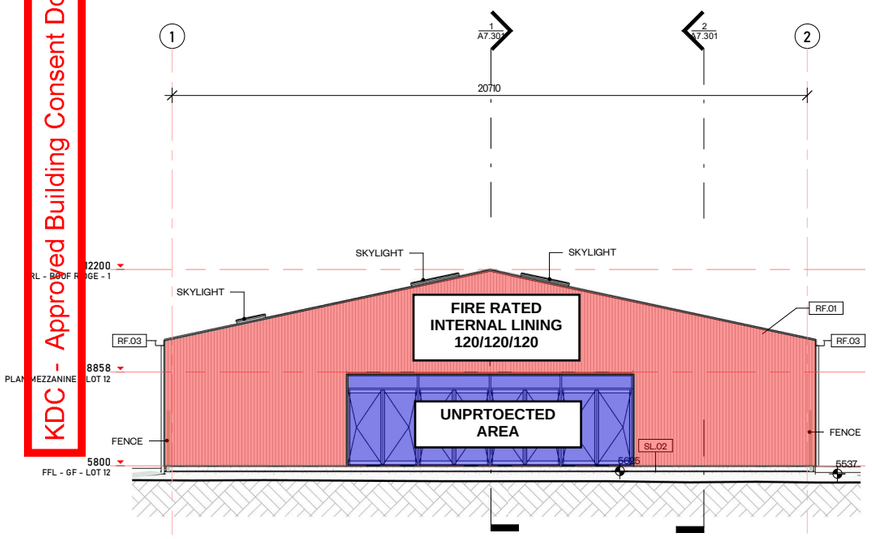
RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH 1X BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE

RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.

RF.05 METAL CANOPY: 8MM FOLDED ALUMINIUM CANOPY. POWDERCOAT 'TITANIA'. INSTALL AS PER DETAILS.

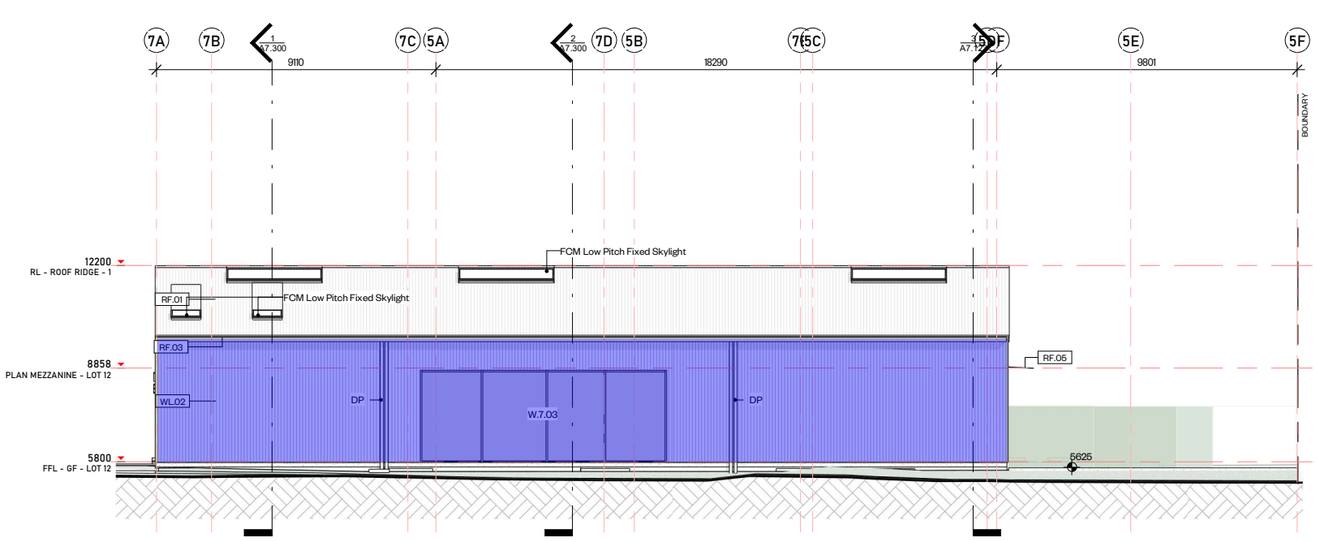
UNPROTECTED AREAS

FIRE RATED CONSTRUCTION 120/120/120 ONE - WAY RATING



2 ELEVATION - SOUTH - LOT 12

1 : 100



4 ELEVATION - WEST - LOT 12

1 : 100

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PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

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DRAWING DATE	10/04/2025
DRAWING NAME	ELEV DWG
DRAWING NUMBER	FD 04 - REV 1
DRAWN BY	SHANE GALLICHAN FIRE ENGINEER

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

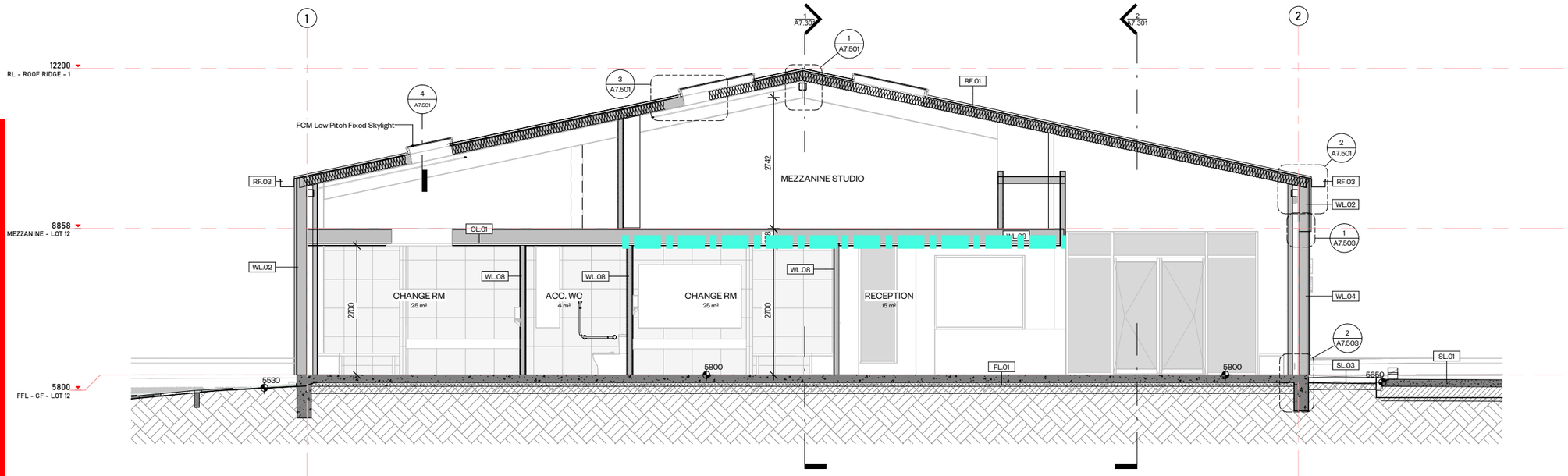
DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

ELEVATIONS - PROPOSED

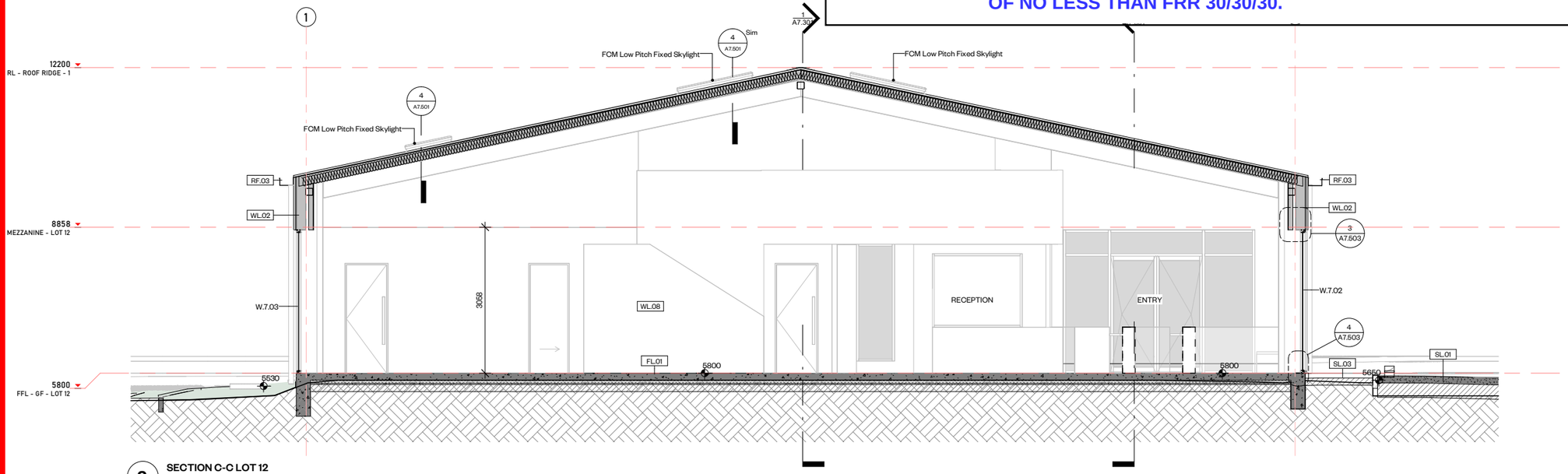
DRAWING **A7.200** REVISION **S5**

KDC - Approved Building Consent Document - BC250144_SP_ISSUED - Pg 73 of 467 - 11/07/2025 - vsingh



1 **SECTION A-A LOT 12**
1:50

INTERMEDIATE FLOORS INCLUDING THEIR SUPPORTING PRIMARY ELEMENTS AND STAIRS SHALL HAVE A FIRE RESISTANCE RATING OF NO LESS THAN FRR 30/30/30.



2 **SECTION C-C LOT 12**
1:50

SL_SLAB

SL.01 IMPERMEABLE DRIVEWAY SYSTEM: 150MM PERMCON PERMEBALE CONCRETE DRIVEWAY / 150MM PERMCON BASE COURSE/ SUB BASE AND SUB-GRADE AS PER MANUFACTURERS SPEC

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

FL_FLOOR

FL.01 CONCRETE FLOOR SLAB: 150MM THICK 25MPA CONCRETE SLAB WITH 1X LAYER SE62 MESH ON POLYTHENE ON 25MM SAND BLINDING ON 100MM COMPACTED BASE COURSE, POWER FLOAT FINISH WITH DOOR REBATES FORMED.

WL_WALL

WL.02 EXTERIOR WALL. METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU' COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.04 EXTERIOR WALL. PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL_WALL

WL.08 INTERNAL WALL NON-FIRE RATED (-/-/-): 13MM GIB STANDARD (AQUALINE TO WET AREAS) ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/-/- FRR

CL- CEILING

CL.01 CEILING LINING : 13MM GIB. LINED AND STOPPED SELECTED PAINT FINISH

RF_ROOF

RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH 1X BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE

RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.

S-STRUCTURAL

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PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

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DRAWING DATE	10/04/2025
DRAWING NAME	INTERM DWG
DRAWING NUMBER	FD 05 - REV 1
DRAWN BY	SHANE GALLICHAN (FIRE ENGINEER)

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

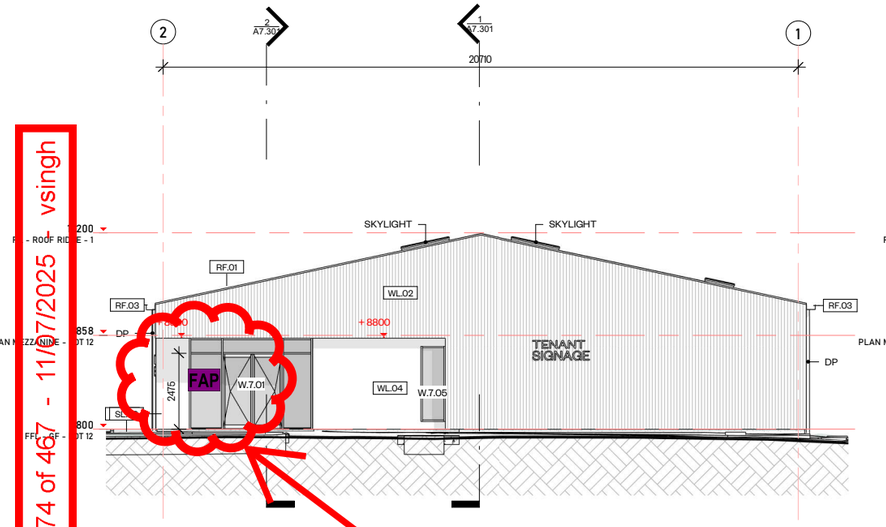
DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

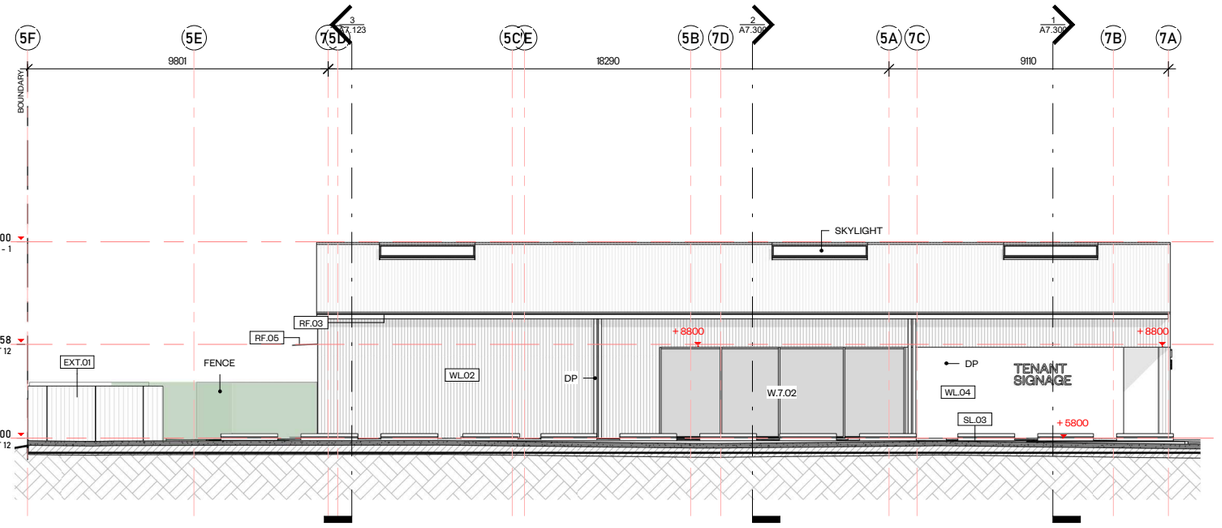
SECTIONS - A & C

DRAWING A7.300 REVISION S5

KDC - Approved Building Consent Document - BC250144_SP_ISSUED - Pg 74 of 467 - 11/7/2025 vsingh



1 ELEVATION - NORTH - LOT 12
1 : 100



3 ELEVATION - EAST - LOT 12
1 : 100

SL_SLAB

SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL
SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

WL_WALL

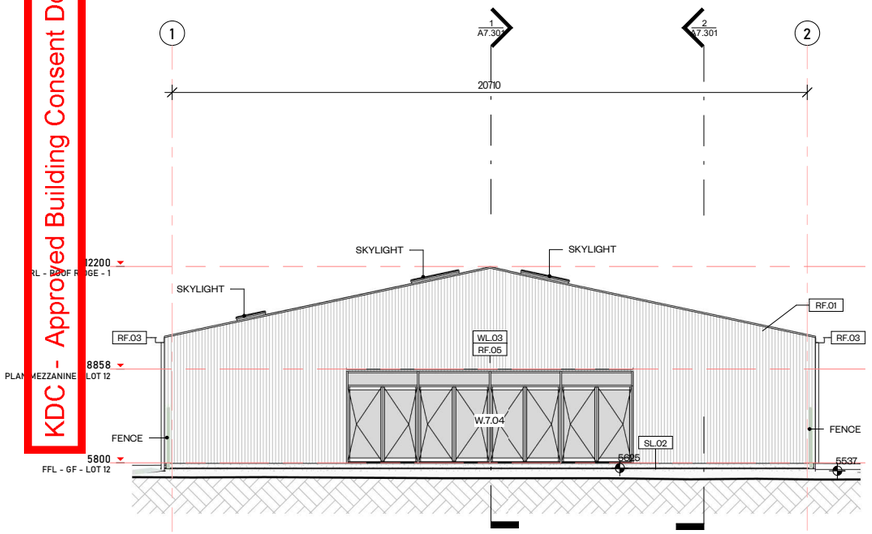
WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY. DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. TO STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM

RF_ROOF

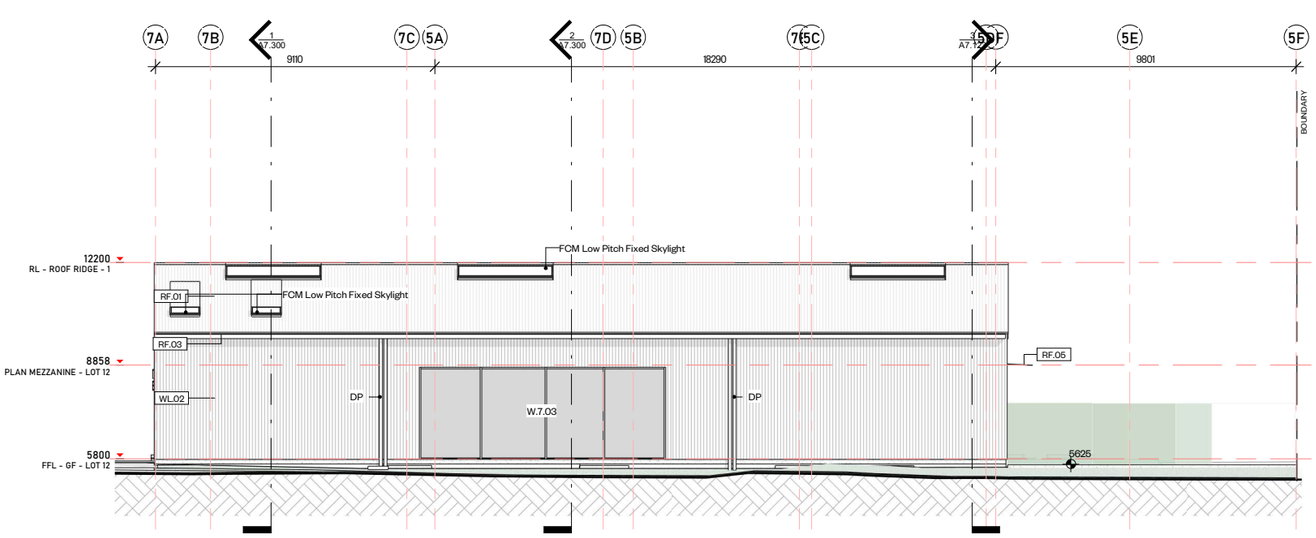
RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH IX BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE
RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.
RF.05 METAL CANOPY: 8MM FOLDED ALUMINIUM CANOPY. POWDERCOAT 'TITANIA'. INSTALL AS PER DETAILS.

INDICATIVE LOCATION PROPOSED FOR THE FIRE ALARM PANEL

FENZ APPROVAL REQIRED BY FIRE ALARM CONTRACTOR



2 ELEVATION - SOUTH - LOT 12
1 : 100



4 ELEVATION - WEST - LOT 12
1 : 100

STRATA

STRATA STUDIO LIMITED
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09 827 7901

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IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE PRINTED AND UP TO DATE DOCUMENTATION IS READILY AVAILABLE ON SITE AT ALL TIMES.

PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

ASSETCARE

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THE DETAILED FIRE SAFETY FEATURES AS INDICATED ON THE FIRE DRAWINGS MAY NOT BE A LIST OF ALL THE FIRE SAFETY FEATURES AS DETAILED IN THE FIRE REPORT THEREFORE THE FIRE REPORT NEEDS TO BE READ IN ITS ENTIRETY TO ENSURE THAT ALL OF THE FIRE DESIGN REQUIREMENTS ARE MET

DRAWING DATE	15/05/2025
DRAWING NAME	PANEL DWG
DRAWING NUMBER	FD 06 - REV 2
DRAWN BY	SHANE GALLICHAN (FIRE ENGINEER)

FIRE DRAWINGS ARE TO BE PRINTED IN COLOUR

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

ELEVATIONS - PROPOSED

DRAWING **A7.200** REVISION **S5**

APPENDIX 3: Technical Information

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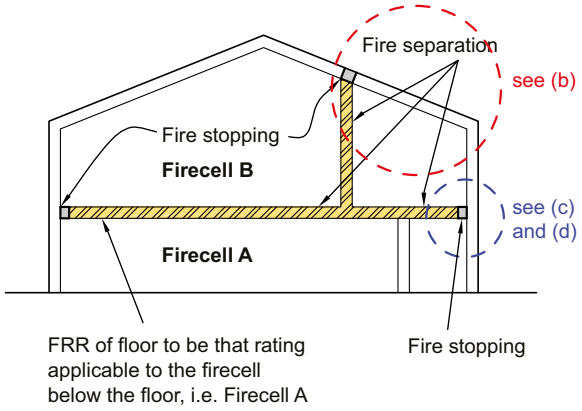
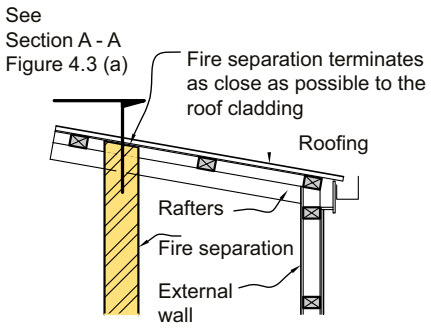
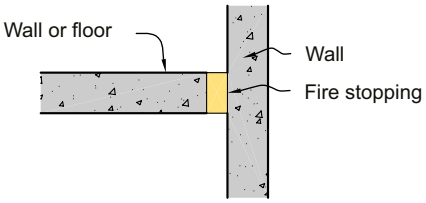
Figure 4.3 **Junction of fire separations – 1**
Paragraphs 4.5.5, 4.5.7 and 4.15.3



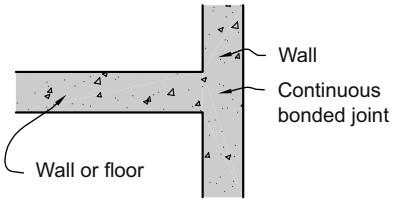
(a) SECTION



(b) SECTION
JUNCTION FIRE SEPARATION
WALL TO ROOFING



(c) PLAN OR SECTION
JUNCTION FIRE SEPARATION
WALL AND FLOOR



(d) PLAN OR SECTION
JUNCTION FIRE SEPARATION
WALL AND FLOOR

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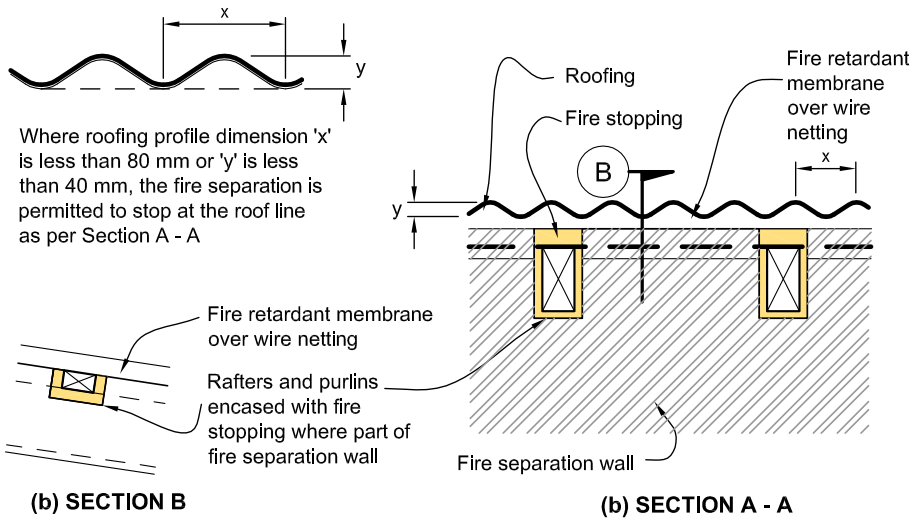
Figure 4.4 **Junction of fire separations – 2**
Paragraphs 4.5.5, 4.5.7 and 4.15.3



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Appendix A (normative): Fire safety systems

A1.1 Fire alarm and sprinkler systems

A1.1.1 Part 2 specifies which type of *fire safety system* shall be installed in each *risk group*.

A1.1.2 *Fire* alarm systems shall be designed and installed in accordance with NZS 4512 where appropriate and the specific requirements of this Acceptable Solution.

A1.1.3 Sprinkler systems shall be designed and installed in accordance with NZS 4541, NZS 4515 or NZS 4517 where appropriate and the specific requirements of this Acceptable Solution.

A1.1.4 Smoke alarms shall be manufactured and installed in accordance with NZS 4514 where appropriate and the specific requirements of this Acceptable Solution.

A2.1 Fire safety system descriptions

Type 1 – Domestic smoke alarm system

A2.1.1 A Type 1 is a smoke alarm or multiple interconnected smoke alarm devices, each containing a smoke detector and an alarm sounding feature. The system shall comply with NZS 4514. Smoke alarms shall be installed in every *household unit* or *suite* of ***risk group* SH**, and ***risk group* SM** where a Type 5 is not required by this Acceptable Solution. Connection to a *remote receiving centre* is not required.

SH SM

Type 2 – Manual fire alarm system

A2.1.2 A Type 2 is a *fire* alarm system compliant with NZS 4512 with manual call points throughout the *building*. Supplementary heat, smoke, or other detectors may be included in the system.

Type 3 – Automatic fire alarm system activated by heat detectors and manual call points

A2.1.3 A Type 3 is an automatic *fire* alarm system compliant with NZS 4512 with full *building* coverage of heat detectors and manual call points.

If the *building* area to be protected is not fully covered with heat detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary detectors.

Type 4 – Automatic fire alarm system activated by smoke detectors and manual call points

A2.1.4 A Type 4 is an automatic *fire* alarm system compliant with NZS 4512 with full *building* coverage of smoke detectors and manual call points.

If the *building* area to be protected is not fully covered with smoke detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary smoke detectors.

In limited circumstances as described in NZS 4512, where the ambient conditions of a space are not suitable for smoke detectors, heat detectors are allowed to be substituted.

Type 5 – Automatic fire alarm system with modified smoke detection and manual call points

A2.1.5 A Type 5 is a variation of the Type 4 and Type 7 alarm systems requiring part of the smoke detection component to comprise only a local alarm. The local alarm system, activated by the presence of smoke, shall have audible alerting devices to warn only the occupants within the *household unit* or *suite*, and the *building* management (such as in motels, hotels or multi-unit accommodation in retirement villages), where such management exists.

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The local alarm component of a Type 5 system:

a) Shall be restricted to single *firecells* containing sleeping accommodation, being *household units* or individual *suites* in ***risk group*** **SM** and **SI**. The local alarm system shall not be extended to other areas such as *exitways*, common spaces, or other *firecells* in the same *building*. These shall retain a Type 4 smoke detection system, and

b) Shall have the facility to be silenced (muted) by a 'hush' facility located at a level readily able to be reached in accordance with clause D1 of the Building Code.

c) Shall be permitted only where an automatic *fire* alarm system activated by heat detectors (part of the main alarm system) is also installed in the *household unit* or *suite* which does not already have an automatic *fire* sprinkler system.

A2.1.6 Where a Type 5 is required, the Type 4 or Type 7 system required in *exitways*, common spaces, and other *firecells* in the same *building* shall not be modified. The system installation for Type 3, Type 4 and Type 7 components shall comply with NZS 4512. The sprinkler element of the system installation for Type 7 shall also comply with NZS 4541.

A2.1.7 The Type 5 system installation for the local smoke alarm component shall also comply with NZS 4512.

Type 6 – Automatic fire sprinkler system with manual call points

A2.1.8 A Type 6 system is a combined automatic *fire* sprinkler system and Type 2 alarm. Activation of the sprinklers shall automatically activate the audible alerting devices of the *fire* alarm system. Sprinkler installation shall comply with NZS 4541, as appropriate and as modified by Appendix B.

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Type 7 – Automatic fire sprinkler system with smoke detectors and manual call points

A2.1.9 A Type 7 system is a combined Type 6 and Type 4 or Type 5 alarm system. Sprinkler installation shall comply with the requirements of a Type 6 system.

Type 9 – Smoke control in air-handling systems

A2.1.10 Where smoke control is required in relation to heating, ventilating or air conditioning systems, it shall comply with the requirements of either:

a) AS 1668.1 for *HVAC* system shutdown and interface with any Type 4 or 7 system, or

b) NZS 4512 to provide ancillary function output for *HVAC* system shutdown if a Type 4 or 7 alarm system is used as a means of smoke detection.

Type 15 – Fire and Emergency New Zealand Lift Control

A2.1.11 The control of lifts under *fire* conditions shall comply with NZS 4332.

Type 18 – Fire hydrant systems for buildings

A2.1.12 *Fire* hydrant systems shall comply with NZS 4510.

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Appendix B (normative): Modifications to standards

B1.1 Fire detection and alarm systems in buildings

B1.1.1 Where domestic smoke alarm systems are required by this Acceptable Solution, they shall comply with NZS 4514 without further modification to the Standard.

B1.1.2 Wherever fire alarms are required by this Acceptable Solution, they shall comply with NZS 4512 without further modification to the Standard.

B2.1 Automatic fire sprinkler systems

B2.1.1 Wherever sprinklers are required by this Acceptable Solution, they shall comply with the relevant New Zealand Standard, modified as shown in Paragraphs B2.1.2 and B2.1.3.

B2.1.2 NZS 4541 is modified as follows:

Clause 1.3 Definitions

Sprinkler system A system including:

(a) to (i) No change.

(j) Delete.

(k) No change.

Clause 2.5 Delete entire clause

Clause 2.6 Delete entire clause

Clause 12.3 Routine inspections

Clause 12.3.1

Delete first two paragraphs and replace with:

"It is important that a sprinkler system at all times complies with this Standard as modified by Paragraph B2.1 of Appendix B to C/AS2 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person."

B2.2.1 NZS 4515 is amended as follows:

Clause 1.5 Definitions

Sprinkler systems A system including:

(a) to (g) No change

(h) Delete.

Clause 1.11 Delete entire clause

Clause 2.1.2 Delete.

Clause 2.1.3 Delete.

B3.1 Smoke control in air-handling systems

B3.1.1 Where AS 1668.1 is used as a means to comply with A2.1.10 a), AS 1668.1 is modified as follows:

Clause 7.2.1(b) Delete clause

Clause 7.2.3 Delete clause

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B3.1.2 Where AS 1668.1 is used as a means to comply with A2.1.10 a), AS 1670.1 as referenced in AS 1668.1 is modified as follows:

Clause 7.1

Delete first sentence.

Delete last sentence and replace with: "Detection and control shall also be in accordance with NZS 4512 except where varied by this clause."

Clause 7.4.1 Replace "this Standard" with "NZS 4512"

Clause 7.5.1 (c) Delete and replace with: "Detectors shall be spaced in accordance with the requirements of NZS 4512"

Clause 7.5.1 (d) Delete and replace with: "Optical beam smoke detectors shall be spaced in accordance with the requirements of NZS 4512"

Clause 7.5.1 Note Delete

Clause 7.5.2.1 Replace "this Standard" with "NZS 4512".

Clause 7.2.5.1(i) Delete the first sentence and replace with: "Rooms that have a dimension of 10 m or more in any direction on the horizontal plane shall have detection provided in the room in accordance with NZS 4512".

Figure 7.5.2.2(B) Replace "15 m" with "10 m"

Clause 7.15.1 Location Delete and replace with "The FFCP shall be incorporated into or located adjacent to the main indicating unit and constructed in accordance with the requirements in NZS 4512.

Note An example is shown in Figure 7.15.1"

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Clause 7.17.2 (iii) Replace "AS/CA S009" with "AS/NZS 3000"

Clause 7.18 Transmission paths Delete first paragraph and replace with: "Transmission paths to equipment serving more than one smoke control zone shall have a redundant transmission path. Transmission paths to the following equipment forming part of the smoke control system shall meet the requirements of Clause 2.6, Clause 3.13, Clause 3.25, Clause 3.26 and NZS 4512."

Clause 7.19.1 Replace "Clause 1.7.2" with "NZS 4512".

B3.1.3 In addition to meeting the requirements in AS 1670.1 as modified to comply with the requirements for smoke detectors which are part of the smoke control in air-handling systems, further requirements in NZS 4512 will need to be met where a *fire* alarm system is required to be installed.

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Appendix C (normative): Test methods

C1.1 General

This Appendix contains test methods for confirming that specific *building elements* satisfy relevant provisions of this Acceptable Solution for Protection from Fire. It includes both established *standard tests* and other test methods for *building elements* in situations where *standard tests* are unavailable.

If these specific *building elements* have been tested to a version of a Standard in force at the date of testing and a later version of that Standard has been incorporated by reference in this Acceptable Solution, retesting is not required.

C2.1 Flammability of floor coverings

Materials shall be assigned a critical radiant flux via either:

a) Testing to ISO 9239 Reaction to fire tests for flooring– Part 1: Determination of the burning behaviour using a radiant heat source, or

b) Adequacy, determined through following the methodology in C/VM2 Appendix B Table B1.

C3.1 Flammability of suspended flexible fabrics and membrane structures

Materials shall be assigned a *flammability index* when tested to:

a) AS 1530 Methods for fire tests on building materials and structures – Part 2: Test for flammability of materials.

C4.1 Properties of lining materials

C4.1.1 Combustibility test

Materials shall be classified as:

a) *Non-combustible* or *combustible* when tested to AS 1530 Methods for fire tests on building materials and structures – Part 1: Combustibility test for materials; or

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b) *Non-combustible* when classified as A1 in accordance with BS EN 13501-1 Fire classification of construction products and building elements – Part 1:2018 Classification using test data from reaction to fire tests; or

c) *Limited combustible* when classified as A2 in accordance with BS EN 13501-1 Fire classification of construction products and building elements – Part 1:2018 Classification using test data from reaction to fire tests.

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C4.1.2 Material for internal surface linings shall be given a *Group Number* in accordance with Appendix A of C/VM2 via one the following methods:

a) Testing to ISO 5660 Reaction-to-fire tests – Part 1: Heat release rate (cone calorimeter method), and Part 2 Smoke production rate (dynamic method), or

b) Testing to ISO 9705 Fire tests – Full scale room test for surface products, or

c) Equivalency determined through an approved alternative test or classification method as provided in Table C1.1, or

d) Adequacy may be determined by applying the values in Table C1.2.

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Table C1.1 Alternative test or classification standards for Group Numbers

Requirements according to C/VM2 Appendix A using ISO 9705 or ISO 5660	Australian requirements according to NCC Specification C1.10 Clause 4 using AS ISO 9705	European Classification using EN 13501-1
Group Number 1-S	Group Number 1, and a smoke growth rate index not more than 100	Class A1, A2 or Class B and smoke production rating s1 or s2
Group Number 1	Group Number 1	Class A1, A2 or B
Group Number 2-S	Group Number 2, and a smoke growth rate index not more than 100	Class C and smoke production rating s1 or s2
Group Number 2	Group Number 2	Class C
Group Number 3	Group Number 3	Class D
Group Number 4	Group Number 4	Class E and F

Table C1.2 Specified performances for some substrate and coating combinations

Coating (coating in good condition and well adhered to substrate)	Substrate	Group Number
Waterborne or solvent borne paint coatings ≤ 0.4 mm thick Polymeric films ≤ 0.2 mm thick	Concrete and masonry ≥ 15 mm thick Sheet metal ≥ 0.4 mm thick Fibre-cement board ≥ 6.0 mm thick Porcelain, ceramic, glass, solid stone or similar tiles	1-S
Waterborne or solvent borne paint coatings ≤ 0.4 mm thick	Gypsum plasterboard with or without paper facing ≥ 9.5 mm thick	2-S
Waterborne or solvent borne paint coatings, varnish or stain ≤ 0.4 mm thick ≤ 100 g/m^2	Solid wood or wood product ≥ 9.0 mm thick ≥ 600 kg/m^3 for particle boards, or ≥ 400 kg/m^3 for all other wood and wood products	3
Note: The requirements of this table do not apply to metal faced panels with polymeric substrate.		

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C5.1 Fire resistance

C5.1.1 *Primary elements* and *secondary elements*, closures and *fire stops* shall be assigned a *fire resistance rating (FRR)* when tested to:

a) AS 1530 Methods for fire tests on building materials and structures – Part 4: Fire resistance tests of elements of building construction, or

b) NZS/BS 476 Fire tests on building materials and structures – Parts 21 and 22.

C5.1.2 *Fire stops* shall be tested:

a) In circumstances representative of their use in service, paying due regard to the size of expected gaps to be *fire stopped*, and the nature of the *fire separation* within which they are to be used, and

b) In accordance with AS 4072: Components for the protection of openings in fire resistent separating elements – Part 1: Service penetrations and control joints.

C6.1 Fire doors and smoke control doors

C6.1.1 *Fire doors* shall be evaluated in circumstances representative of their use in service, and shall comply with NZS 4520 Fire-resistant doorsets.

Smoke control doors

C6.1.2 A door shall be deemed to be a *smoke control door* if, in addition to the requirements in this Acceptable Solution for *smoke control doors:*

a) The door is a *fire door* that is fitted with appropriate smoke seals, or

b) It is *constructed* with solid core leaves. Solid timber core leaves, when used, shall have a leaf thickness of no less than 35 mm, and

c) It is provided with smoke seals as required by this Acceptable Solution. Smoke seals shall be in continuous contact with the mating element, and located so as to minimise interruption by hardware, and

d) The frames are constructed of timber, and the jambs are no less than 30 mm thick, and

e) Any vision panel cut-outs are no less than 150 mm from the leaf edges, and

f) The maximum average clearances (excluding pre-easing) are

   i) Leaf to frame 3 mm

   ii) Leaf to leaf 5 mm

   iii) Leaf to top of any floor covering 10 mm, and

g) Any additional facings are adhesive fixed, and

h) It is provided with signage identifying it as a *smoke control door* in accordance with Acceptable Solution F8/AS1.

Frictional forces

C6.1.3 The forces required to open any *fire door* or *smoke control door* on an *escape route* shall not exceed 67 N to release the latch, 133 N to set the door in motion, and 67 N to open the door to the minimum required width. These forces shall be applied at the latch stile.

SI These requirements do not apply to horizontal sliding doors in ***risk group* SI** or to power-operated doors.

Self-closing provision

C6.1.4 All *fire* and *smoke control door* leaves shall be self-closing, and provision shall be made for the self-closing device to be adjustable during commissioning to satisfy the requirements of Paragraph C6.1.3 after installation.

C6.1.5 Where it is desirable in normal circumstances for a *fire door* or *smoke control door* to operate freely, it is acceptable to use a self-closer mechanism which activates in the event of *fire* but does not operate at other times.

Automatic smoke-sensing devices

C6.1.6 Automatic smoke-sensing devices complying with NZS 4512, if used, shall be positioned within the stream of air that passes the door when the *smoke control door* is fully open.

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C7.1 Fire properties of external wall cladding systems

C7.1.1 Cladding materials shall be classified using the values in Table C1.3 when tested in accordance with:

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a) ISO 5660 Reaction-to-fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method), or

b) AS/NZS 3837 Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter.

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C7.1.2 In addition to meeting the general requirements of ISO 5660 Part 1 or AS/NZS 3837, testing shall be in accordance with the following specific requirements:

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a) An applied external heat flux of 50 kW/m^2, and

b) A test duration of 15 minutes, and

c) The total heat release measured from start of the test, and

d) Sample orientation horizontal, and

e) Ignition initiated by the external spark igniter.

C7.1.3 Timber claddings which have a *fire retardant* treatment incorporated in or applied to them shall be subjected to the regime of accelerated weathering described in ASTM D 2898 Method B with the water flow rate from Method A before testing in accordance with the requirements of Paragraph C7.1.1.

C7.1.4 Claddings incorporating a metal facing with a melting point of less than 750°C covering a *combustible* core or insulant shall be tested as described in Paragraph C7.1.2 without the metal facing present.

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Table C1.3 Classification of cladding materials
C7.1.1

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Cladding material type	Peak heat release rate (kW/m^2)	Total heat released (MJ/m^2)
Type A	≤ 100	≤ 25
Type B	≤ 150	≤50

APPENDIX 4: Information & Drawings used for this project

Architectural drawings, specifications and data sheets go here.

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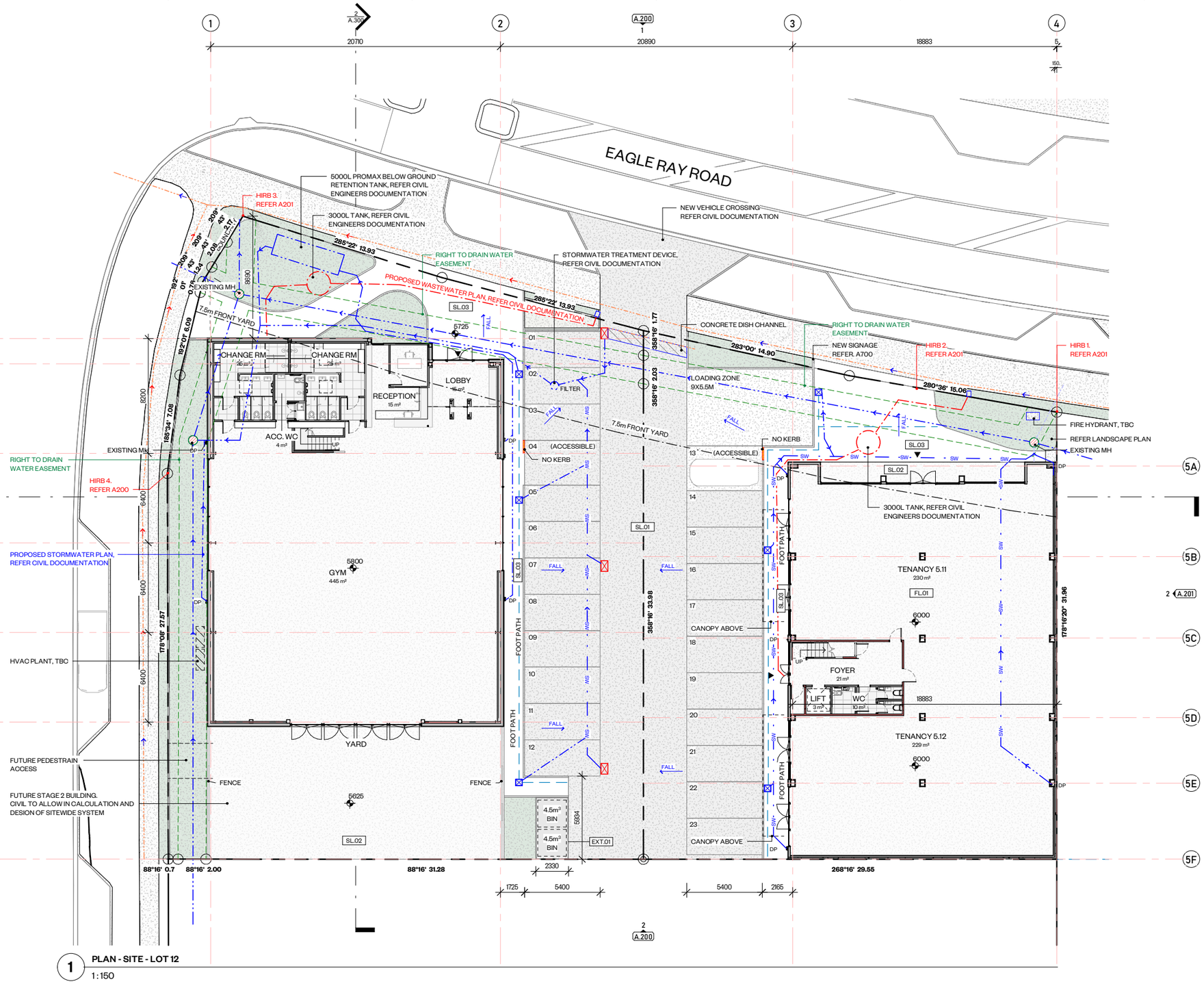

1 PLAN - SITE - LOT 12
1 : 150

SL_SLAB

SL.01 IMPERMEABLE DRIVEWAY SYSTEM: 150MM PERMCON PERMEBALE CONCRETE DRIVEWAY / 150MM PERMCON BASE COURSE/ SUB BASE AND SUB-GRADE AS PER MANUFACTURERS SPEC
SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL
SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

EXT_EXTERIOR WORKS

EXT.01 BIN STORAGE: 75X75 STAINLESS STEEL FRAME / SELECTED TIMBER CLADDING / STAIN FINISH

PIPE TYPES AND SIZES

EXISTING WASTER WATER LINE
NEW WASTE WATER LINE
EXISTING STORM WATER LINE
NEW STORM WATER LINE
Ø160 NOVAFLO SUBSOIL DRAIN
TYPE 2 SUMP, REFER CIVIL DOCUMENTATION
uPVC SUMP, REFER CIVIL DOCUMENTATION

SITE IDENTIFICATION - 7 EAGLE RAY ROAD

ADDRESS	7 EAGLE RAY ROAD, MANGAWHAI
LOT	LOT 12
DP	DP 579625
CT	-
SITE AREA	1408m²
TA	KAIPARA DISTRICT COUNCIL
SITE ZONE	SUBZONE 7 - SERVICE
WINDZONE	HIGH
WIND REGION	REGION A
EARTHQUAKE ZONE	ZONE 1
EXPOSURE ZONE	ZONE D

SITE PLANNING CONTROLS

		COMPLIANCE
BOUNDARY OFFSET		
FRONT YARD	7.5 M	NO
REAR YARD	0 M	YES
SIDE YARD	0 M	YES
MAXIMUM HEIGHT	8.0 M	NO
HEIGHT IN RELATION TO BOUNDARY	3M+45°	YES

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PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

REVISIONS

DATE		DRAWN	Author
SHEET SIZE	A3	CHECKED	Checker

TITLE

PLAN - SITE

DRAWING

A7.101

REVISION

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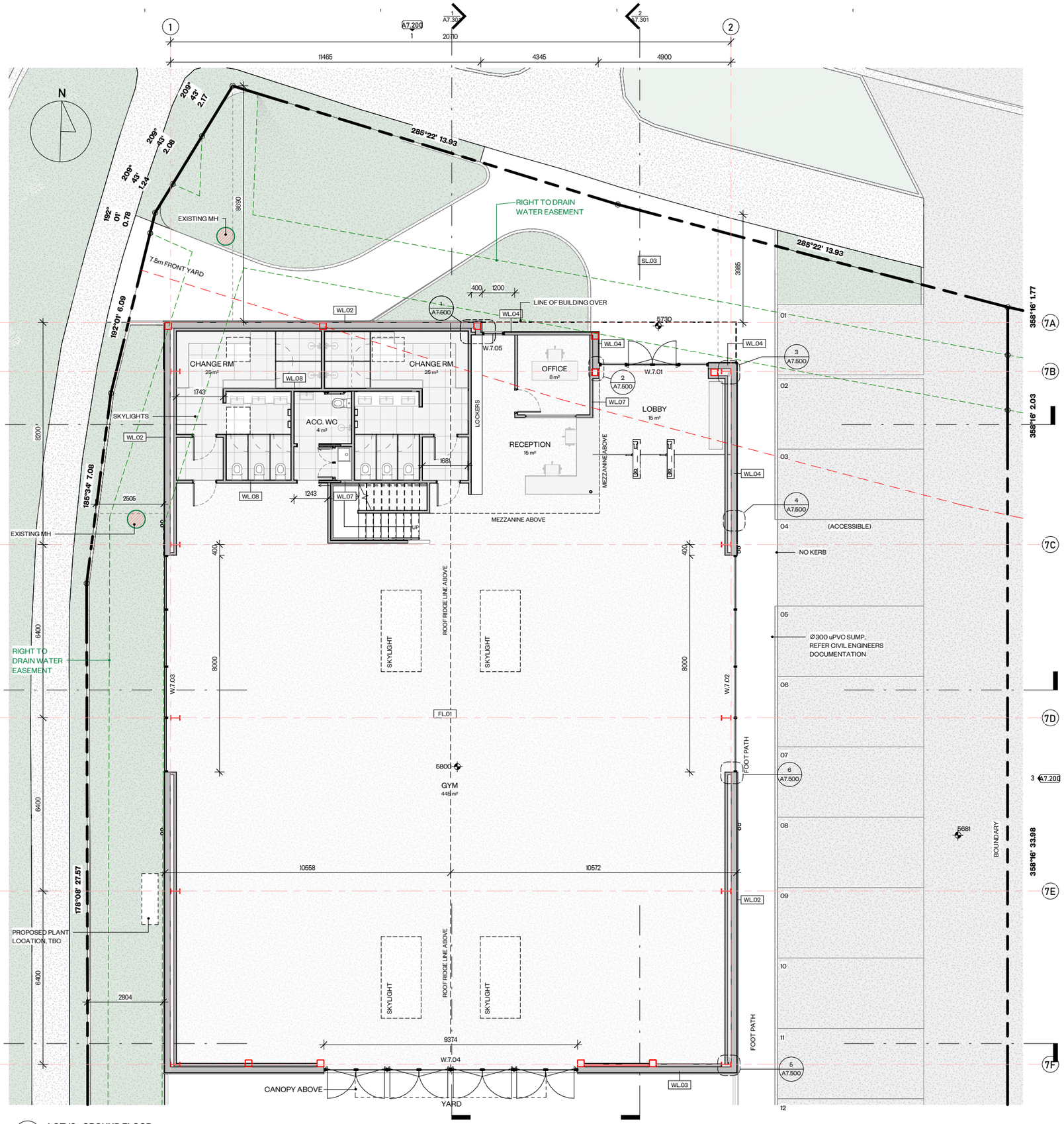

1 **LOT 12 - GROUND FLOOR**
1 : 75

FIRE PROTECTION

- INTERNAL FIRE SEPARATIONS FRR 60/60/60 (LIFE RATING)
- EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (1-WAY PROPPERTY RATING)
- EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (2-WAY PROPPERTY RATING)
- FIRE RATED DOORS FRR -/60/30

SL_SLAB

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

FL_FLOOR

FL.01 CONCRETE FLOOR SLAB: 150MM THICK 25MPA CONCRETE SLAB WITH 1X LAYER SE62 MESH ON POLYTHENE ON 25MM SAND BLINDING ON 100MM COMPACTED BASE COURSE, POWER FLOAT FINISH WITH DOOR REBATES FORMED.

WL_WALL

WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.03 EXTERIOR WALL METAL CLADDING SYSTEM FIRE RATED (120/120/120): METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON H1.2 140MM SGB TIMBER FRAMED WALL. STUDS: 450CRS, NOGS: 800CRS MAX. H1.2 140X45 SG8 BOTTOM AND TOP PLATE. DPC TO ALL TIMBER/CONCRETE CONNECTIONS. PINKBATTS BIB SYSTEM PER H1 SCHEDULE. GBUW120 2/19MM GIB FYRELINE LINING. L4 STOPPED AND PAINT FINISH.

WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.07 INTERNAL WALL FIRE RATED (-/60/60): GBS 60 SYSTEM. 13MM GIB FYRELINE ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/60/60 FRR

WL.08 INTERNAL WALL NON-FIRE RATED (-/-/-): 13MM GIB STANDARD (AQUALINE TO WET AREAS) ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/-/- FRR

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GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

N

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

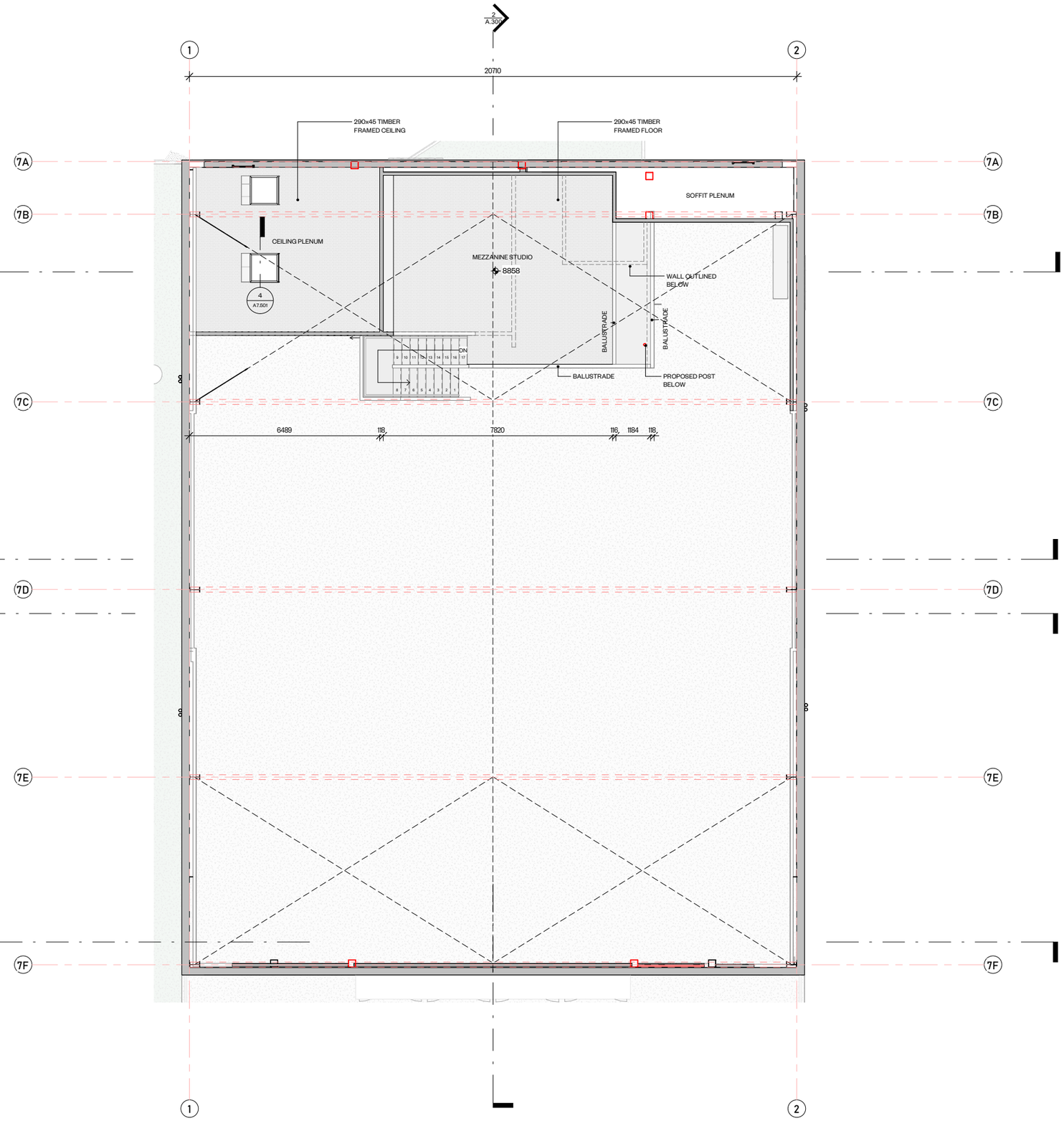
DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

PLAN - GROUND FLOOR

DRAWING **A7.102**

REVISION **S5**



1 PLAN MEZZANINE - LOT 12
1:75

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DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

PLAN - MEZZANINE FLOO

DRAWING **A7.103**

REVISION **S5**

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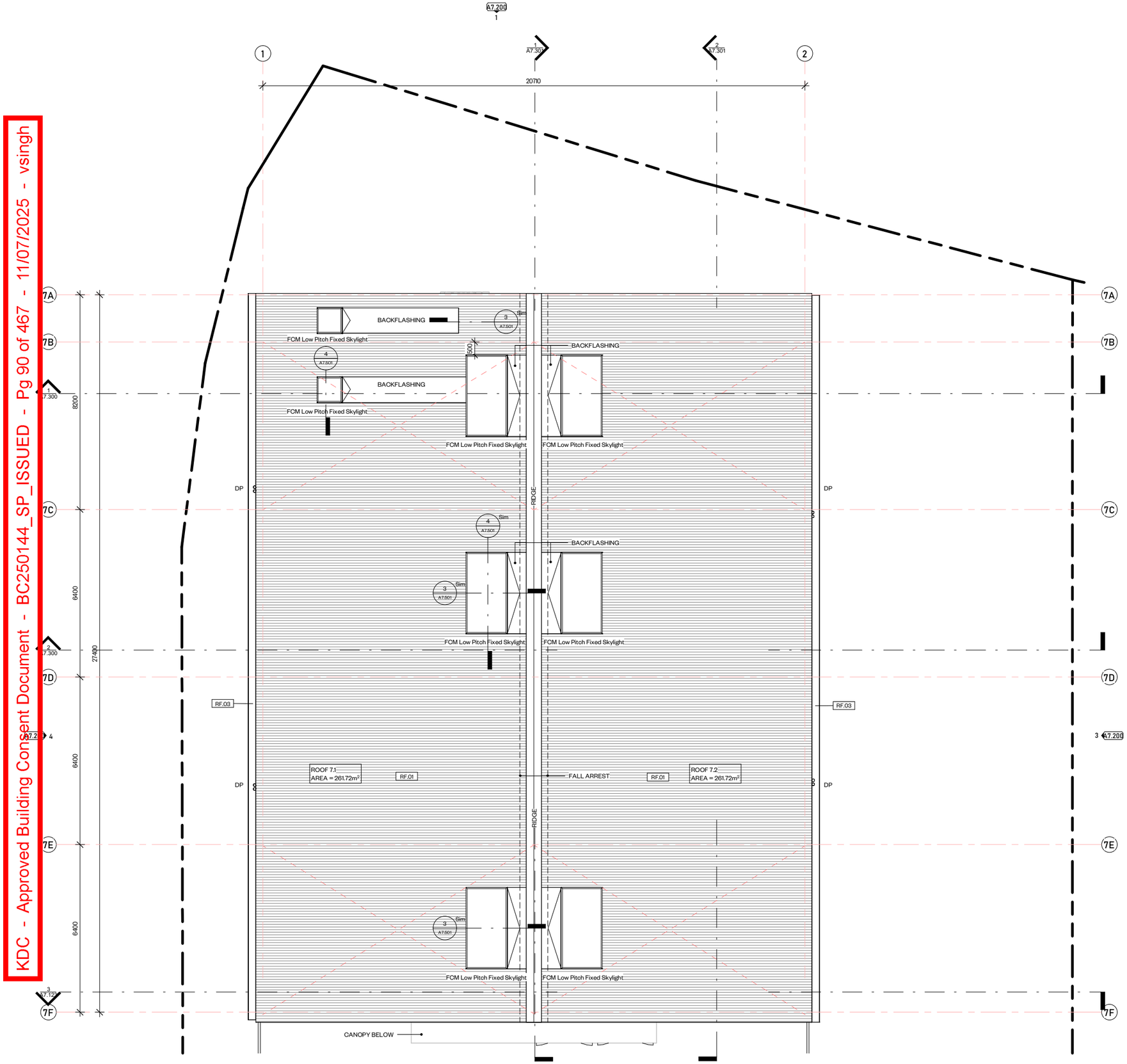

1 **PLAN - FIRST FLOOR**
1:75

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GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

RF_ROOF

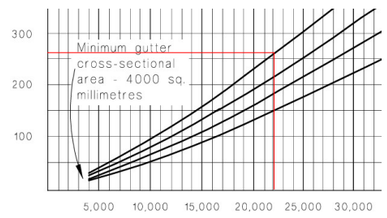
RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH 1X BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE

RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.

ROOF CATCHMENTS

ROOF 7.1 :	261.72m²
CROSS SECTIONAL AREA REQUIRED:	22,200mm²
EFFECTIVE GUTTER CROSS SECTION:	30,000mm²
EXTERNAL GUTTER :	METALCRAFT BOX GUTTER 300
DOWN PIPE:	100mm Ø

ROOF 7.2 :	261.72m²
GUTTER CROSS SECTIONAL AREA:	22,200mm²
EFFECTIVE GUTTER CROSS SECTION:	30,000mm²
EXTERNAL GUTTER :	METALCRAFT BOX GUTTER 300
DOWN PIPE:	100mm Ø



CROSS-SECTIONAL AREA - EXTERNAL GUTTER

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S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

PLAN - ROOF

DRAWING **A7.104**

REVISION **S5**

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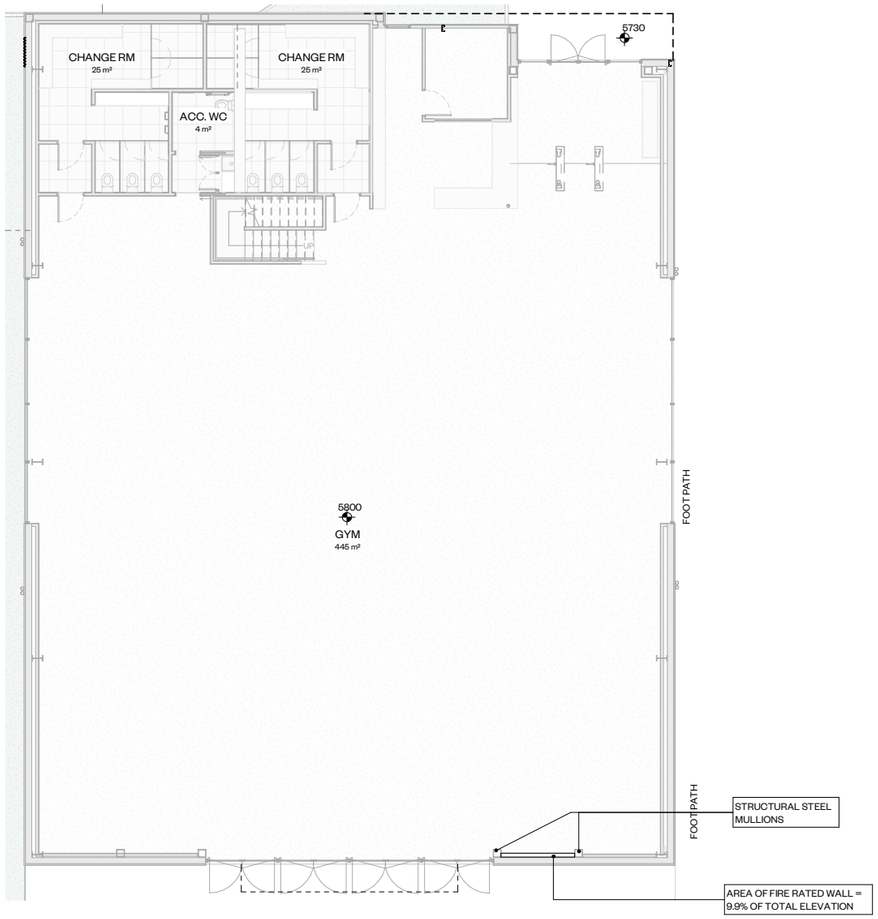
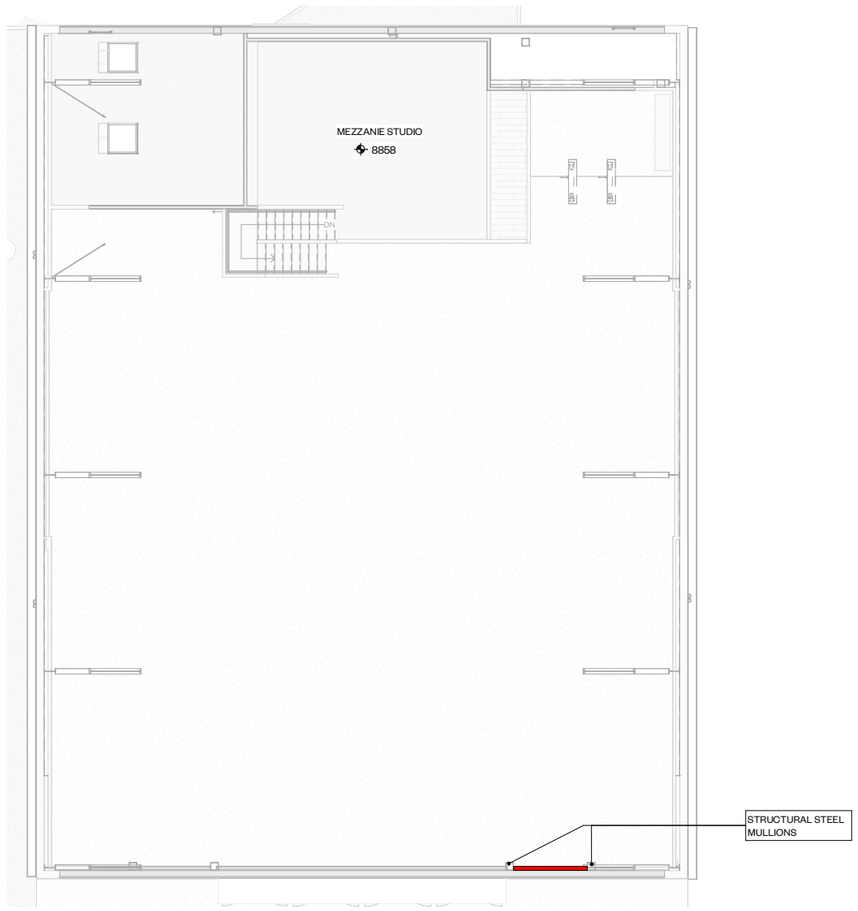
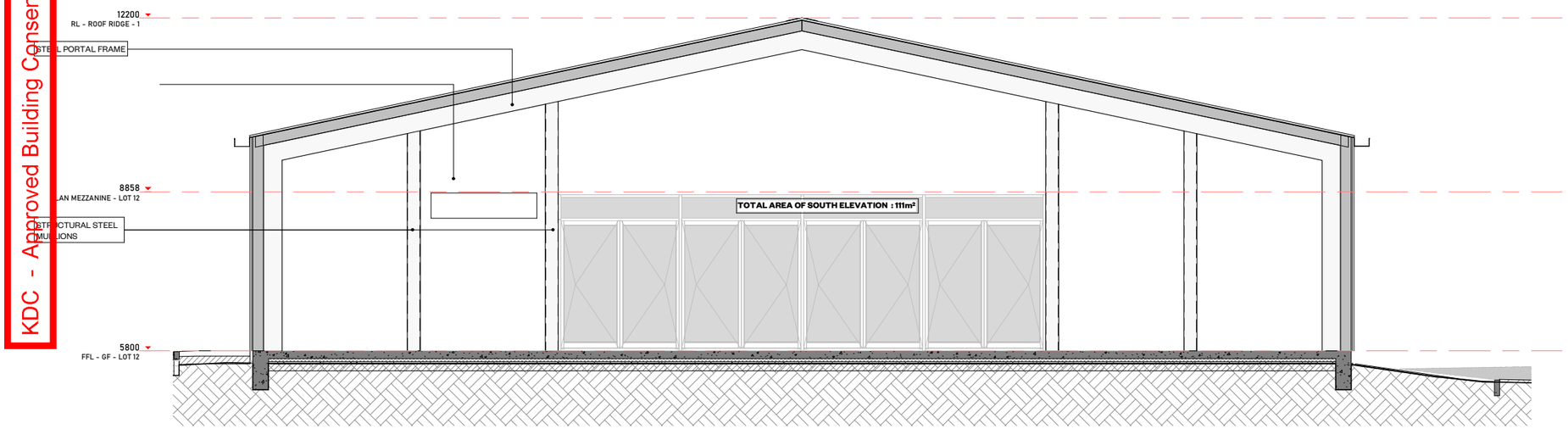


1 FIRE DESIGN PLAN - GROUND FLOOR
1:100



2 FIRE DESIGN PLAN - MEZZANINE
1:100



3 FIRE SEPARATION ELEVATION
1:50

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TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

REVISIONS

DATE		DRAWN	Author
SHEET SIZE	A3	CHECKED	Checker

TITLE

PLAN - FIRE DESIGN

DRAWING

A7.123

REVISION

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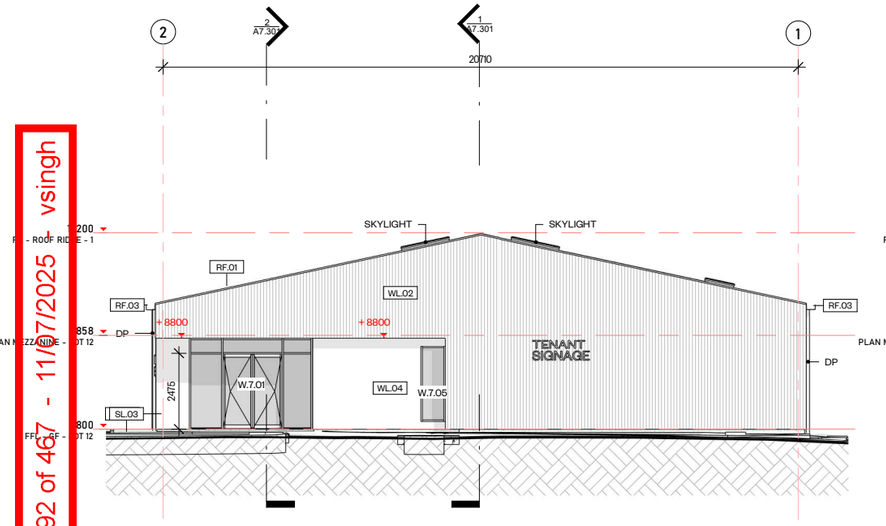
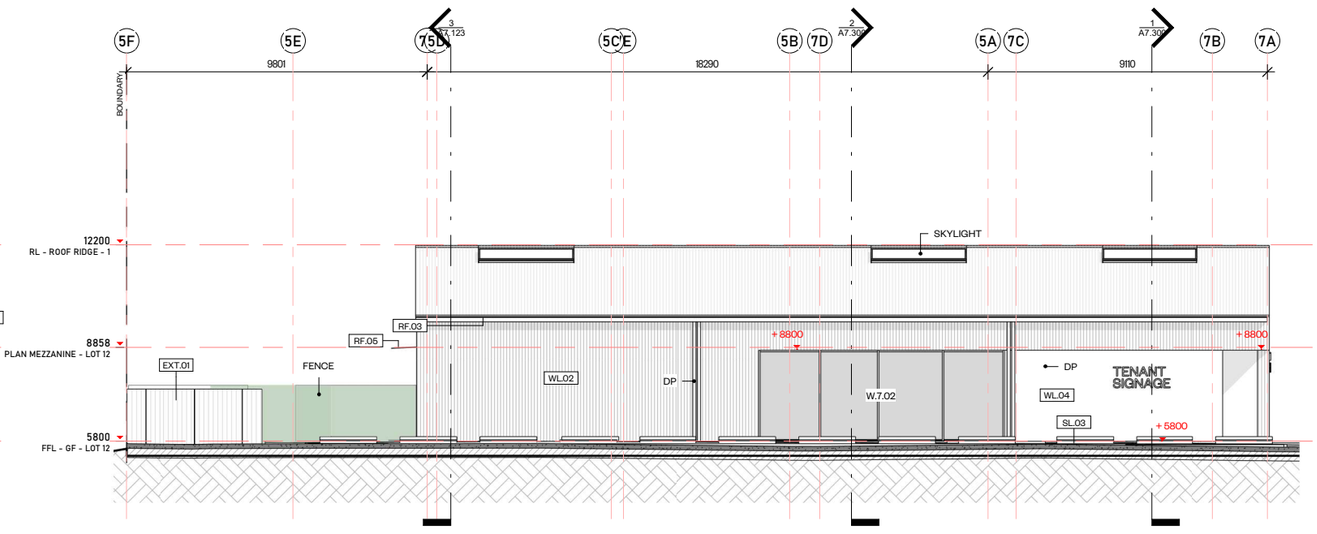


1 ELEVATION - NORTH - LOT 12
1 : 100



3 ELEVATION - EAST - LOT 12
1 : 100

SL_SLAB

SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

WL_WALL

WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY. DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.03 EXTERIOR WALL METAL CLADDING SYSTEM FIRE RATED (120/120/120): METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON H1.2 140MM SG8 TIMBER FRAMED WALL. STUDS: 450CRS, NOGS: 800CRS MAX. H1.2 140X45 SG8 BOTTOM AND TOP PLATE. DPC TO ALL TIMBER/CONCRETE CONNECTIONS. PINKBATTS BIB SYSTEM PER H1 SCHEDULE. GBUW120 2/19MM GIB FYRELINE LINING. L4 STOPPED AND PAINT FINISH.

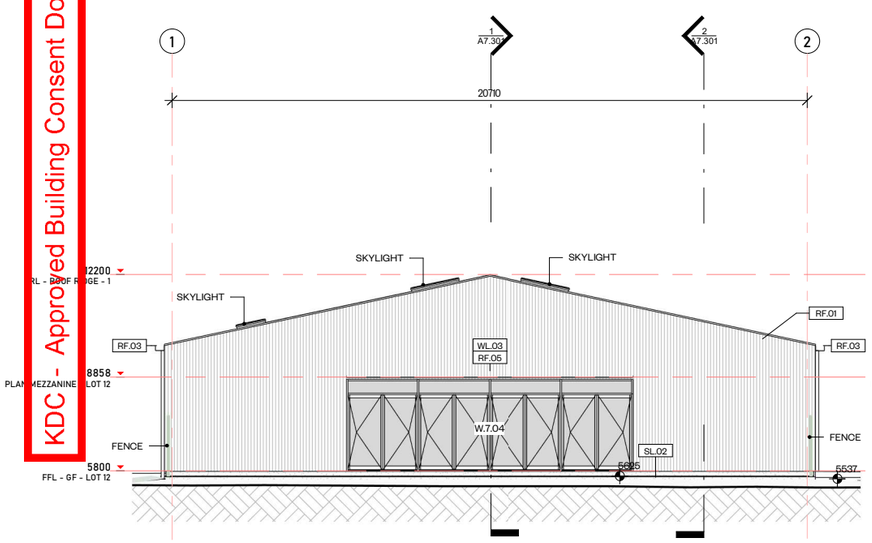
WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

RF_ROOF

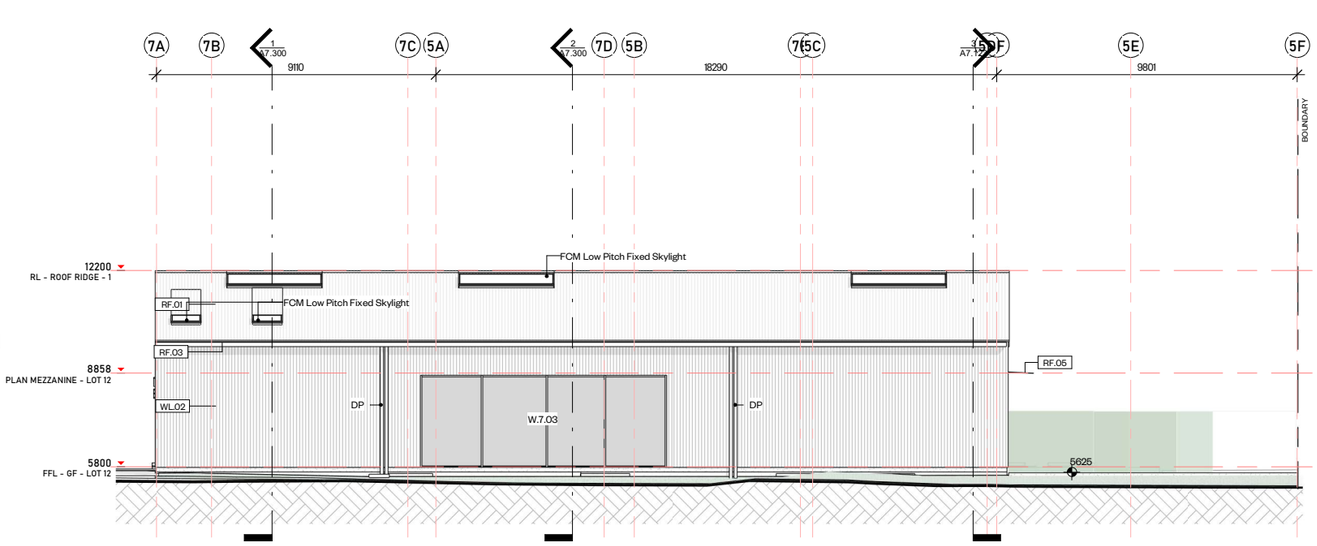
RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH 1X BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE

RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.

RF.05 METAL CANOPY: 8MM FOLDED ALUMINIUM CANOPY. POWDERCOAT 'TITANIA'. INSTALL AS PER DETAILS.



2 ELEVATION - SOUTH - LOT 12
1 : 100



4 ELEVATION - WEST - LOT 12
1 : 100

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REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

ELEVATIONS - PROPOSED

DRAWING **A7.200** REVISION **S5**

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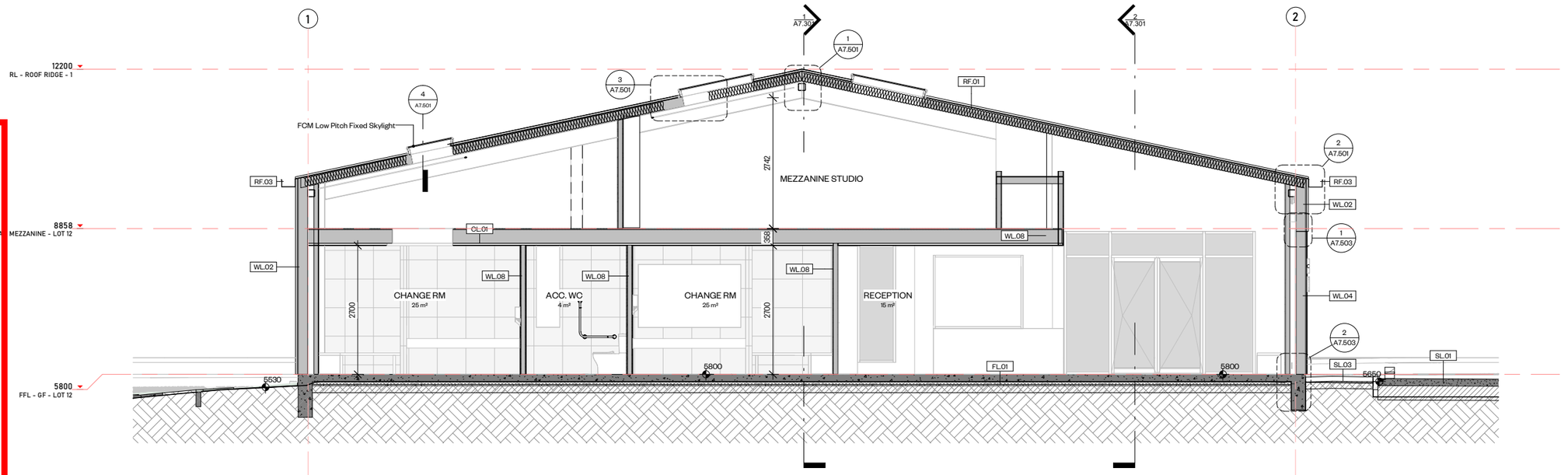
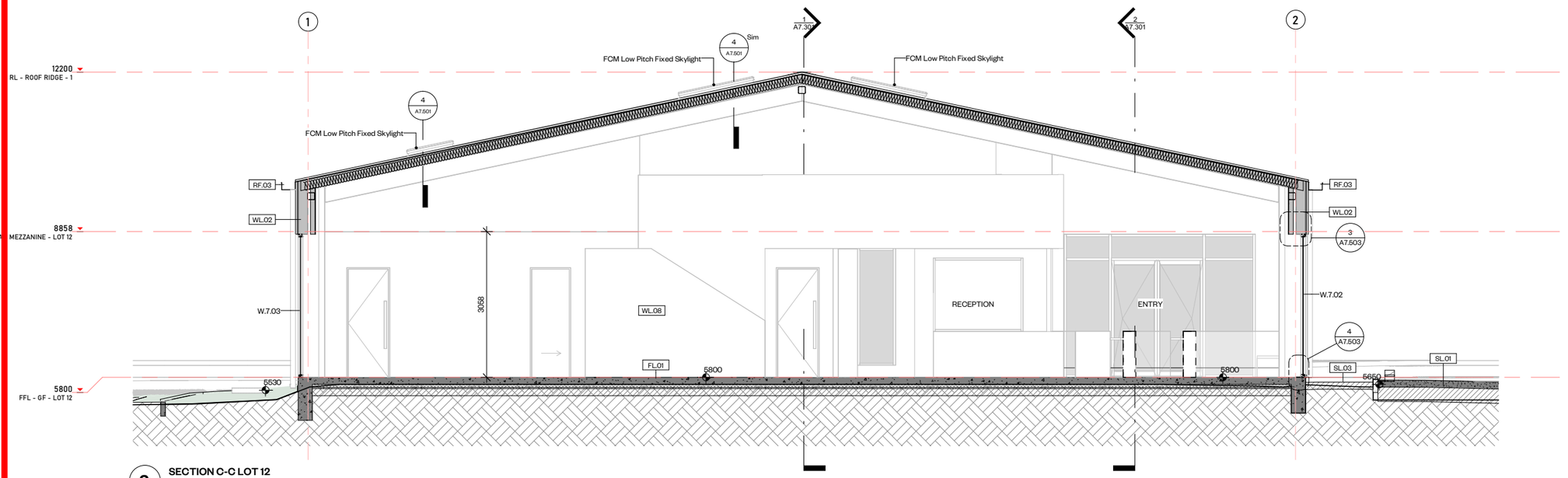


1 SECTION A-A LOT 12
1:50



2 SECTION C-C LOT 12
1:50

SL_SLAB

SL.01 IMPERMEABLE DRIVEWAY SYSTEM: 150MM PERMCON PERMEBALE CONCRETE DRIVEWAY / 150MM PERMCON BASE COURSE/ SUB BASE AND SUB-GRADE AS PER MANUFACTURERS SPEC

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

FL_FLOOR

FL.01 CONCRETE FLOOR SLAB: 150MM THICK 25MPA CONCRETE SLAB WITH 1X LAYER SE62 MESH ON POLYTHENE ON 25MM SAND BLINDING ON 100MM COMPACTED BASE COURSE, POWER FLOAT FINISH WITH DOOR REBATES FORMED.

WL_WALL

WL.02 EXTERIOR WALL. METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU' COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL_WALL

WL.08 INTERNAL WALL NON-FIRE RATED (-/-/-): 13MM GIB STANDARD (AQUALINE TO WET AREAS) ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/-/- FRR

CL- CEILING

CL.01 CEILING LINING : 13MM GIB. LINED AND STOPPED SELECTED PAINT FINISH

RF_ROOF

RF.01 ROOFING INDUSTRIES TRAPEZOIDAL ROOFING: 0.55BMT ROOFING INDUSTRIES 'MULTIRIB'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON WATERGATE 295 PLUS ROOF UNDERLAY ON ROOFING MESH ON 250/13 DHS PURLINS AT 1200CRS WITH 1X BRACE AT MIDSPAN. DHS PURLINS FIXED TO PORTAL FRAME CLEATS WITH 4XM12 BOLTS. REFER STRUCTURAL ENGINEERS SPECIFICATION. PINKBATTS BIB SYSTEM PER H1 SCHEDULE

RF.03 EXTERNAL GUTTER (300): METALCRAFT BOX GUTTER 300 ON EXPOSED GUTTER BRACKETS. 'TITANIA' PAINT FINISH.

S-STRUCTURAL

STRATA

STRATA STUDIO LIMITED
478 KARANGAHAPE ROAD, AUCKLAND 1010
OFFICE@STRATA-ARCHITECTS.NZ
09 827 7901

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THE ARCHITECTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE ASSOCIATED SPECIFICATIONS, SUPPORTING CONSULTANT DOCUMENTATION, CONDITIONS OF CONTRACT, RESOURCE & BUILDING CONSENT DOCUMENTATION INCLUDING ANY SPECIFIC COUNCIL CONDITIONS. ANY DISCREPANCIES SHALL BE REFERRED TO THE ARCHITECT FOR RESOLUTION.

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PROJECT	5 & 7 EAGLE RAY ROAD
PROJECT NO	PN2435
ADDRESS	5 & 7 EAGLE RAY ROAD, MANGAWHAI
LEGAL	LOT 11 & 12 DP 579625
CLIENT	MAROTERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
GEOTECH	RICHARDS CONSULTING ENGINEERS
PLANNER	CAMPBELL BROWN PLANNING
TRAFFIC	TRAFFIC PLANNING CONSULTANTS
LIGHTING	TARGETTI
LANDSCAPE	LANDSCAPE AND ECOLOGY

S5	17/03/2025	TENDER ISSUE
S4	28/01/2024	RESOURCE CONSENT
S3	20/12/2024	UPDATE FRONTAGE
S2	16/12/2024	CONSULTANT ISSUE
S1	05/12/2024	CLIENT ISSUE

REVISIONS

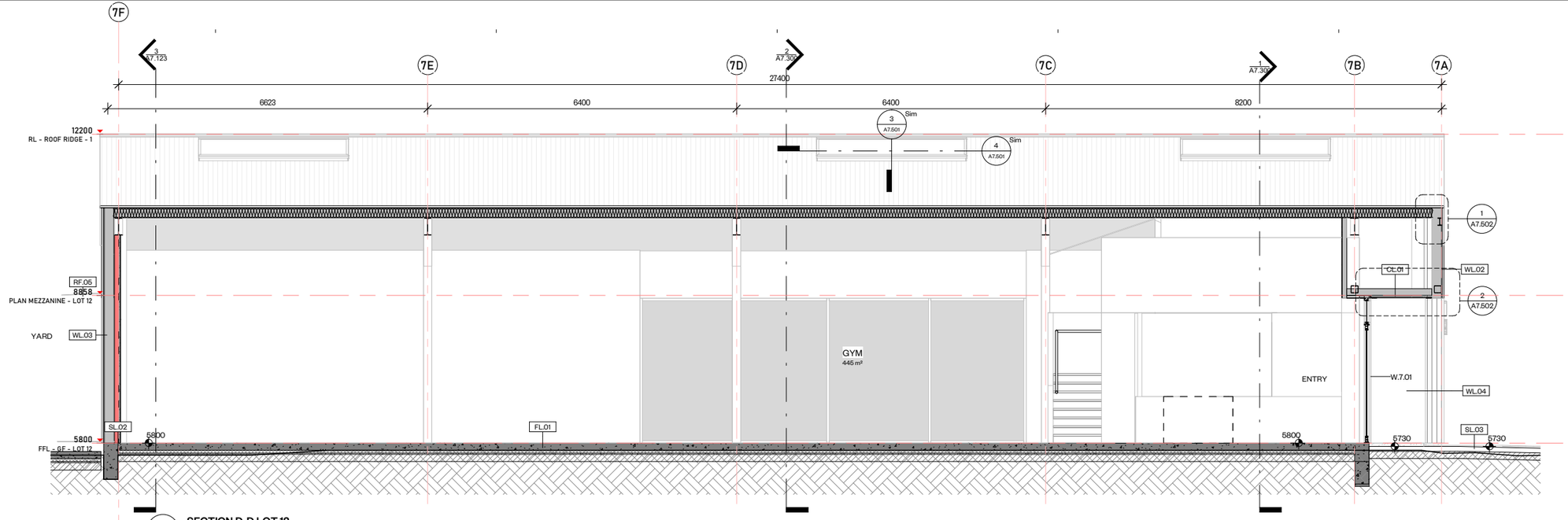
DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

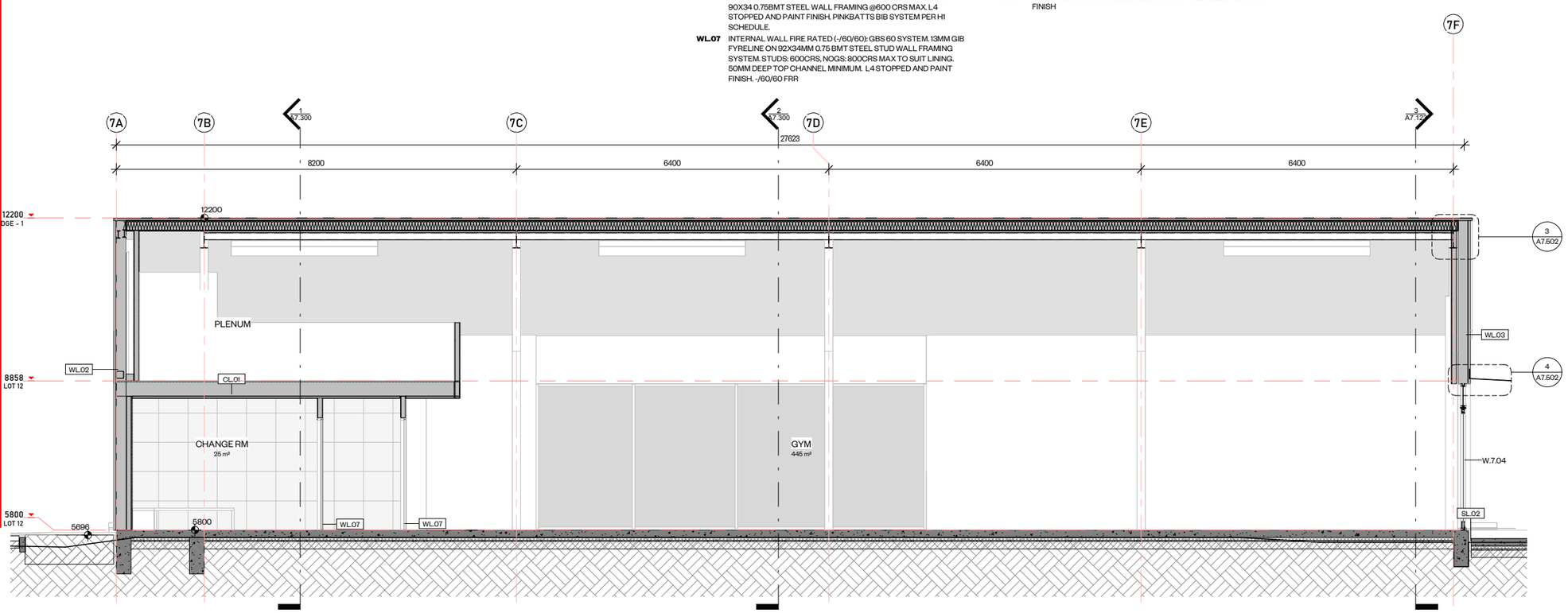
SECTIONS - A & C

DRAWING A7.300

REVISION S5



2 SECTION D-D LOT 12
1 : 50



1 SECTION B-B LOT 12
1 : 50

SL_SLAB

SL.02 EXTERIOR CONCRETE SLAB: 100MM CONCRETE FLOOR SLAB / 25MM SANDBLIND / 150MM PREPARED HARDFILL

SL.03 PERMEABLE PAVING: 100MM PERMEABLE CONCRETE PAVER / PREPARED SUBSTRATE BY CIVIL ENGINEER

FL_FLOOR

FL.01 CONCRETE FLOOR SLAB: 150MM THICK 25MPA CONCRETE SLAB WITH 1X LAYER SE62 MESH ON POLYTHENE ON 25MM SAND BLINDING ON 100MM COMPACTED BASE COURSE, POWER FLOAT FINISH WITH DOOR REBATES FORMED.

WL_WALL

WL.02 EXTERIOR WALL METAL CLADDING SYSTEM: METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA'. COLORSTEEL MAXAM. ON 200/18 DHS GIRT @1M CRS MAX WITH 20 CAVITY, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL_WALL

WL.03 EXTERIOR WALL METAL CLADDING SYSTEM FIRE RATED (120/120/120): METALCRAFT TRAPEZOIDAL CLADDING: 0.55BMT METALCRAFT 'KAHU'. COLOR 'TITANIA': COLORSTEEL MAXAM. ON H1.2 140MM SG8 TIMBER FRAMED WALL. STUDS: 450CRS, NOGS: 800CRS MAX. H1.2 140X45 SG8 BOTTOM AND TOP PLATE. DPC TO ALL TIMBER/CONCRETE CONNECTIONS. PINKBATTS BIB SYSTEM PER H1 SCHEDULE. GBUW120 2/19MM GIB FYRELINE LINING. L4 STOPPED AND PAINT FINISH.

WL.04 EXTERIOR WALL PLASTER CLADDING SYSTEM: 5MM ROCKCOTE CERANO PLASTER SYSTEM ON 9MM JAMES HARDIE AXON PANEL ON 20MM DRAINED CAVITY OVER WATERGATE 295 BUILDING WRAP ON 200/18 DHS GIRT @1M CRS MAX, DPC TO ALL TIMBER/CLADDING/CONCRETE CONNECTIONS. SEPARATE INTERNAL STEEL STUD WALL: 13MM GIB STANDARD LINING ON 90X34 0.75BMT STEEL WALL FRAMING @600 CRS MAX. L4 STOPPED AND PAINT FINISH. PINKBATTS BIB SYSTEM PER H1 SCHEDULE.

WL.07 INTERNAL WALL FIRE RATED (-/60/60): GBS 60 SYSTEM. 13MM GIB FYRELINE ON 92X34MM 0.75 BMT STEEL STUD WALL FRAMING SYSTEM. STUDS: 600CRS, NOGS: 800CRS MAX TO SUIT LINING. 50MM DEEP TOP CHANNEL MINIMUM. L4 STOPPED AND PAINT FINISH. -/60/60 FRR

RF_ROOF

RF.05 METAL CANOPY: 8MM FOLDED ALUMINIUM CANOPY. POWDERCOAT 'TITANIA'. INSTALL AS PER DETAILS.

CL- CEILING

CL.01 CEILING LINING : 13MM GIB. LINED AND STOPPED SELECTED PAINT FINISH

FIRE PROTECTION

- INTERNAL FIRE SEPARATIONS FRR 60/60/60 (LIFE RATING)
- EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (1-WAY PROPPERTY RATING)
- EXTERNAL FIRE SEPARATIONS FRR 120/120/120 (2-WAY PROPPERTY RATING)
- FIRE RATED DOORS FRR -/60/30

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PROJECT NO	PN2435
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LEGAL	LOT 11 & 12 DP 579625
CLIENT	MARETERE & ST LAMBERT

ARCHITECT	Designer
SURVEYOR	ARCLAB
SERVICES	HSC
FIRE	ASSETCARE LIMITED
STRUCTURE	RICHARDS CONSULTING ENGINEERS
CIVIL	RICHARDS CONSULTING ENGINEERS
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REVISIONS

DATE	17/03/2025	DRAWN	PK
SHEET SIZE	A3	CHECKED	JO

TITLE

SECTIONS - B & D

DRAWING **A7.301** REVISION **S5**

RICHARDS
CONSULTING | ENGINEERS

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7 Eagle Ray Road, Mangawhai

STRUCTURAL DESIGN REPORT

20 May 2025

Revision B

Project A24362

Christchurch 03 347 1624 | Auckland 09 391 1324 | Wellington 04 974 9094 | Queenstown 03 347 1624
rce@rcengineers.co.nz
www.rcengineers.co.nz

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Structural Design Report – Rev B

Project No: **A24362**
Date: **20 May 2025**
Project Name: **Proposed Gym Structure**
Project Address: **7 Eagle Ray Road, Mangawhai**

Revision 1 –Original Document
Revision B – RFI changes

1.0 SCOPE OF WORK

The scope of work covered by the attached Producer Statement (PS1-design) is (for the gym structure only):

- Foundation perimeter footings and slab
- Foundation bridging beam and piles
- Portal frame reinforced pads
- Steel portal frame and wall cross bracing
- Roof purlins
- Roof plane cross bracing
- Mullions, lintels and girts
- Internal mezzanine framing and bracing
- Internal steel stud framing wall (non-structural)
- Internal timber wall framing in mezzanine area

Items that are specifically excluded from this work include:

- Civil design (for this structural PS1)
- Fire assessment
- Architectural design elements including but not excluded to; claddings, weather proofing, water proofing, accessibility and services
- Balustrades and stairs – we envisage these would be proprietary elements which would be specified by the architect

2.0 MEANS OF COMPLIANCE

The design of the structure is in compliance with the New Zealand Building Code (NZBC) section B1.

3.0 DESIGN DOCUMENTATION

The design is described in the following documentation:

- Richards Consulting Engineers drawings titled “Proposed Gym, 7 Eagle Ray Road, Mangawhai” and numbered S.00-S.02, S1.01-S1.02, S2.01-S2.03, S3.01-S3.04, S4.01-S4.02

4.0 ASSUMPTIONS

The following assumptions were made as part of the design process:

- The architectural design drawings are an accurate representation of what will be constructed

5.0 DESIGN LOADS

The structure has been determined as having an importance level of 2.

Dead: Standard material loads
Live: 3.0kPa/2.7kN mezzanine floor loads, 5kPa/3.6kN for the gym located on the foundation slab, 0.25kPa or (1.8/A+0.12)kPa or 1.4kN for roof loads.
Barriers: N/A

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Snow and Ice: N/A
Seismic: Z = 0.13, seismic site subsoil category: Class D, T=0.46s for portal frames, Ductility = 1.25 for portal frames and 1.0 for cross bracing
Wind: 39 m/s from NZS1170.2:2021, equivalent to a "High" wind zone in accordance with NZS 3604:2011
Retaining: N/A
Construction: N/A
Other: N/A

6.0 GEOTECHNICAL CONDITIONS

Wiley Geotechnical Ltd has conducted an investigation on October 2024 at the following site. They have produced a report titled "Geotechnical Investigation Report, 7 Eagle Ray Road, Mangawhai Central, Mangawhai" referenced 24116. The following has been summarised:

- Hand augers were carried out to depths of 2.3m to 2.5m.
- The subsurface material encountered in our hand auger investigation generally consisted of topsoil underlain by moderately clayey silt engineered fill material with occasional angular gravels. Beneath the clayey silt fill medium dense to dense yellow brown sand material was encountered.
- The proposed building footprint, and surrounding area, is located upon relatively level ground with proposed earthworks generally keeping in line with this. Slope instability is not considered to be a considerable risk factor over the proposed development area.
- Long term static settlement of the engineered fill and deep soil layers is not likely for the proposed development.
- The Expansive Site Class of the soil material for design purposes is considered to be "M – moderate", as per in AS 2870.
- It is recommended that a minimum 200 mm layer of compacted hard fill is placed prior to applying blinding sand for any reinforced concrete slab and foundation elements have a minimum embedment depth of 0.6 m.

Richards Consulting Ltd has also conducted an investigation titled "Geotechnical Assessment Report, 5 Eagle Ray Road, Mangawhai." Note that the contents of this report is for the neighbouring site but some aspects can be relied upon due to close proximity to the proposed building. The following has been summarised:

- On 18 February 2025, Richards Consulting carried out a site investigation at the 5 Eagle Ray site. The scope of the site investigation consisted of two hand auger holes to 2.9m and 3.0mBGL and six scala probes to depths ranging from 0.8m to 3.3mBGL. The following was encountered:

Hand Auger Ref No	Termination Depth	Groundwater Observations	Summary of Geology Encountered
HA1	3.0mBGL	GW encountered at 2.4mBGL	0 – 0.4mBGL : Topsoil 0.4 – 1.5mBGL : Firm to Stiff CLAY & SILT 1.5 – 3.0mBGL : SAND w minor silt
HA2	2.9mBGL	GW encountered at 2.6mBGL	0 – 0.3mBGL : Topsoil 0.4 – 1.4mBGL : Stiff CLAY 1.4 – 2.9mBGL : Silty SAND

- Water levels recorded in the Wiley Geotechnical hand augers varied from 1.8m to 2.0mBGL. Groundwater was encountered in the two hand augers carried out by Richards Consulting in February 2025, at 2.4m and 2.6mBGL. Taking the above readings into account, we recommend a ground water level of 2.0mBGL is adopted for design purposes.

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- Bearing assessment concludes that an Ultimate Bearing Capacity of 300kPa is available.
- Liquefaction has been identified as not being a risk on this site and lateral spread does not pose a risk to this development.
- With reference to NZS1170 Part 5 (2004) we consider the site to conform to Class D – Deep or Soft Soil Sites.

7.0 STRUCTURAL PHILOSOPHY

7.1 Building Description

The proposed gym is a single-storey structure consisting of lightweight corrugated roof and wall cladding. Cold steel DHS purlins support the roof and span between regularly spaced portal frames. Cold steel DHS girts also span between portals to support external wall cladding. The portal frames will be supported on reinforced pad footings, with a slab on grade. An internal mezzanine is located on the northern side of the building.

7.2 Serviceability criteria

- Beams: Deflection limit of L/400 for simply supported members and a/200 for cantilevered members
- Purlins L/360 for gravity only, L/300 for gravity and live load combination, L/150 for wind uplift
- Portal Frames: SLS lateral deflection limit of H/250 and bay spacing/200 and ULS lateral deflection limit of 2.5%
- Floor vibrations: 1mm deflection limit under 1kN midspan point load

7.3 Gravity resisting system

The roof loads will be supported by purlins spanning between portal frames. Steel beams are installed on the northern gable due to a small section of cantilevered roof, which is supported by the end portal frame and steel posts. The mezzanine is supported by steel beams, timber joists, and timber beams which land on internal timber-framed walls.

7.4 Lateral load resisting system

The lateral loads within the super structure will be resisted by portal frames in the transverse direction and is will be resisted by reidbraces in the longitudinal direction (along external wall lines). Steel girts and mullions are situated across external openings to support wind face loads. The mezzanine floor loads will be supported by timber-framed plasterboard-lined braced walls.

7.5 Earthquake resilience

The deflection limitations as per section 7.2 governed the steel portal designs and restraints have been provided to ensure sufficient capacity of the framing members. The structure has been designed as nominally ductile and the structure has been designed to a maximum drift limit of 2.5% of the building height, however the calculated drifts are in the order of 0.5%.

7.6 Foundation system

The structure will be supported by a slab on grade with deepened perimeter foundations. The perimeter embedment is designed for Moderately Expansive soils as per AS2870. Concrete pads are located underneath every portal leg column. The North and Western side will require bridging beams and piles due to an existing council culvert. The bridging requirements have been designed in accordance with Auckland Council guidelines. Internal pads are located under critical point loads in the mezzanine area.

7.7 Other design considerations

None.

8.0 MATERIAL PROPERTIES

Refer to RCE Structural Specifications

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9.0 PROPRIETARY SYSTEMS

N/A

10.0 FIRE

Assetcare Ltd has conducted a fire investigation titled "Proposed New Gym, Mangawhai Central Fitness, 7 Eagle Ray Road, Mangawhai" dated 13/03/2025. The following relevant information is summarised:

- The north elevation wall of the Gym firecell is facing Eagle Ray Road therefore, the north elevation wall of the Gym firecell can be made up of 100% unprotected areas.
- The east elevation wall of the Gym firecell is located 10.0 m from the relevant boundary therefore in accordance with Table C2(d), of C/VM2, the east elevation wall of the Gym can be made of 100% unprotected areas.
- The south elevation wall of the Gym firecell is located 12.6 m from the relevant boundary therefore in accordance with Table C2(e), of C/VM2, the south elevation wall of the Gym firecell is required to be fire rated FRR 120/120/120. The south elevation wall of the Gym firecell is more than 1 m from the relevant boundary therefore a one (1) way internal fire rating is acceptable.
- The west elevation wall of the Gym firecell is facing Eagle Ray Road therefore, the west elevation wall of the Gym firecell can be made up of 100% unprotected areas.

11.0 DURABILITY

The site's macroclimate can be considered a "C3" corrosion category. The surface specific corrosivity for steel members within the building's internal envelope and **fully enclosed** can be considered a "C1" corrosion category. A priming layer is suitable for fully concealed members.

For steel members within the building but not enclosed, a "C3" corrosion category is acceptable. We recommend the steel is treated to a minimum galvanising layer of HDG600. This system has a minimum intended design life of 40 years to first maintenance. To obtain a 50-year design life, we recommend regular maintenance of the steel, and repair where required.

12.0 SAFETY IN DESIGN

As part of the design process we have considered the safety of people during the erection, habitation, maintenance and contractors involved in potential future alterations and demolition of the structure.

The proposed structure has a clear use with commonly understood and accepted risks and hazards associated with it. We therefore believe any risks associated with the erection and use of the proposed structure can be managed by employing competent contractors using best practice health and safety and construction methods.

13.0 CONSTRUCTION MONITORING

Richards Consulting Engineers has been engaged by St Lambert Limited to undertake construction monitoring.

To verify that the structure is constructed in accordance with the design and is structurally adequate. It is required that the following construction monitoring be undertaken:

	Structural Element	Construction monitoring method	Notes/date completed
1	Bridging pile pre-pour	Richards Consulting Auckland	
2	Foundation beam (including bridging) and pad pre-pour and excavations	Richards Consulting Auckland	

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3	Superstructure framing and connections - Portal frames - Roof beams and posts - Mullions, lintels, girts - Cross bracing and struts - Purlins	Richards Consulting Auckland	
4	Internal slab pre-pour	Richards Consulting Auckland	
5	Mezzanine framing including internal timber-framed walls	Richards Consulting Auckland	
6	Wall bracing pre-line/post-line	Kaipara Council Building Inspector	

Please note a PS4 will be issued on completion of this project.

14.0 REFERENCES

The following design standards and guidelines have been referenced as part of the design process:

- AS/NZS 1170: 2002
- NZS 3603: 1993
- NZS 3404: 1997
- NZS 3101: 2006
- Wiley Geotechnical Ltd report titled “Geotechnical Investigation Report, 7 Eagle Ray Road, Mangawhai Central, Mangawhai” referenced 24116.
- Richards Consulting Ltd report titled “Geotechnical Assessment Report, 5 Eagle Ray Road, Mangawhai.”
- Assetcare Ltd fire investigation titled “Proposed New Gym, Mangawhai Central Fitness, 7 Eagle Ray Road, Mangawhai” dated 13/03/2025

Prepared by

Emery Ning
BE(hons)
RICHARDS CONSULTING ENGINEERS

Reviewed by

Nicholas Baker
CPEng (Structural)

RICHARDS
CONSULTING | ENGINEERS

Project: A24362

20 May 2025

Local Building Consent Authority

B2 COMPLIANCE IN RESPECT OF NEW GYM STRUCTURE
AT 7 EAGLE RAY ROAD, MANGAWHAI

To whom it may concern,

Compliance with Building Code Clause B2 – Durability

The purpose of this letter is to demonstrate how compliance with Clause B2 (Durability) of the Building Code will be achieved for the above project. We can confirm that for specifically designed structural elements that are included within our design documentation:

Material	Means of compliance	Details
Reinforced concrete	B2/AS1	Concrete cover to reinforcing has been selected in accordance with NZS3101, Part 1, Section 3
Structural timber	B2/AS1	Timber treatment has been selected in accordance with Table 1A of B2/AS1
Mild steel structure	Alternative Solution	Protection for mild steel has been specified in accordance with SNZ TS 3404 – Durability requirements for steel structures and components and AS/NZS2312 – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings. This guide works on a time to first maintenance basis and assumes on-going maintenance. Refer to the attached maintenance plan (optional but recommended).

We trust this provides the information you are seeking.

Prepared by

Emery Ning
BE(hons)
RICHARDS CONSULTING ENGINEERS

Reviewed by

Nicholas Baker
CPEng (Structural)

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New Gym Structure – 7 Eagle Ray Road, Mangawhai
STRUCTURAL MAINTENANCE SCHEDULE

This schedule of ongoing inspection and maintenance of structural elements shall be included with the O&M manuals and provided to the Owner/Body Corporate and building managers.

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Inspection/Maintenance timeframe and item	
(a) Half-yearly	Wash down all exposed steelwork that is not in a fully interior environment including: N/A
(b) 5-yearly	Inspect and repair sealant that encloses structural mild-steel components and/or timber with mild-steel fixings.
(c) 10-yearly	Check exposed timber fixings for corrosion, repair as required.
	Inspect/replace sealant that encloses structural mild-steel components and/or timber with mild-steel fixings. **Note that 10 years is the expected useful life for many sealants.**
	Check exposed structural steel within plantrooms and plenums for corrosion. Repair protective coatings as required.
	Check all exposed steelwork that is not in a fully interior environment for signs of corrosion. Repair protective coatings as required.
	Audit of damage to exposed intumescent coatings. Repair as required.
(d) 25-yearly	Inspect samples of structural steel that is hidden from view but not enclosed within a vapour barrier, and repair protective coatings as necessary. A typical example is a veranda with built-in steelwork. (Such steelwork should typically have duplex protective coatings). Inspection may typically require removal of claddings and/or the drilling of holes for borescope access. Repair as required.
	Inspect all exposed, external reinforced concrete for signs of spalling. Repair as required.
	Audit of damage to enclosed intumescent coatings. Repair as required.
Following fit-out or alterations	Audit of damage to intumescent coatings. Repair as required.
Following seismic shaking > SLS1 event	Inspections and repair as per b), c) and d) above.

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PRODUCER STATEMENT – PS1 DESIGN

BUILDING CODE CLAUSE(S): B1 only **JOB NUMBER:** A24362

ISSUED BY: Richards Consulting Auckland Limited
(Engineering Design Firm)

TO: St Lambert Limited
(Owner/Developer)

TO BE SUPPLIED TO: Kaipara District Council
(Building Consent Authority)

IN RESPECT OF: New Gym Structure - refer to Section 1.0 of the structural design report
(Description of Building Work)

AT: 7 Eagle Ray Road, Mangawhai
(Address, Town/City)

LEGAL DESCRIPTION: Lot 12 DP 579625 **N/A** ☐

We have been engaged by the owner/developer referred to above to provide *(Extent of Engagement)*:
refer to attached structural report for scope of work
in respect of the requirements of the Clause(s) of the Building Code specified above for Part only, as specified in the Schedule, 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 *(Verification method/acceptable solution)* B1/VM1 &B1/VM4 and/or;
- ☐ Alternative solution as per the attached Schedule.

The proposed building work covered by this producer statement is described on the drawings specified in the Schedule, together with the specification, and other documents set out in the Schedule.

On behalf of the Engineering Design Firm, and subject to:

- Site verification of the following design assumptions: Refer to section 13.0
- All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that:

- the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the Schedule, will comply with the relevant provisions of the Building Code and that;
- the persons who have undertaken the design have the necessary competency to do so.

I recommend the **CM2** level of **construction monitoring**.

I, *(Name of Engineering Design Professional)* Nicholas Baker , am

- ☒ CPEng number 1016657

and hold the following qualifications BE(Hons)

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than $200,000
The Engineering Design Firm is a member of ACE New Zealand.

SIGNED BY *(Name of Engineering Design Professional)*: Nicholas Baker
(Signature below)

ON BEHALF OF *(Engineering Design Firm)*: Richards Consulting Auckland Limited Date: 20/05/2025

Note: This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Engineering Design Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, 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.

SCHEDULE TO PS1

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

Refer to section 3.0

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RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road, Mangawhai		
Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

SECTION 1:
Applied Loads/ Building Weights

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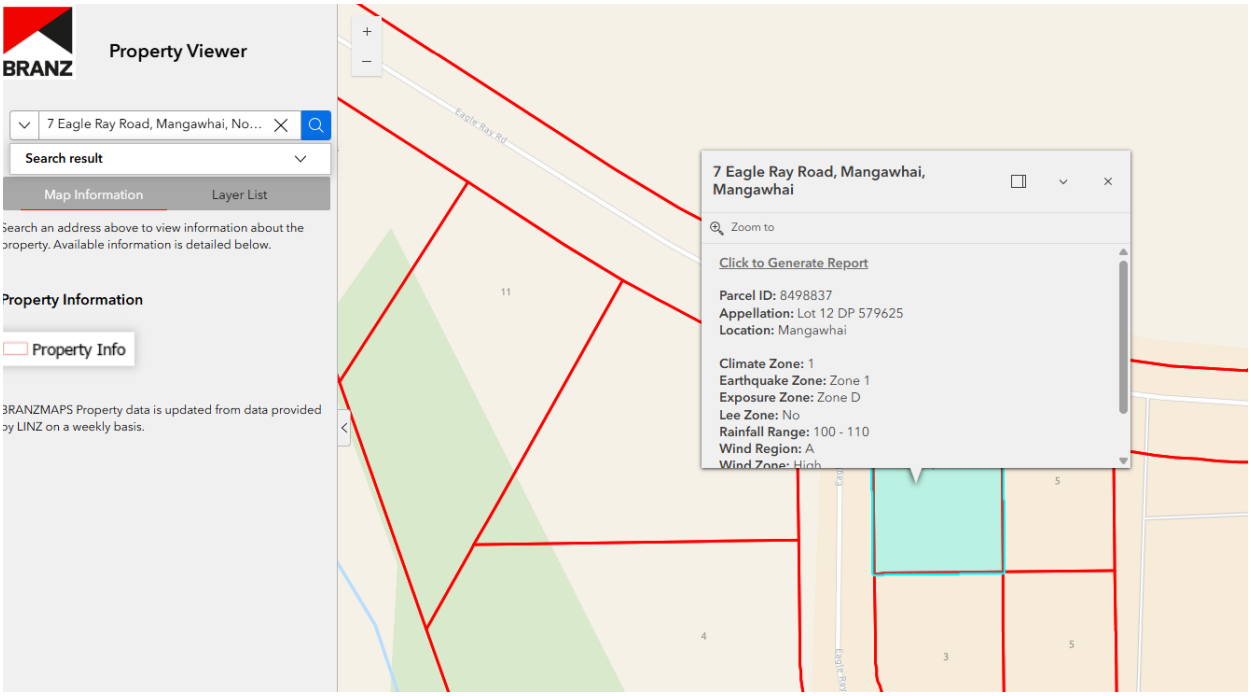
RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road, Mangawhai		
Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

SITE LOADS

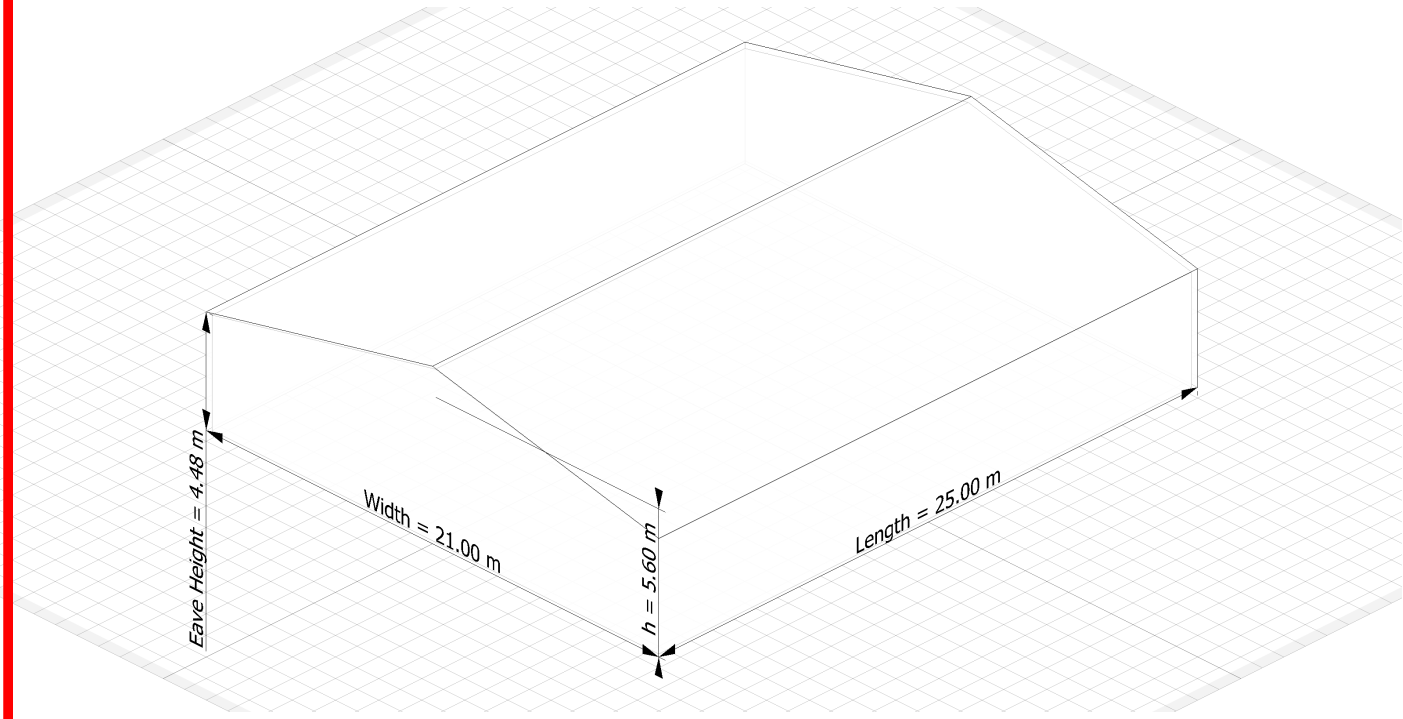


CHECKWIND AS/NZS 1170.2-2021 SITE REPORT

revolutic

STRUCTURE:	BUILDING	LATITUDE:	-36.113350	CRITICAL DIRECTION:	West
ORIENTATION:	0°	LONGITUDE:	174.571603	Md:	1.0
WIDTH:	21.00 m	ELEVATION:	5.00 m	Mc:	1.0
LENGTH:	25.00 m			TC:	2.5
HEIGHT (h):	5.60 m	WIND REGION:	NZ1	Mz,cat:	0.8754
BASE RL:	0.00 m	ULTIMATE ARI:	500 YEARS	Ms:	1.0
		ULTIMATE VR:	45 m/s	Mh:	1.0
		SERVICEABILITY VR:	39 m/s	Mlee:	1.0
				Mel:	1.0
				Mt:	1.0
				Vsit,β:	39.39 m/s
				qsit,β:	0.9309 kPa
				Vserv,β:	34.14 m/s
				qserv,β:	0.6993 kPa

0.93kPa site wind pressure



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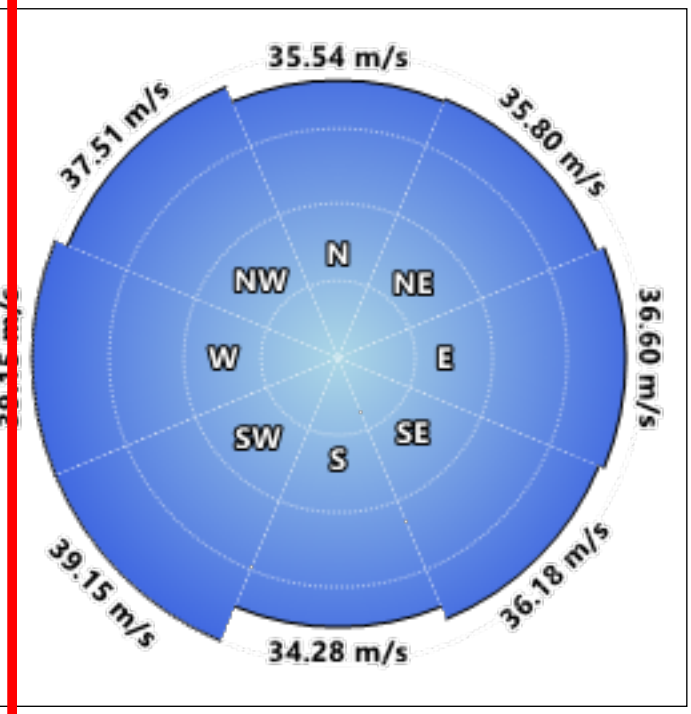
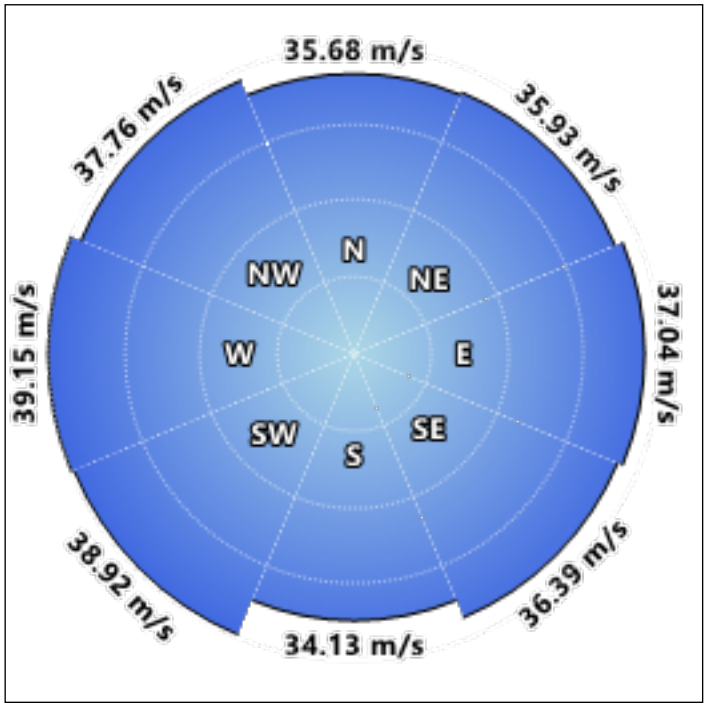


Wind Rose @ z = 0.00 m



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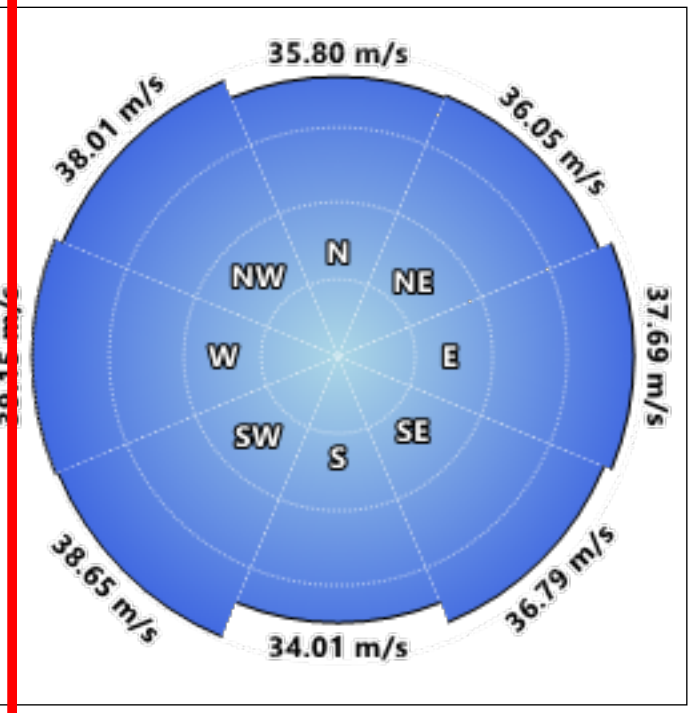
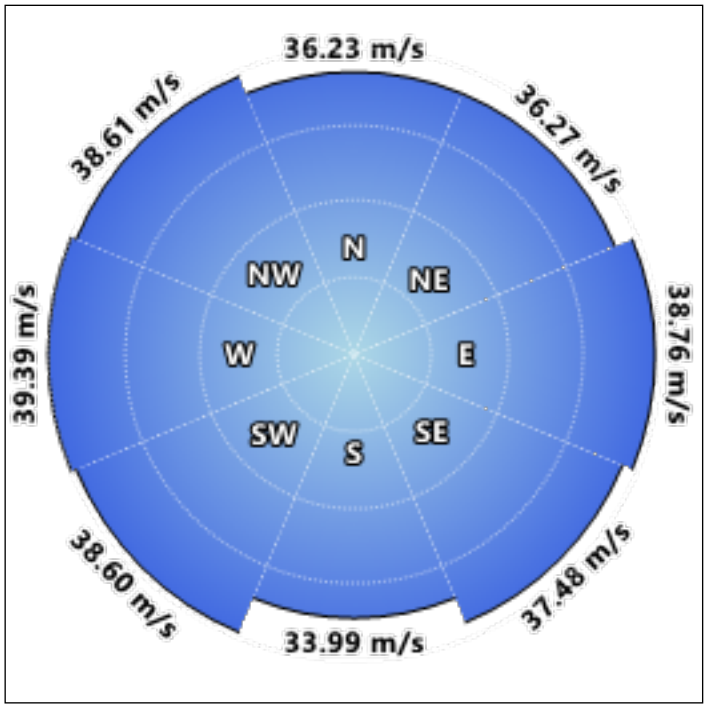


Wind Rose @ z = 3.73 m



Wind Rose @ z = 5.60 m

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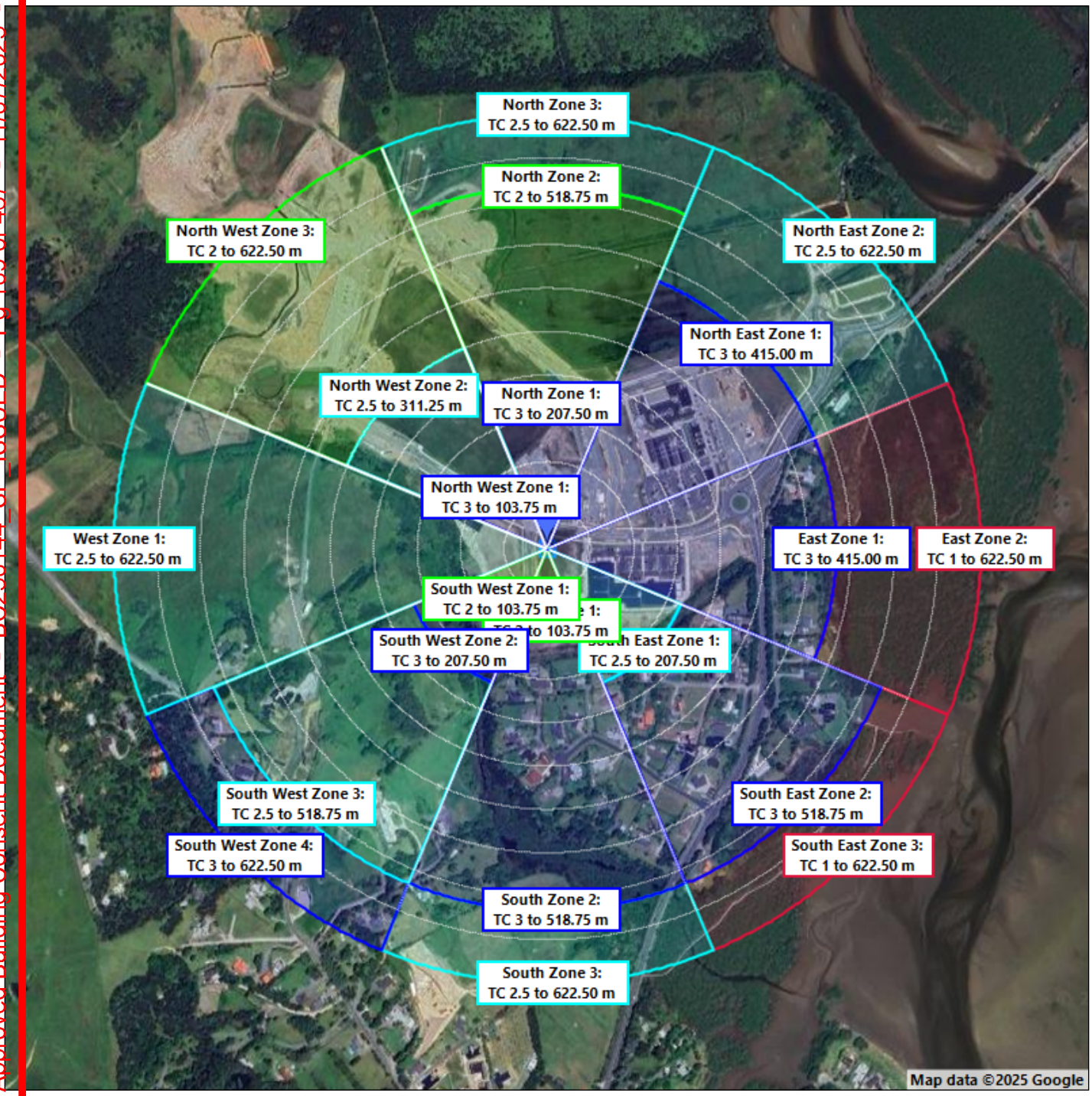

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TITLE:
PROJECT:
CODE:

CHECKWIND 8.2.1
Tuesday, March 18, 2025 3:06:29 PM
Emery Ning @ Richards Consulting Engineers

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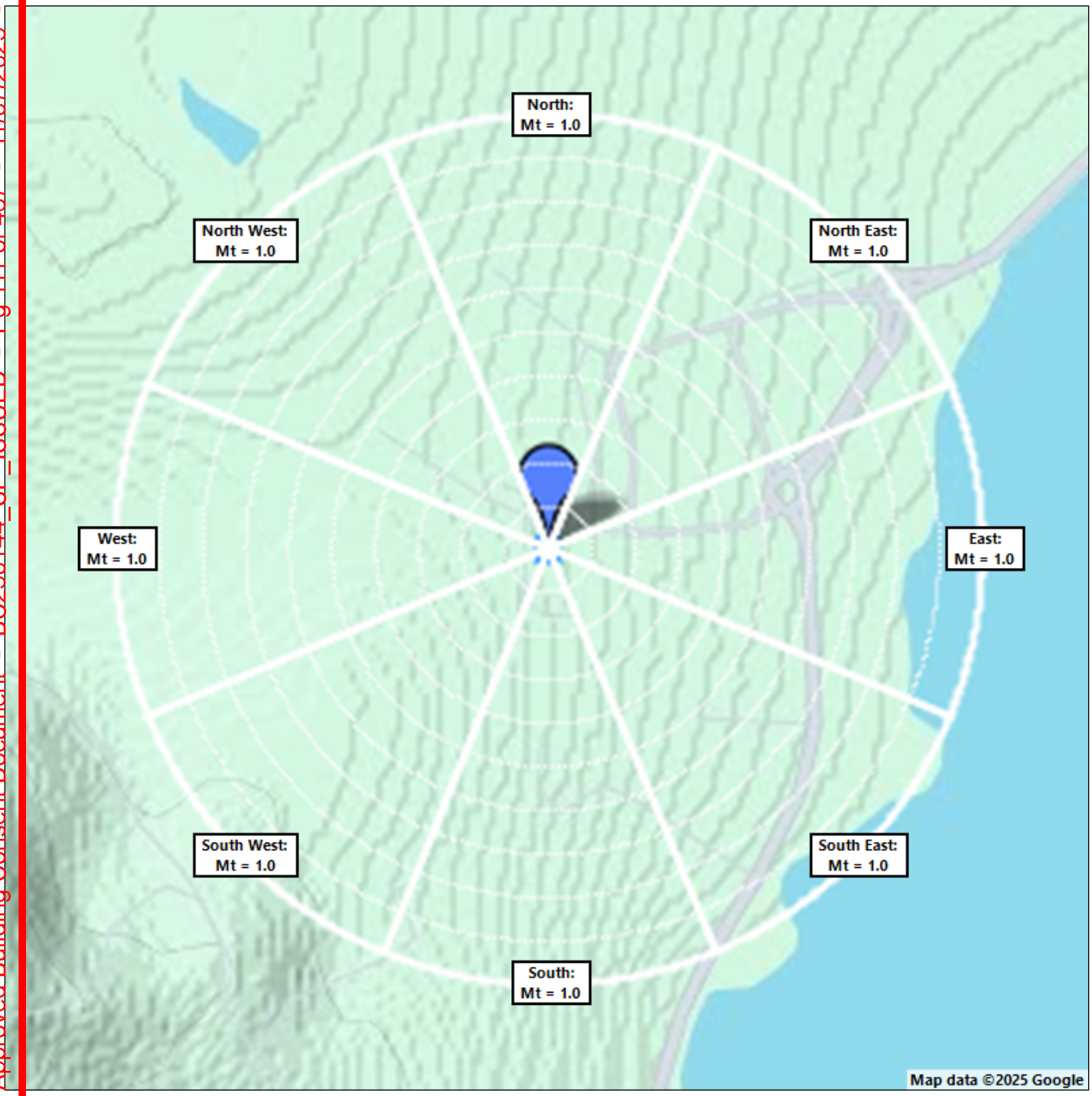

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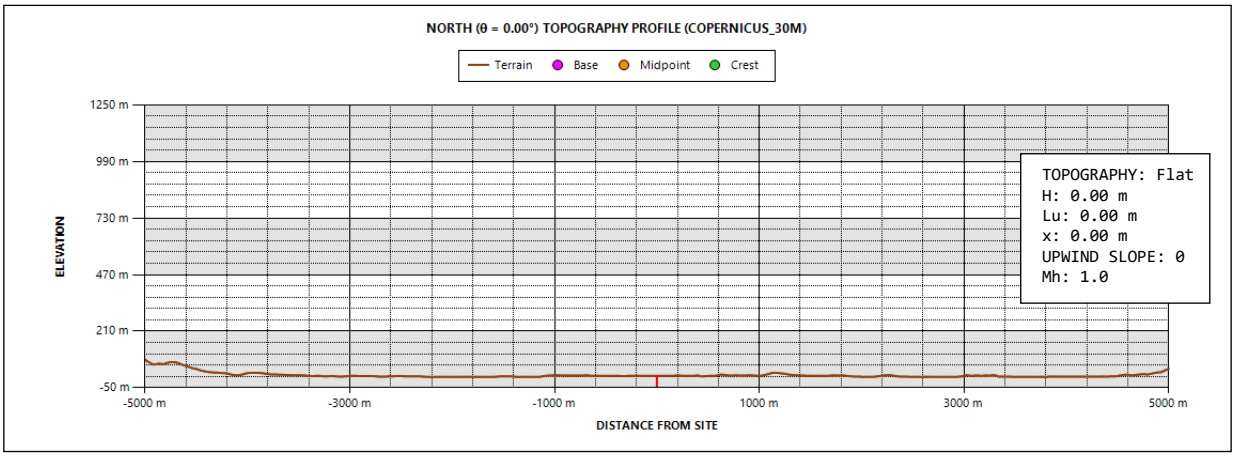

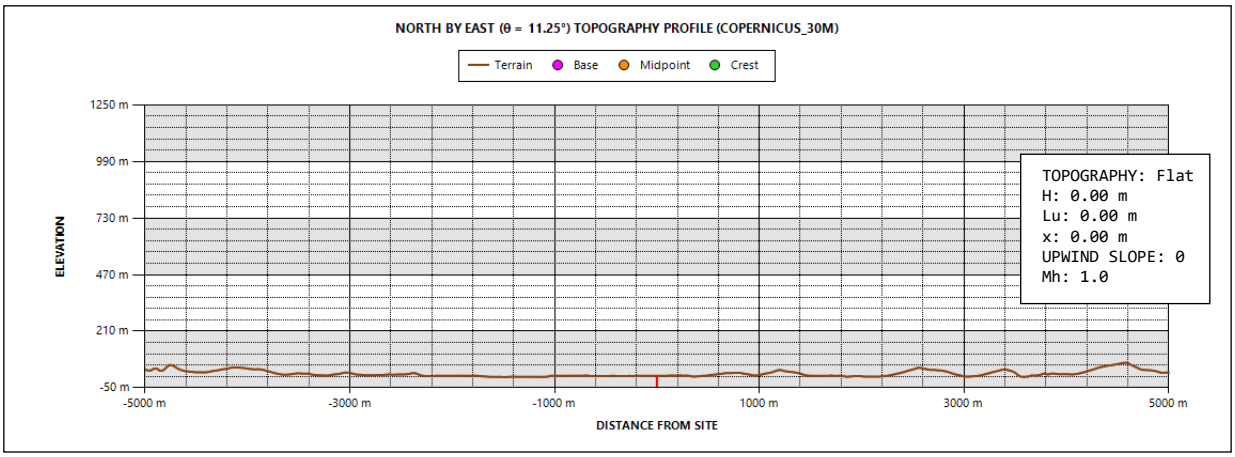

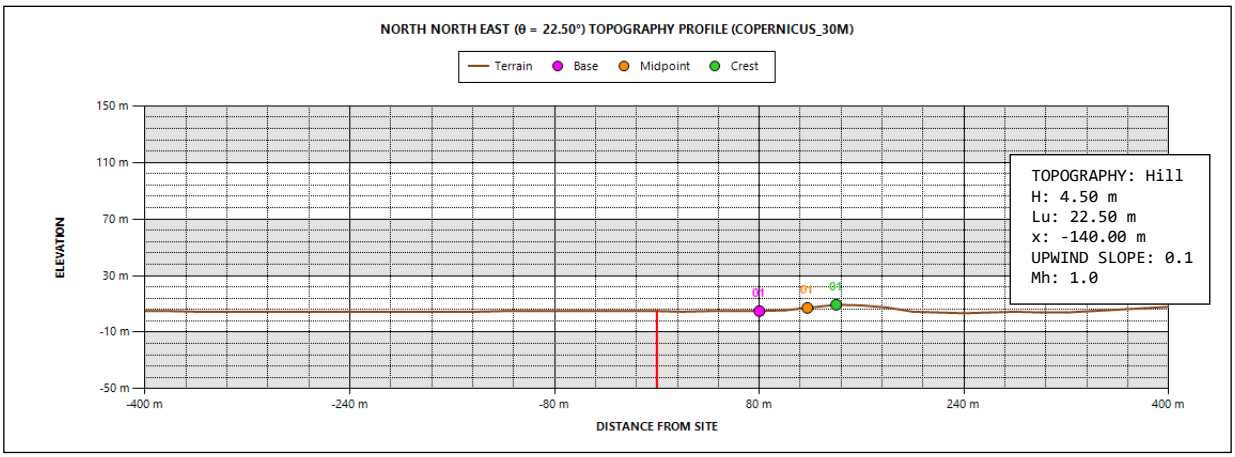

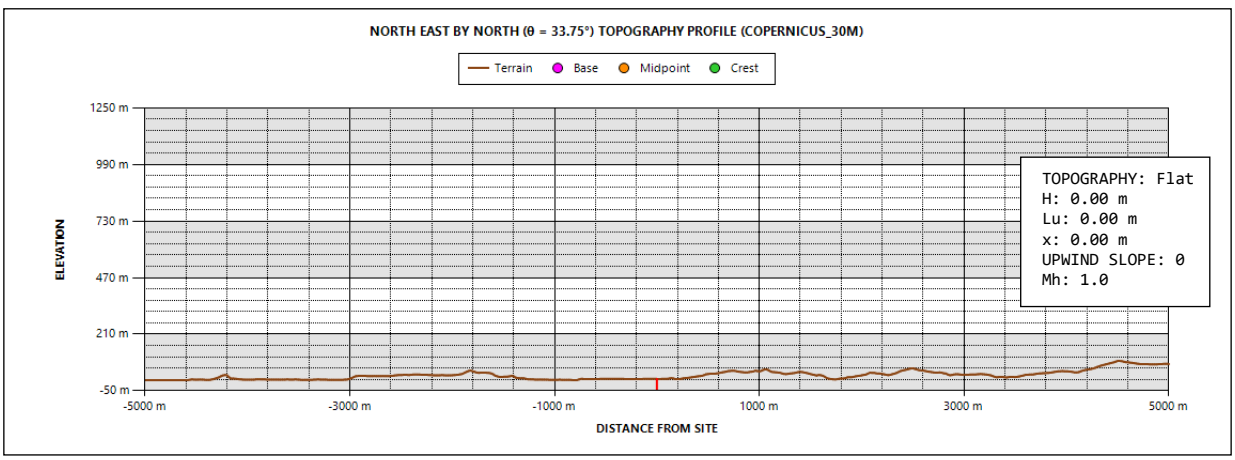

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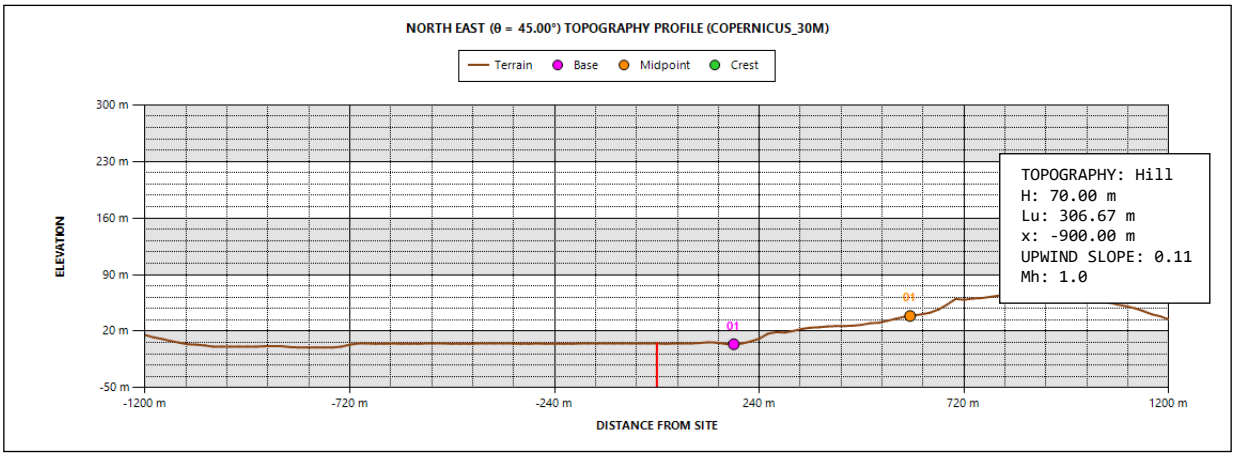

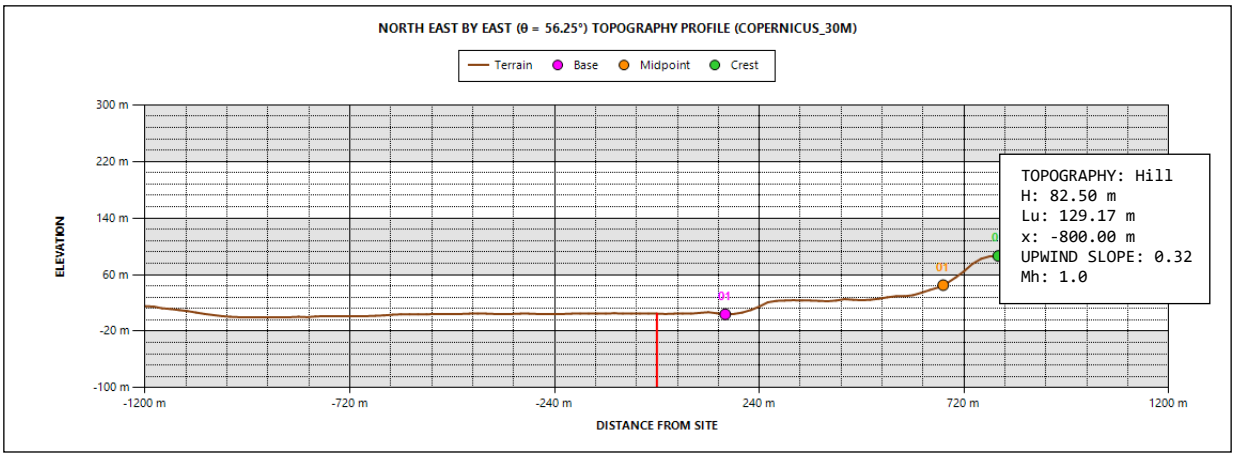

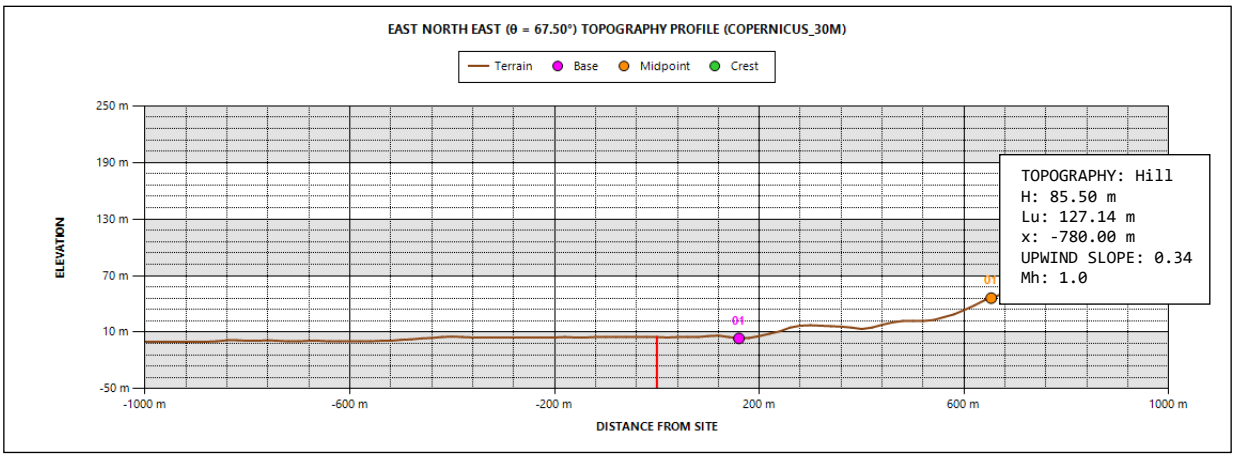

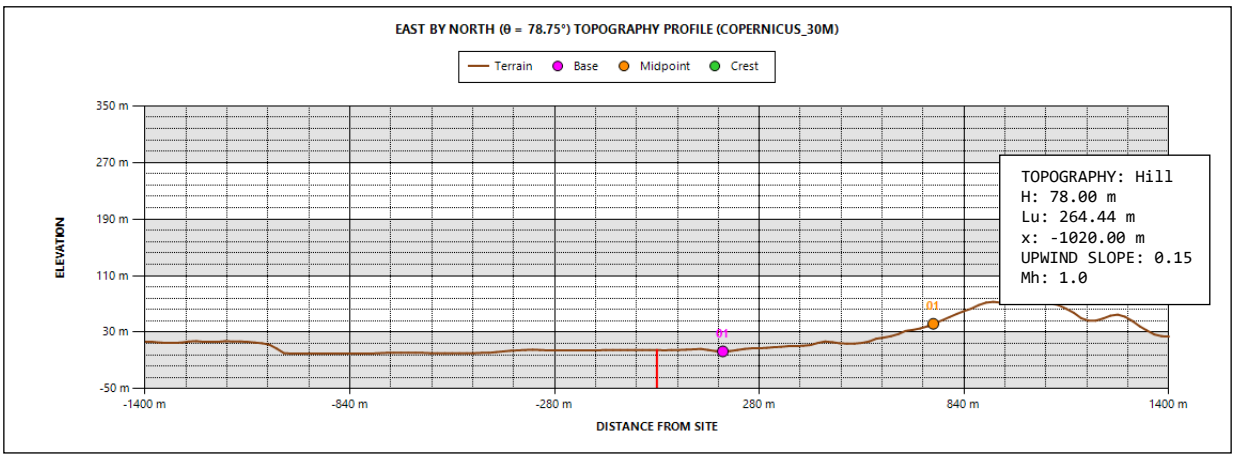

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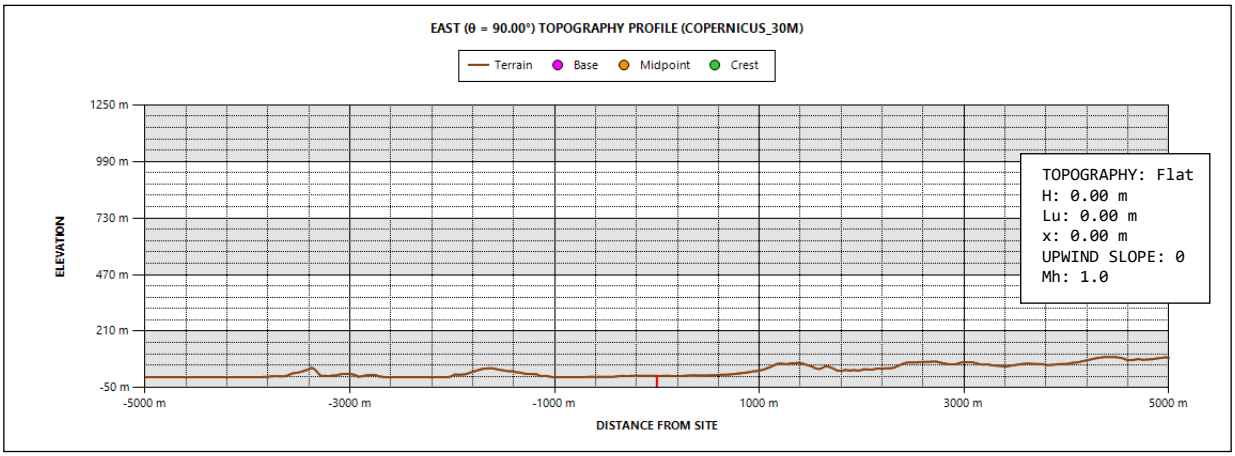

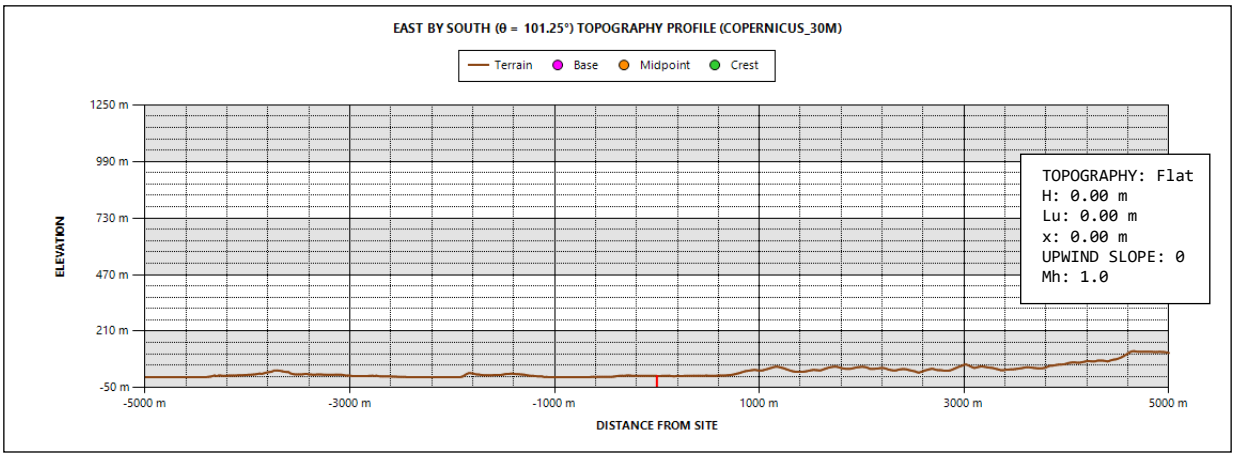

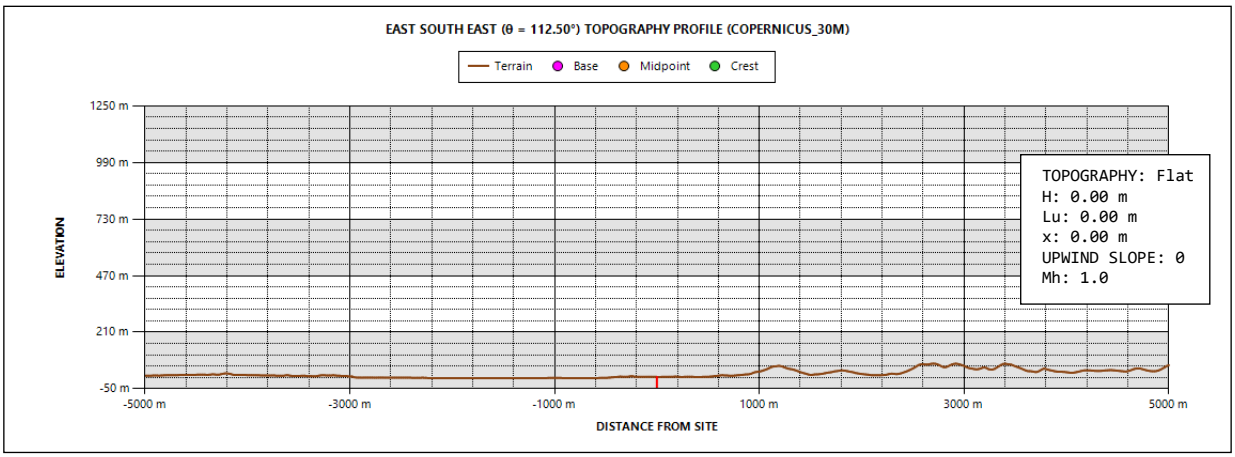

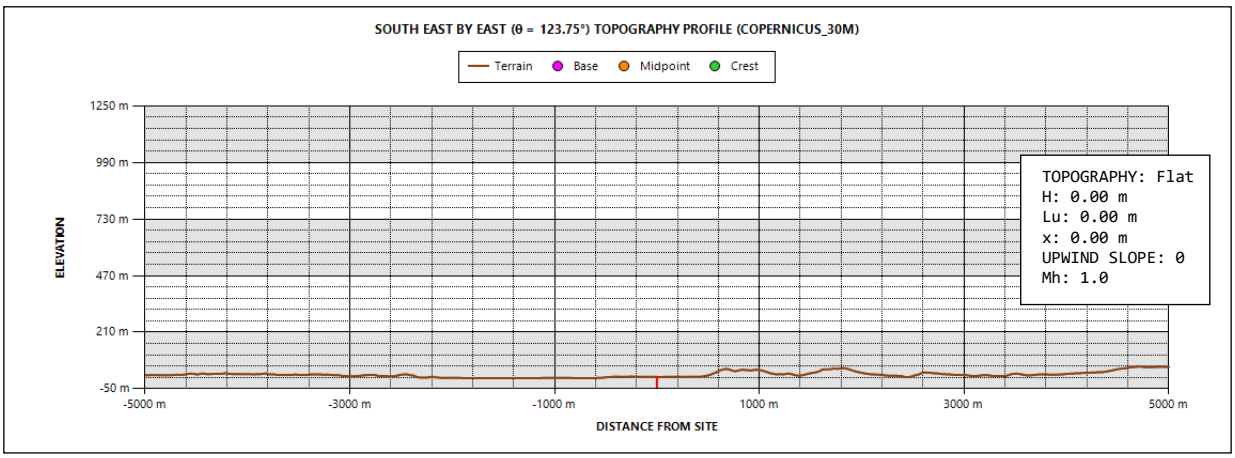

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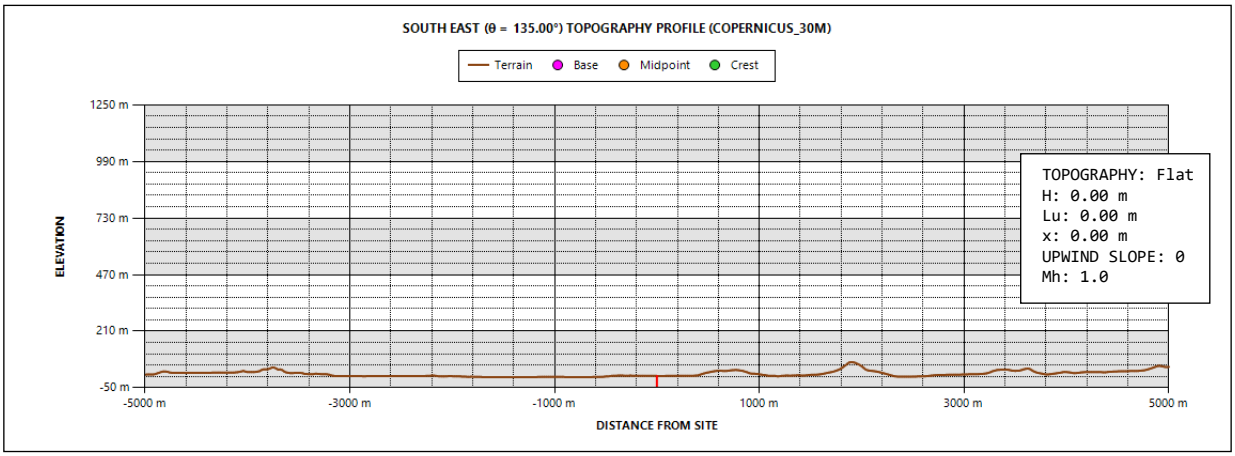

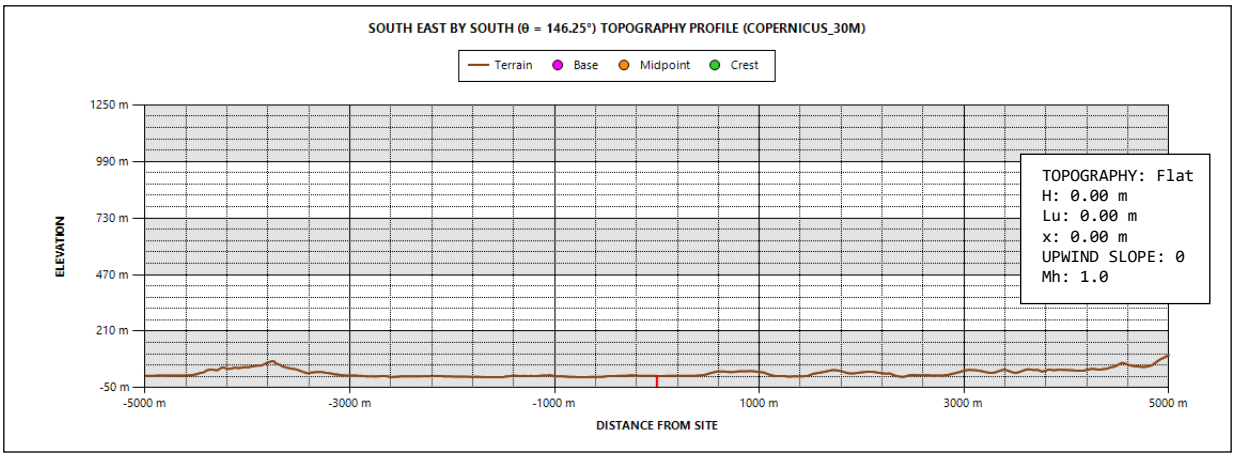

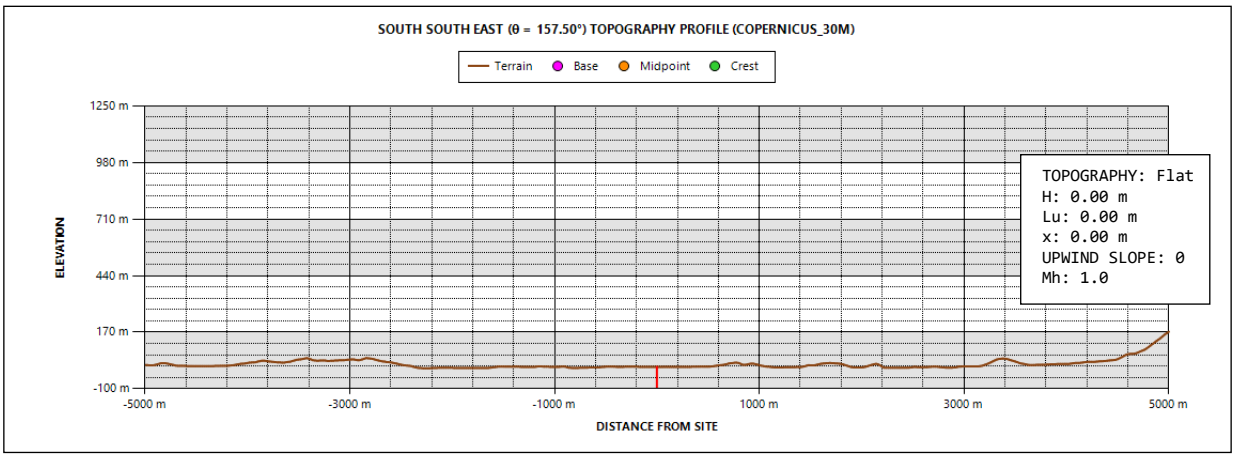

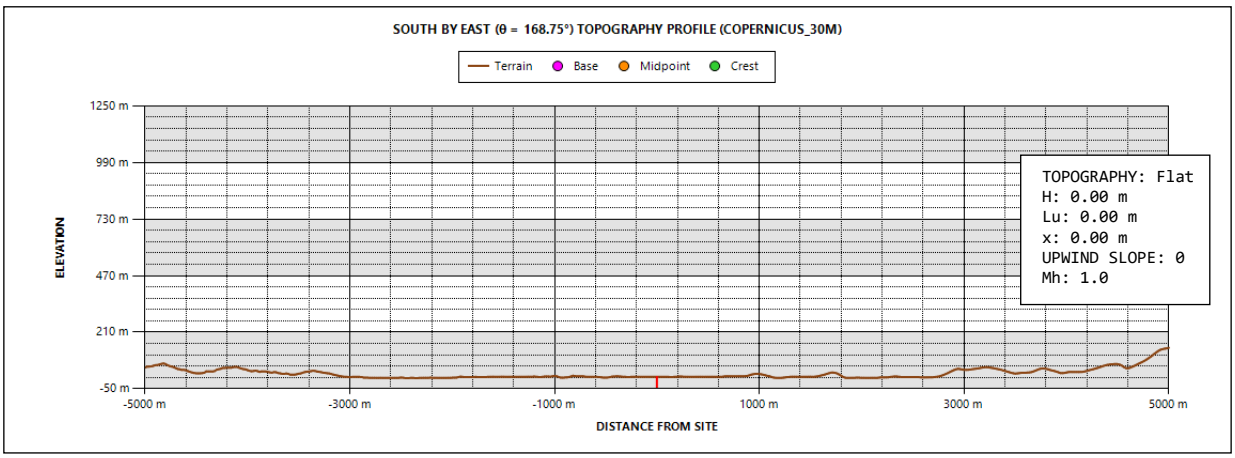

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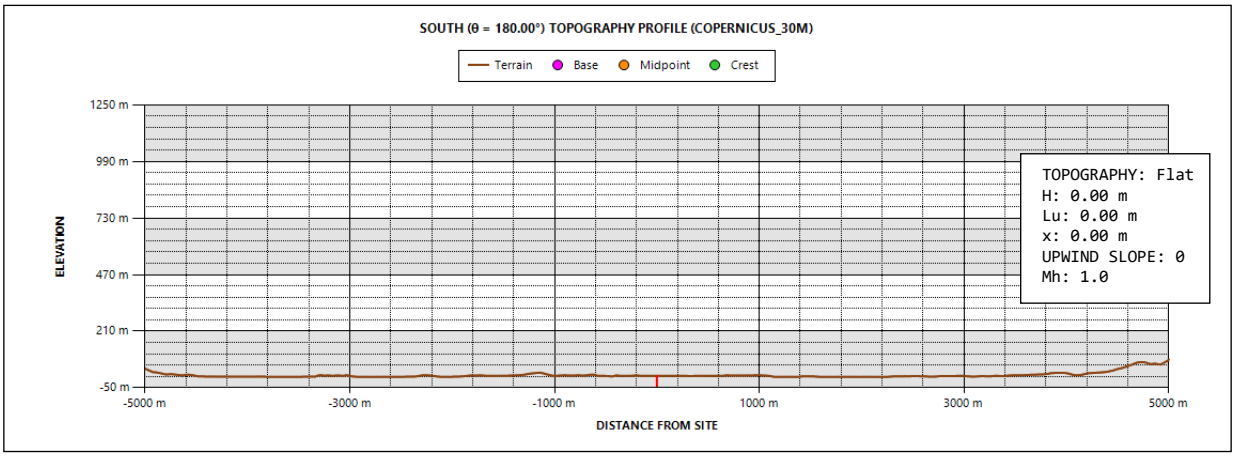

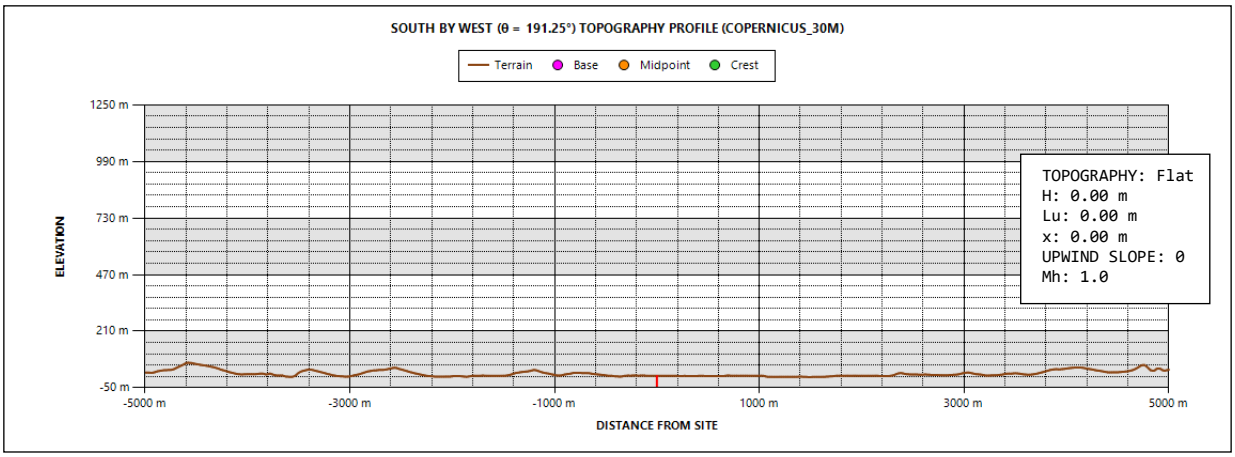

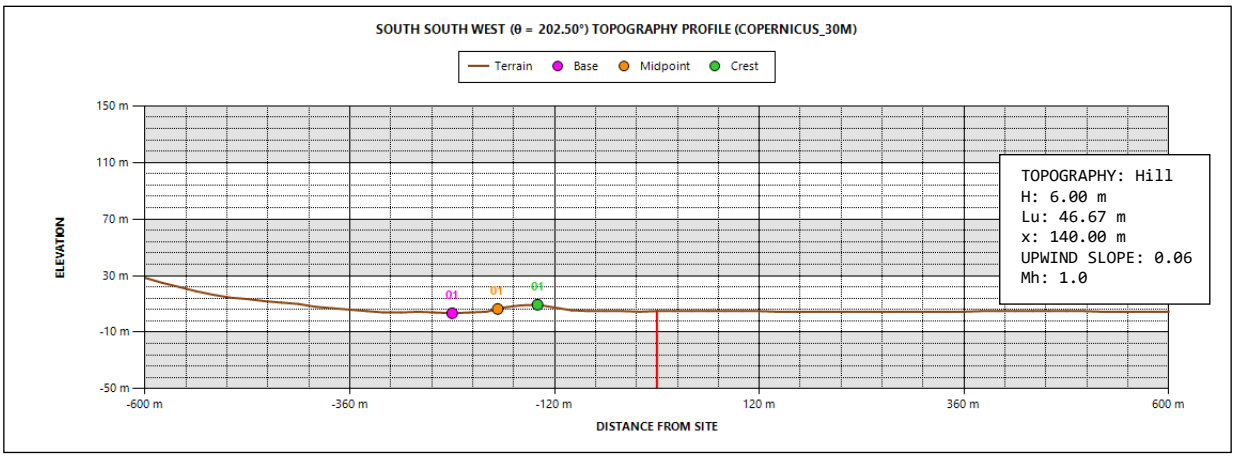

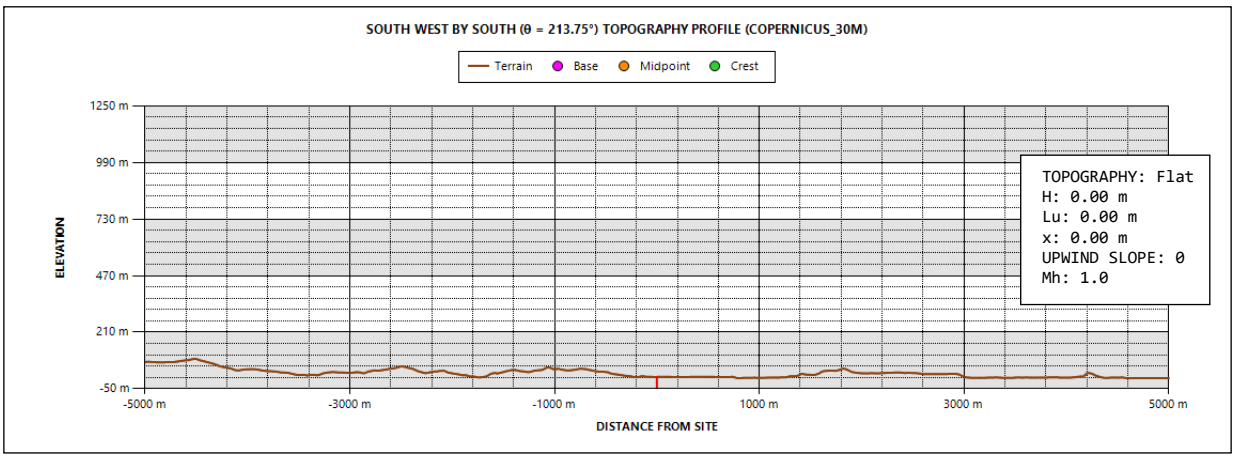

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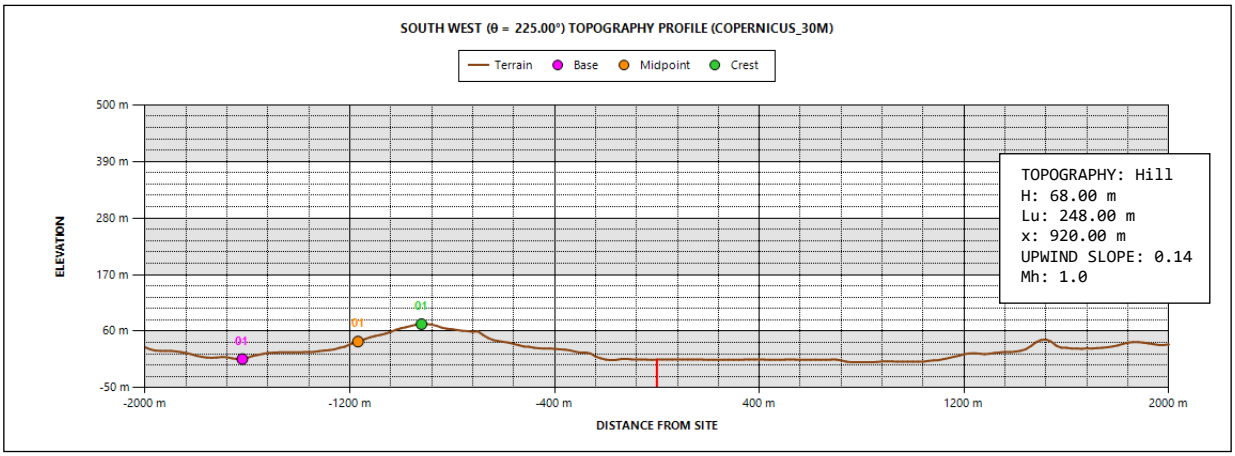

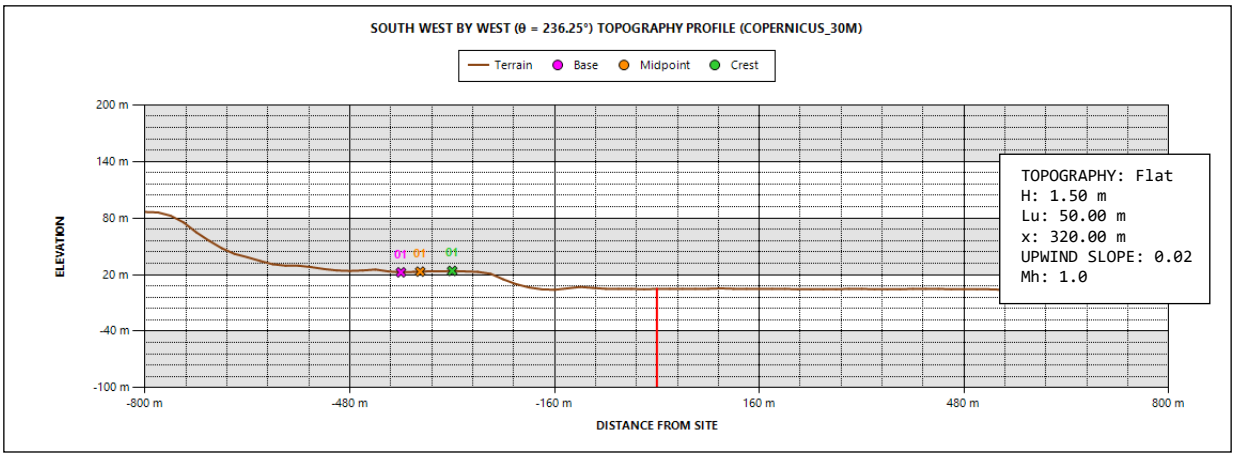

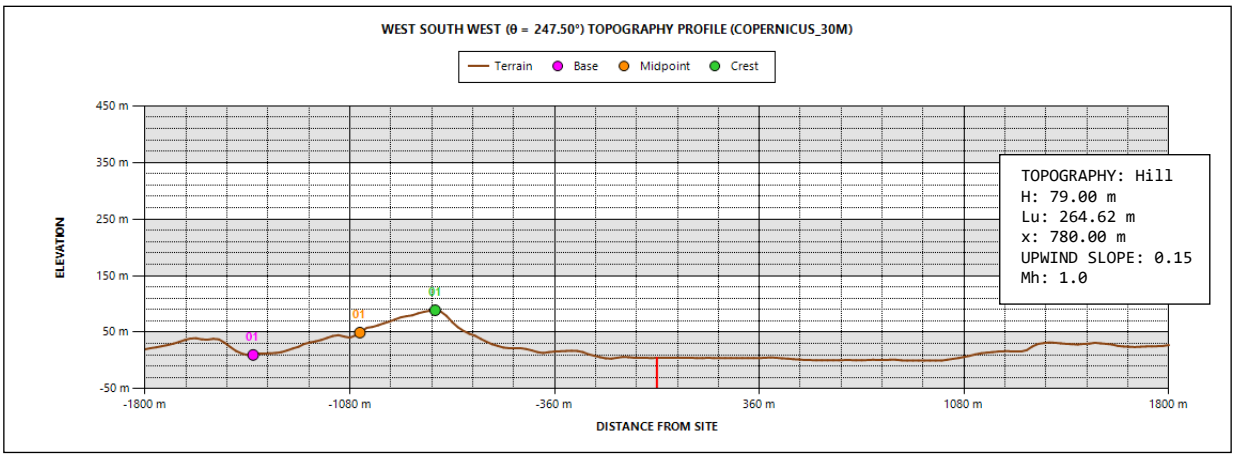

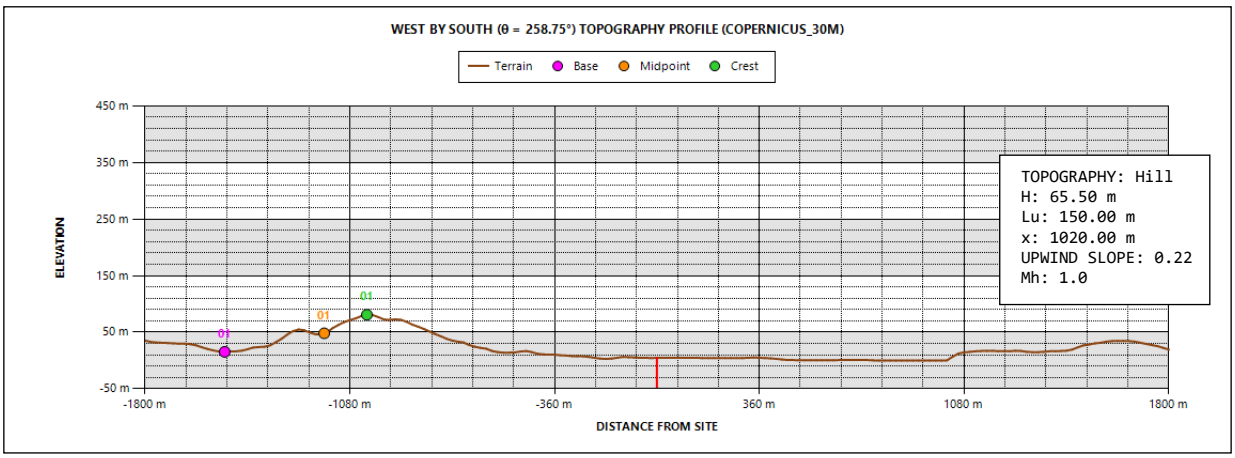

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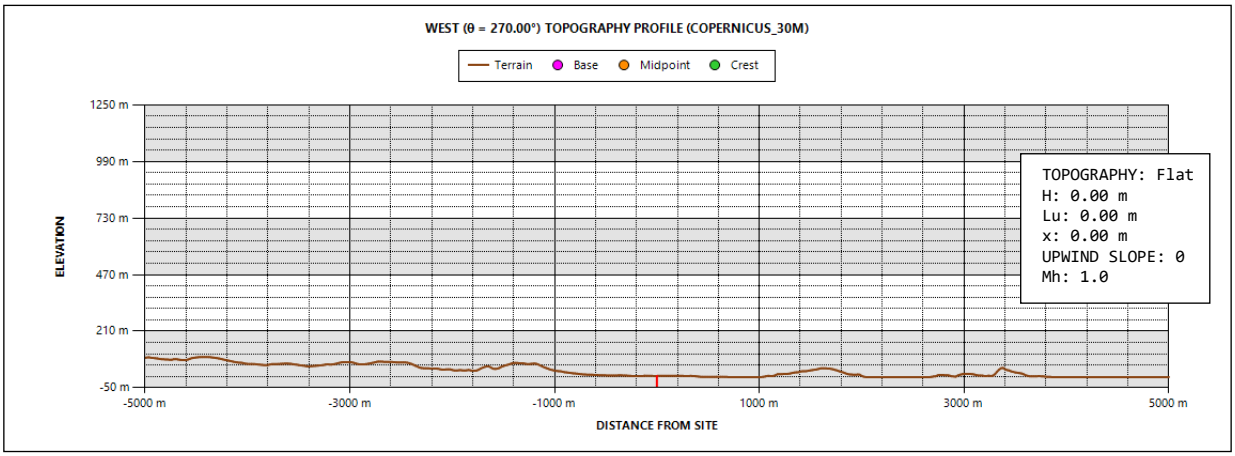

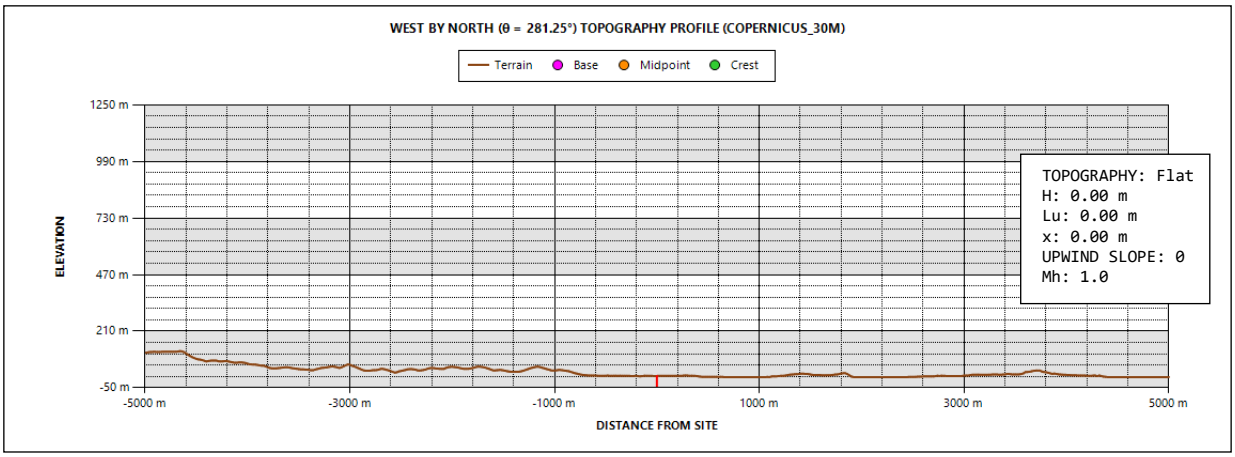

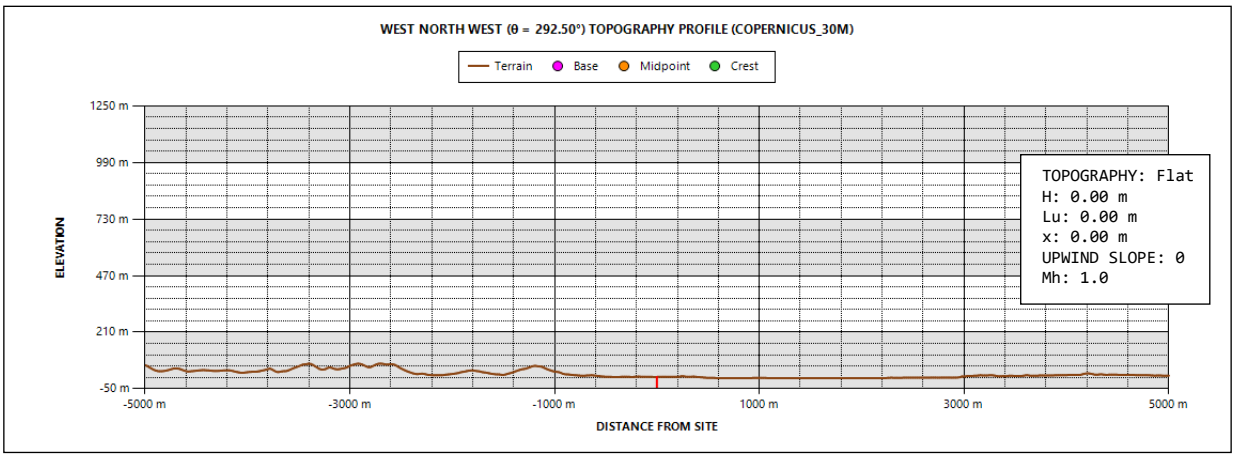

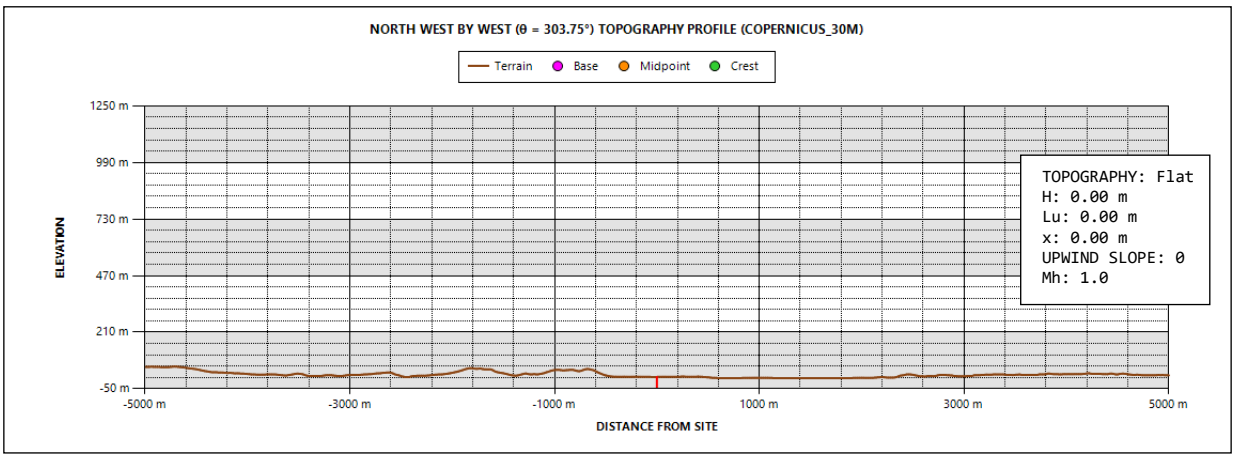

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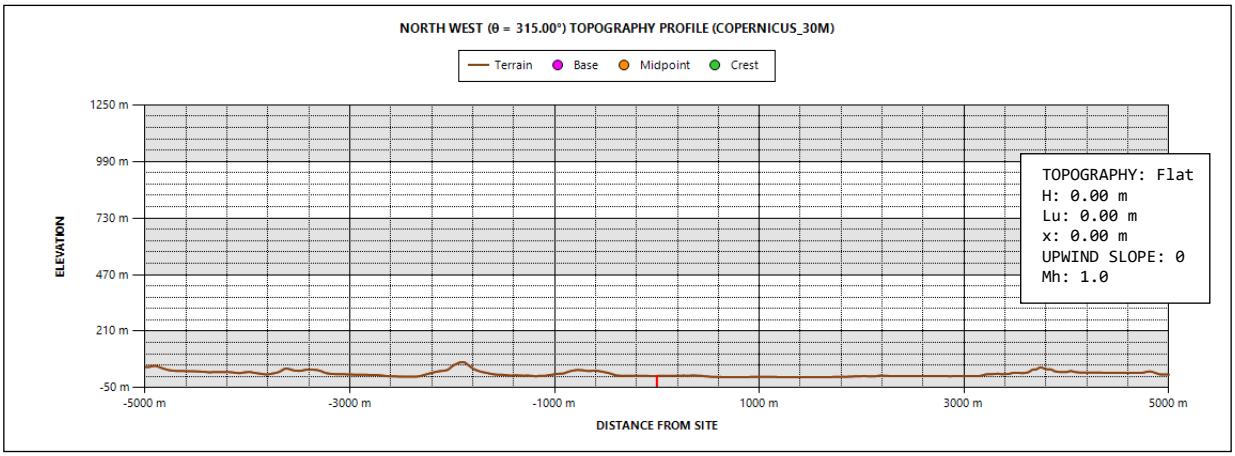

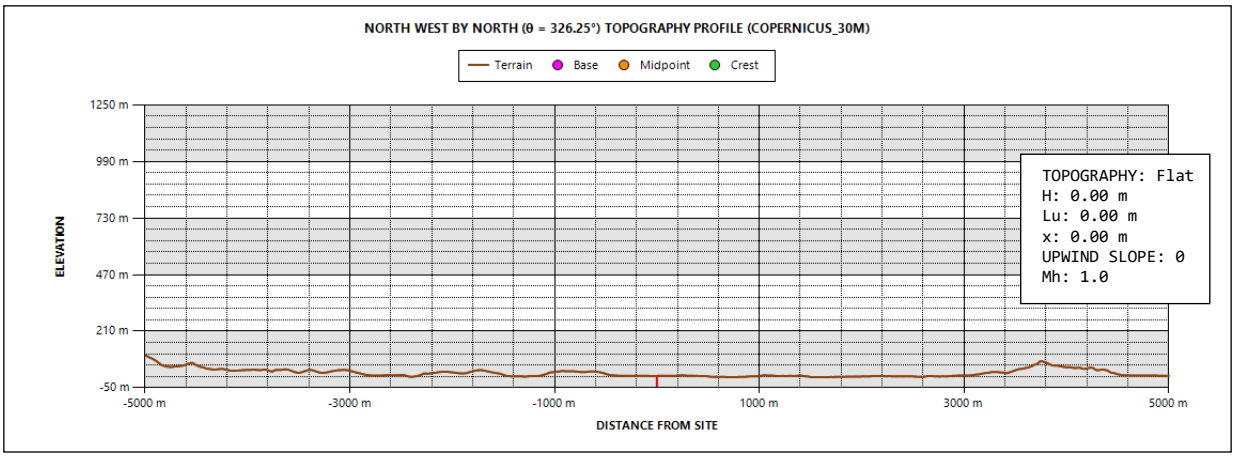

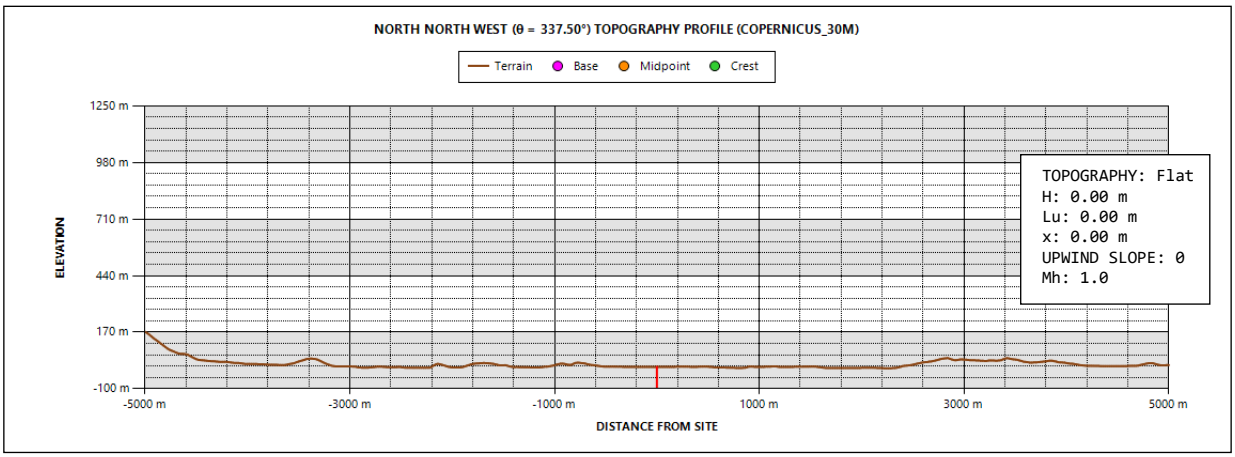

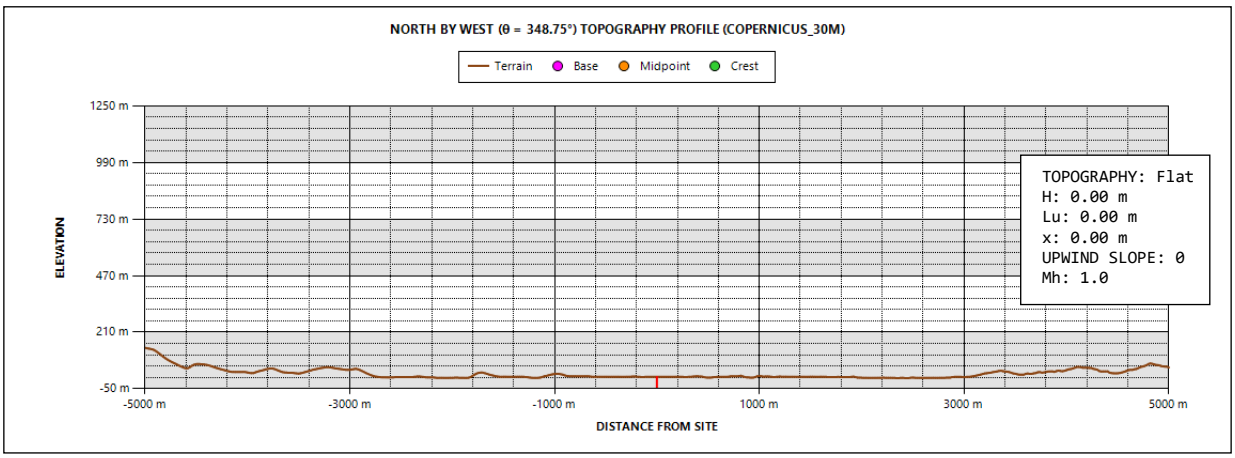

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RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road, Mangawhai		
Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

Kl factors

For walls, the value of dimension a is the minimum of $0.2b$ or $0.2d$ or the height (h) as shown in Figure 5.3. For roofs, the value of a is the minimum of $0.2b$ or $0.2d$, if (h/b) or (h/d) ≥ 0.2; or $2h$ if both (h/b) and (h/d) < 0.2. The side ratio of any local pressure factor area shall not exceed 4.

h=5.3m
d=21.1m
b=24.8m
h/d = 0.25, h/b=0.21

Therefore a = min. (0.2b or 0.2d) = 4.2m

is the shortest horizontal dimension of the building.

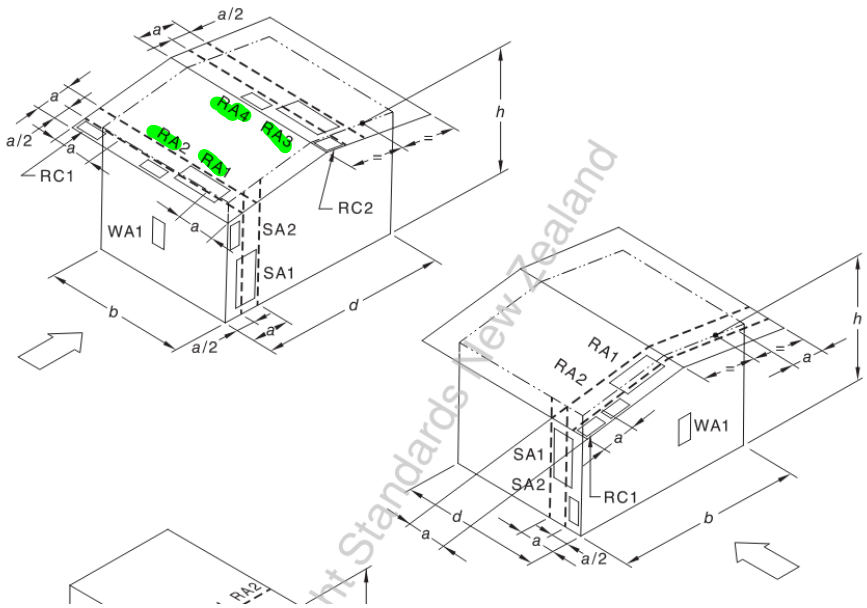

Table 5.6 — Local pressure factor (K_ℓ)

Design case	Figure 5.3 reference case	Building aspect ratio (r)	Area (A)	Proximity to edge	$K\ell$
Positive pressures					
Windward wall	WA1	All	$A \le 0.25a^2$	Anywhere	1.5
All other areas	—	All	—	—	1.0
Negative pressures					
Upwind corners of roofs with pitch < 10° AND Downwind corners of roofs with pitch ≥ 10°	RC1 RC2	All	$A \le 0.25a^2$	< a from two edges < a from both roof edge and ridge	3.0
Upwind roof edges	RA1	All	$A \le a^2$	< a	1.5
	RA2	All	$A \le 0.25a^2$	< 0.5a	2.0
Downwind side of hips and ridges of roofs with pitch ≥ 10°	RA3	All	$A \le a^2$	< a	1.5
	RA4	All	$A \le 0.25a^2$	< 0.5a	2.0
Side walls near windward wall edges	SA1	≤ 1	$A \le a^2$	< a	1.5
	SA2	≤ 1	$A \le 0.25a^2$	< 0.5a	2.0
	SA3	> 1	$A \le 0.25a^2$	> a	1.5
	SA4	> 1	$A \le a^2$	< a	2.0
	SA5	> 1	$A \le 0.25a^2$	< 0.5a	3.0
All other areas	—	All	—	—	1.0

NOTE 1 Figure reference numbers and dimension a are defined in Figure 5.3.
NOTE 2 The building aspect ratio (r) is defined as the average roof height (h) divided by the smaller of b or d.

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P1 (uplift only) areas with no ceilings

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V 1.4

Span (L) 6.4 m
Live load action applied to: Other Roofs
Axil load (N*) 0 kN
C_{mx} 1

Deflection Limit L/150
Type Single Span
Cfig ↑ = -1.1
Cfig ↓ = 0.6

no ceilings
Wu only

Primary Loads

		(kPa)
G	Roof (inc self)	0.1
	Wall	0
Q	Roof	0
S (snow)	Roof	0
W (wind)	Roof	0.93

Load Cases

Serviceability
G + ψ_sQ = 0.10 kPa
Ws ↑ = -0.77 kPa
Ws ↓ = 0.42 kPa
Ultimate
1.2G+1.5Q = 0.12 kPa
1.2G +S+ψ_cQ = 0.12 kPa
0.9G + W ↑ = -0.93 kPa
1.2G + W ↓ = 0.68 kPa
1.35G = 0.14 kPa

Table 3.1 AS/NZS 1170.1:2002
Ws/Wu 0.75
AS/NZS 1170.2
Table 4.1 AS/NZS 1170.0:2002
AS/NZS 1170.3

ignore any services/suspended ceiling etc. only consider roofing

DHS		W_{LC} / W_s (kN/m)		Maximum spacing Deflection (m)	maximum ↑ spacing (m)	maximum ↓ spacing (m)	Max overall spacing (m)
150/12	1B	0.756			0.81		0.67
0	2B	1.138			1.22		0.67
0	3B	1.138			1.22		0.67
0	FR	1.138			1.22	1.68	0.67
0	Ws	0.516	L/150	0.67			
150/15	1B	1			1.07		0.85
0	2B	1.552			1.66		0.85
0	3B	1.552			1.66		0.85
0	FR	1.552			1.66	2.29	0.85
0	Ws	0.652	L/150	0.85			
200/12	1B	1.342			1.44		1.40
0	2B	1.686			1.81		1.40
0	3B	1.686			1.81		1.40
0	FR	1.686			1.81	2.49	1.40
0	Ws	1.074	L/150	1.40			
200/15	1B	1.902			2.04		1.82
0	2B	2.308			2.47		1.82
0	3B	2.308			2.47		1.82
0	FR	2.308			2.47	3.40	1.82
0	Ws	1.4	L/150	1.82			
200/18	1B	2.38			2.55		2.21
0	2B	2.98			3.19		2.21
0	3B	2.98			3.19		2.21
0	FR	2.98			3.19	4.40	2.21
0	Ws	1.698	L/150	2.21			
250/13	1B	2.306			2.47		2.47
0	2B	2.616			2.80		2.61
0	3B	2.616			2.80		2.61
0	FR	2.616			2.80	3.86	2.61
0	Ws	2.006	L/150	2.61			
250/15	1B	2.904			3.11		3.11
0	2B	3.208			3.44		3.22
0	3B	3.208			3.44		3.22
0	FR	3.208			3.44	4.73	3.22
0	Ws	2.468	L/150	3.22			
250/18	1B	3.918			4.20		4.05
0	2B	4.148			4.45		4.05
0	3B	4.148			4.45		4.05
0	FR	4.148			4.45	6.12	4.05
0	Ws	3.106	L/150	4.05			
300/15	1B	4.01			4.30		4.30
0	2B	4.162			4.46		4.46
0	3B	4.162			4.46		4.46
0	FR	4.162			4.46	6.14	4.46
0	Ws	3.74	L/150	4.87			
300/18	1B	4.136			4.43		4.43
0	2B	4.2			4.50		4.50
0	3B	4.2			4.50		4.50
0	FR	4.2			4.50	6.19	4.50
0	Ws	3.704	L/150	4.83			
350/18	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/150	0.00			
400/20	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/150	0.00			

for purlins a/2 from eave and apex where Kl=2.0, the maximum spacing is therefore halved = 1.1m crs -> make this for all pulins

200/18 DHS purlins at 1m crs max

P1 consider G+Q

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V 1.4

Span (L)	6.4	m	Deflection Limit	L/300	
Live load action applied to:	Other Roofs		Type	Single Span	
Axil load (N*)	0	kN	Cfig ↑ =	-1.1	
C_{mx}	1		Cfig ↓ =	0.6	

G+Q

0.05kPa for purlin
0.1kPa roofing
allow 0.1kPa services
allow 0.1kPa for suspended ceiling
(0.35 total)

Primary Loads

		(kPa)
G	Roof (inc self)	0.4
	Wall	0
Q	Roof	0.42
S (snow)	Roof	0
W (wind)	Roof	

Load Cases

Serviceability

G + ψ_sQ =	0.69	kPa
Ws ↑ =	0.00	kPa
Ws ↓ =	0.00	kPa

Ultimate

1.2G+1.5Q =	1.11	kPa
1.2G +S+ψ_cQ =	0.48	kPa
0.9G + W ↑ =	0.36	kPa
1.2G + W ↓ =	0.48	kPa
1.35G =	0.54	kPa

Table 3.1 AS/NZS 1170.1:2002

Ws/Wu 0.75

AS/NZS 1170.2

Table 4.1 AS/NZS 1170.0:2002

AS/NZS 1170.3

DHS		W_{LC} / W_s (kN/m)		Maximum spacing Deflection (m)	maximum ↑ spacing (m)	maximum ↓ spacing (m)	Max overall spacing (m)
150/12	1B	0.756			2.10		
0	2B	1.138			3.16		
0	3B	1.138			3.16		
0	FR	1.138			3.16	1.03	0.37
0	Ws	0.516	L/300	0.37			
150/15	1B	1			2.78		
0	2B	1.552			4.31		
0	3B	1.552			4.31		
0	FR	1.552			4.31	1.40	0.47
0	Ws	0.652	L/300	0.47			
200/12	1B	1.342			3.73		
0	2B	1.686			4.68		
0	3B	1.686			4.68		
0	FR	1.686			4.68	1.52	0.77
0	Ws	1.074	L/300	0.77			
200/15	1B	1.902			5.28		
0	2B	2.308			6.41		
0	3B	2.308			6.41		
0	FR	2.308			6.41	2.08	1.01
0	Ws	1.4	L/300	1.01			
200/18	1B	2.38			6.61		
0	2B	2.98			8.28		
0	3B	2.98			8.28		
0	FR	2.98			8.28	2.68	1.22
0	Ws	1.698	L/300	1.22			
250/13	1B	2.306			6.41		
0	2B	2.616			7.27		
0	3B	2.616			7.27		
0	FR	2.616			7.27	2.36	1.45
0	Ws	2.006	L/300	1.45			
250/15	1B	2.904			8.07		
0	2B	3.208			8.91		
0	3B	3.208			8.91		
0	FR	3.208			8.91	2.89	1.78
0	Ws	2.468	L/300	1.78			
250/18	1B	3.918			10.88		
0	2B	4.148			11.52		
0	3B	4.148			11.52		
0	FR	4.148			11.52	3.74	2.24
0	Ws	3.106	L/300	2.24			
300/15	1B	4.01			11.14		
0	2B	4.162			11.56		
0	3B	4.162			11.56		
0	FR	4.162			11.56	3.75	2.69
0	Ws	3.74	L/300	2.69			
300/18	1B	4.136			11.49		
0	2B	4.2			11.67		
0	3B	4.2			11.67		
0	FR	4.2			11.67	3.78	2.67
0	Ws	3.704	L/300	2.67			
350/18	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/300	0.00			
400/20	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/300	0.00			

200/18 DHS purlins at 1m crs max

P1 consider G only

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V 1.4

Span (L)	6.4	m	Deflection Limit	L/400	
Live load action applied to:	Other Roofs		Type	Single Span	
Axil load (N*)	0	kN	Cfig ↑ =	-1.1	
C_{mx}	1		Cfig ↓ =	0.6	

recommend min, L/360 limit

Primary Loads

		(kPa)
G	Roof (inc self)	0.4
	Wall	0
Q	Roof	
S (snow)	Roof	0
W (wind)	Roof	

Load Cases

Serviceability			
G + ψ_sQ =	0.40	kPa	
Ws ↑ =	0.00	kPa	*Table 3.1 AS/NZS 1170.1:2002*
Ws ↓ =	0.00	kPa	Ws/Wu 0.75
Ultimate			
1.2G+1.5Q =	0.48	kPa	
1.2G +S+ψ_cQ =	0.48	kPa	*AS/NZS 1170.2*
0.9G + W ↑ =	0.36	kPa	*Table 4.1 AS/NZS 1170.0:2002*
1.2G + W ↓ =	0.48	kPa	*AS/NZS 1170.3*
1.35G =	0.54	kPa	

DHS		W_{LC} / W_s (kN/m)		Maximum spacing Deflection (m)	maximum ↑ spacing (m)	maximum ↓ spacing (m)	Max overall spacing (m)
150/12	1B	0.756			2.10		0.48
0	2B	1.138			3.16		
0	3B	1.138			3.16		
0	FR	1.138			3.16	2.11	0.48
0	Ws	0.516	L/400	0.48			
150/15	1B	1			2.78		0.61
0	2B	1.552			4.31		
0	3B	1.552			4.31		
0	FR	1.552			4.31	2.87	0.61
0	Ws	0.652	L/400	0.61			
200/12	1B	1.342			3.73		
0	2B	1.686			4.68		
0	3B	1.686			4.68		
0	FR	1.686			4.68	3.12	1.01
0	Ws	1.074	L/400	1.01			
200/15	1B	1.902			5.28		
0	2B	2.308			6.41		
0	3B	2.308			6.41		
0	FR	2.308			6.41	4.27	1.31
0	Ws	1.4	L/400	1.31			
200/18	1B	2.38			6.61		
0	2B	2.98			8.28		
0	3B	2.98			8.28		
0	FR	2.98			8.28	5.52	1.59
0	Ws	1.698	L/400	1.59			
250/13	1B	2.306			6.41		
0	2B	2.616			7.27		
0	3B	2.616			7.27		
0	FR	2.616			7.27	4.84	1.88
0	Ws	2.006	L/400	1.88			
250/15	1B	2.904			8.07		
0	2B	3.208			8.91		
0	3B	3.208			8.91		
0	FR	3.208			8.91	5.94	2.31
0	Ws	2.468	L/400	2.31			
250/18	1B	3.918			10.88		
0	2B	4.148			11.52		
0	3B	4.148			11.52		
0	FR	4.148			11.52	7.68	2.91
0	Ws	3.106	L/400	2.91			
300/15	1B	4.01			11.14		
0	2B	4.162			11.56		
0	3B	4.162			11.56		
0	FR	4.162			11.56	7.71	3.51
0	Ws	3.74	L/400	3.51			
300/18	1B	4.136			11.49		
0	2B	4.2			11.67		
0	3B	4.2			11.67		
0	FR	4.2			11.67	7.78	3.47
0	Ws	3.704	L/400	3.47			
350/18	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/400	0.00			
400/20	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/400	0.00			

200/18 DHS purlins at 1m crs max

G1

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V 1.4

Span (L)	6.4	m	Deflection Limit	L/300	
Live load action applied to:	Other Roofs		Type	Single Span	
Axil load (N*)	0	kN	Cfig ↑ =	1	
C_{mx}	1		Cfig ↓ =	1	

Primary Loads

		(kPa)
G	Roof (inc self)	0
	Wall	0
Q	Roof	0
S (snow)	Roof	0
W (wind)	Roof	0.93

Load Cases

Serviceability			
G + ψ_sQ =	0.00	kPa	
Ws ↑ =	0.70	kPa	*Table 3.1 AS/NZS 1170.1:2002*
Ws ↓ =	0.70	kPa	Ws/Wu 0.75
Ultimate			
1.2G+1.5Q =	0.00	kPa	
1.2G +S+ψ_cQ =	0.00	kPa	*AS/NZS 1170.2*
0.9G + W ↑ =	0.93	kPa	*Table 4.1 AS/NZS 1170.0:2002*
1.2G + W ↓ =	0.93	kPa	*AS/NZS 1170.3*
1.35G =	0.00	kPa	

DHS		W_{LC} / W_s (kN/m)		Maximum spacing Deflection (m)	maximum ↑ spacing (m)	maximum ↓ spacing (m)	Max overall spacing (m)
150/12	1B	0.756			0.81		0.37
0	2B	1.138			1.22		0.37
0	3B	1.138			1.22		0.37
0	FR	1.138			1.22	1.22	0.37
0	Ws	0.516	L/300	0.37			
150/15	1B	1			1.08		0.47
0	2B	1.552			1.67		0.47
0	3B	1.552			1.67		0.47
0	FR	1.552			1.67	1.67	0.47
0	Ws	0.652	L/300	0.47			
200/12	1B	1.342			1.44		0.77
0	2B	1.686			1.81		0.77
0	3B	1.686			1.81		0.77
0	FR	1.686			1.81	1.81	0.77
0	Ws	1.074	L/300	0.77			
200/15	1B	1.902			2.05		1.00
0	2B	2.308			2.48		1.00
0	3B	2.308			2.48		1.00
0	FR	2.308			2.48	2.48	1.00
0	Ws	1.4	L/300	1.00			
200/18	1B	2.38			2.56		1.22
0	2B	2.98			3.20		1.22
0	3B	2.98			3.20		1.22
0	FR	2.98			3.20	3.20	1.22
0	Ws	1.698	L/300	1.22			
250/13	1B	2.306			2.48		1.44
0	2B	2.616			2.81		1.44
0	3B	2.616			2.81		1.44
0	FR	2.616			2.81	2.81	1.44
0	Ws	2.006	L/300	1.44			
250/15	1B	2.904			3.12		1.77
0	2B	3.208			3.45		1.77
0	3B	3.208			3.45		1.77
0	FR	3.208			3.45	3.45	1.77
0	Ws	2.468	L/300	1.77			
250/18	1B	3.918			4.21		2.23
0	2B	4.148			4.46		2.23
0	3B	4.148			4.46		2.23
0	FR	4.148			4.46	4.46	2.23
0	Ws	3.106	L/300	2.23			
300/15	1B	4.01			4.31		2.68
0	2B	4.162			4.48		2.68
0	3B	4.162			4.48		2.68
0	FR	4.162			4.48	4.48	2.68
0	Ws	3.74	L/300	2.68			
300/18	1B	4.136			4.45		2.66
0	2B	4.2			4.52		2.66
0	3B	4.2			4.52		2.66
0	FR	4.2			4.52	4.52	2.66
0	Ws	3.704	L/300	2.66			
350/18	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/300	0.00			
400/20	1B	0			0.00		0.00
0	2B	0			0.00		0.00
0	3B	0			0.00		0.00
0	FR	0			0.00	0.00	0.00
0	Ws	0	L/300	0.00			

200/18 DHS purlins at 1.0m crs max

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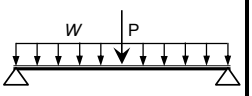
V 5 Element Name: G2

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall	1.2	0.6	0.7		
Other			0.0		
Self			0.3		
		Sum	1.0		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		Cfig = -1.1
Misc					
SLS			0		
ULS			0		

Assumptions:
1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from largest deflection
5. Governing ULS determined by largest M*
6. Live loads on floors are considered to be from: Other Floors
7. Live loads on roofs are considered to be from: Other Roofs
8. Structural element is considered a: Beam & Girt
9. Vertical loads are applied to: Major axis (i.e. strong direction)
10. Horizontal loads are applied to: Minor axis (i.e. weak direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	2.1	0.93	-1.953	
EQ			0	
Fire			0	

Cfig = -1
R_{SLS}/R_{ULS} = 0.25
Table 3.1 AS/NZS 1170.1:2002

Comments

Allow for 90mm steel stud support also

Beam properties

Span (L) = 6.4 m

Try: 150 x 6 SHS Steel beam
E = 200 GPa Steel Grade: 350 MPa

I_x = 11.3 $\times 10^6$ mm^4 *AISC Tables*
I_y = 11.3 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **2.42** **mm** < 1 mm ~~NOT OK~~

Comments

Check Deflection *L/Δ>400 ok*

$\Delta_{max,\ vertical}$ =	**9.44**	**mm**	L/Δ = 678	**OK**	**G + ψsQ**
$\Delta_{max,\ horizontal}$ =	**14.16**	**mm**	L/Δ = 452	~~NOT OK~~	**Wind**

Comments

Check Bending Strength

M^*_x =	**6.8**	**kN.m**		**1.35G**
Le_x =	6.40	m	*Effective length*	**Beam**
$\varnothing M_{bx}$ =	**55.07**	**kN.m**		
$M^* < \varnothing M_{bx}$ =	0.12	**OK**	$M^*/\varnothing M_n$<1 ok	
$M^*_{b,\ uplift}$ =	**No Uplift**	**kN.m**		
Le_b =	6.40	m	*Effective length*	
$\varnothing M_{bx}$ =	**55.07**	**kN.m**		
$M^*_{b,\ uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok	
M^*_y =	**10.0**	**kN.m**		**Wind**
$\varnothing M_y$ =	**55.13**	**kN.m**		**Girt**
$M_y^* < \varnothing M_y$ =	0.18	**OK**	$M_y^*/\varnothing M_y$<1 ok	

α_m = 1

>L/400 - OK

Comments

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.3 < 1.0 **OK**

Comments

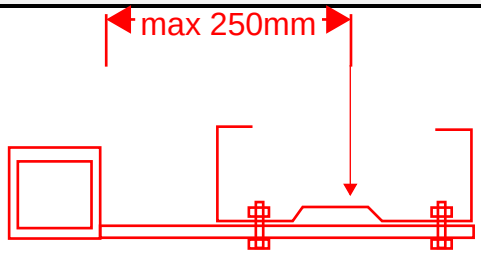
Reactions

R_1 =	4.22	kN		**1.35G**
	No Uplift			
R_2 =	4.22	kN		**1.35G**
	No Uplift			
$R_y = V^*_y$ =	6.2	kN		**Wind**

Comments

Comments

150 x 6 SHS 350



Check torsion in G2
1.2m x 0.35kPa x 6.4m x0.25m
= 0.7kNm - OK

Consider wind face load only (no gravity)

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Project:		Page:
Reference:	Date: 8/04/25	By:

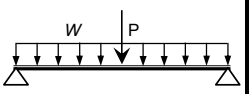
V 5 Element Name: G3

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall	3	0	0.0		
Other			0.0		
Self			0.3		
		Sum	0.3		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Cfig = -1.1

Assumptions:
1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from largest deflection
5. Governing ULS determined by largest M*
6. Live loads on floors are considered to be from: Other Floors
7. Live loads on roofs are considered to be from: Other Roofs
8. Structural element is considered a: Beam & Girt
9. Vertical loads are applied to: Minor axis (i.e. weak direction)
10. Horizontal loads are applied to: Major axis (i.e. strong direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	3	0.93	-2.79	
EQ			0	
Fire			0	

Cfig = -1
R_{SLS}/R_{ULS} = 0.25
Table 3.1 AS/NZS 1170.1:2002

Comments

Beam properties

Try: 310 UB 32 Steel beam
E = 200 GPa 350
Span (L) = 9.4 m
I_x = 4.42 $\times 10^6$ mm^4 *AISC Tables*
I_y = 63.2 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **19.57** mm < 1 mm **NOT OK**

Comments: Not applicable

Check Deflection *L/Δ>400 ok*

$\Delta_{max,\ vertical}$ =	**36.10** mm	L/Δ =	260	**NOT OK**	**G + ψsQ**
$\Delta_{max,\ horizontal}$ =	**16.83** mm	L/Δ =	559	**NOT OK**	**Wind**

Comments

Check Bending Strength

M^*_x =	**30.8**	**kN.m**		**Wind**	α_m = 1
Le_x =	9.40	m	*Effective length*	**Girt**	
$\varnothing M_{bx}$ =	**23.46**	**kN.m**			
$M^* < \varnothing M_{bx}$ =	1.31	**NOT OK**	$M^*/\varnothing M_n$<1 ok		
$M^*_{b,\ uplift}$ =	**N/A**	**kN.m**		**N/A**	
Le_b =	9.40	m	*Effective length*		
$\varnothing M_{bx}$ =	**23.46**	**kN.m**			
$M^*_{b,\ uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok		
M^*_y =	**4.7**	**kN.m**		**1.35G**	
$\varnothing M_y$ =	**25.00**	**kN.m**		**Beam**	
$M_y^* < \varnothing M_y$ =	0.19	**OK**	$M_y^*/\varnothing M_y$<1 ok		

Consider OK

Comments

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.4 < 1.0 **OK**

Comments

Reactions

R_1 =	1.99	kN	**1.35G**	
	No Uplift			
R_2 =	1.99	kN	**1.35G**	
	No Uplift			
$R_y = V^*_y$ =	13.1	kN	**Wind**	

Comments

Comments

310 UB 32

Consider gravity deflections

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Project:		Page:
Reference:	Date: 8/04/25	By:

V 5 Element Name: G3

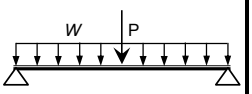
Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall	3	0.2	0.6		
Other			0.0		
Self			0.3		
		Sum	0.9		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Cfig = -1.1

Assumptions:

1. *Loads distributed evenly along beam*
2. *Beam is simply supported*
3. *Point loads act at midspan*
4. *Governing SLS determined from largest deflection*
5. *Governing ULS determined by largest M**
6. *Live loads on floors are considered to be from* — Other Floors
7. *Live loads on roofs are considered to be from* — Other Roofs
8. *Structural element is considered a:* — Beam & Girt
9. *Vertical loads are applied to:* — Minor axis (i.e. weak direction)
10. *Horizontal loads are applied to:* — Major axis (i.e. strong direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	0	0.93	0	
EQ			0	
Fire			0	

Cfig = -1

R_{SLS}/R_{ULS} = 0.25

Table 3.1 AS/NZS 1170.1:2002

Comments

Support at midspan by dropper

Beam properties

Span (L) = 4.7 m

Try: 310 UB 32 Steel beam

E = 200 GPa 350

I_x = 4.42 $\times 10^6$ mm^4 *AISC Tables*

I_y = 63.2 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **2.45** **mm** < 1 mm **NOT OK**

Comments: Not applicable

Check Deflection *L/Δ>400 ok*

$\Delta_{max, vertical}$ =	**6.57**	**mm**	L/Δ = 716	**OK**	**G + ψsQ**
~~$\Delta_{max, horizontal}$ =~~	~~**0.00**~~	~~**mm**~~	L/Δ = ####	~~**#DIV/0!**~~	~~**Wind**~~

Comments

Check Bending Strength

M^*_x =	**0.0**	**kN.m**		**Wind**	α_m = 1
Le_x =	4.70	m	*Effective length*	**Girt**	
$\varnothing M_{bx}$ =	**53.58**	**kN.m**			
$M^* < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok		
$M^*_{b, uplift}$ =	**N/A**	**kN.m**		**N/A**	
Le_b =	4.70	m	*Effective length*		
$\varnothing M_{bx}$ =	**53.58**	**kN.m**			
$M^*_{b, uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok		
M^*_y =	**3.4**	**kN.m**		**1.35G**	
$\varnothing M_y$ =	**25.00**	**kN.m**		**Beam**	
$M_y^* < \varnothing M_y$ =	0.14	**OK**	$M_y^*/\varnothing M_y$<1 ok		

Comments

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.1 < 1.0 **OK**

Comments

Reactions

R_1 =	2.90	kN	**1.35G**	
	No Uplift			
R_2 =	2.90	kN	**1.35G**	
	No Uplift			
$R_y = V^*_y$ =	0.0	kN	**Wind**	

Comments

Comments

310 UB 32

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Southern gable

M1

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Project:		Page:
Reference:	Date: 8/04/25	By:

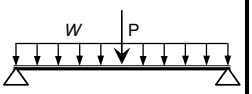
V 5 Element Name: M2

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall			0.0		
Other			0.0		
Self			0.3		
		Sum	0.3		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Cfig = -1.1

Assumptions:
1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from largest deflection
5. Governing ULS determined by largest M*
6. Live loads on floors are considered to be from: Other Floors
7. Live loads on roofs are considered to be from: Other Roofs
8. Structural element is considered a: Beam & Girt
9. Vertical loads are applied to: Major axis (i.e. strong direction)
10. Horizontal loads are applied to: Minor axis (i.e. weak direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	6	0.93	-5.58	
EQ			0	
Fire			0	

Cfig = -1
R_{SLS}/R_{ULS} = 0.25

Table 3.1 AS/NZS 1170.1:2002

Comments

Beam properties

Span (L) = 4.9 m

Try: 200 x 6 SHS Steel beam — Steel Grade: 350 MPa

E = 200 GPa

I_x = 28 $\times 10^6$ mm^4 *AISC Tables*

I_y = 28 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **0.44** **mm** < 1 mm **OK**

Comments

Check Deflection *L/Δ>400 ok*

$\Delta_{max,\ vertical}$ =	**0.47**	**mm**	L/Δ = ####	**OK**	**G + ψsQ**
$\Delta_{max,\ horizontal}$ =	**5.61**	**mm**	L/Δ = 874	**OK**	**Wind**

Comments

Check Bending Strength

M^*_x =	**1.4**	**kN.m**		**1.35G**
Le_x =	4.90	m	*Effective length*	**Beam**
$\varnothing M_{bx}$ =	**85.68**	**kN.m**		
$M^* < \varnothing M_{bx}$ =	0.02	**OK**	$M^*/\varnothing M_n$<1 ok	
$M^*_{b,\ uplift}$ =	**No Uplift**	**kN.m**		
Le_b =	4.90	m	*Effective length*	
$\varnothing M_{bx}$ =	**85.68**	**kN.m**		
$M^*_{b,\ uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok	
M^*_y =	**16.7**	**kN.m**		**Wind**
$\varnothing M_y$ =	**85.68**	**kN.m**		**Girt**
$M_y^* < \varnothing M_y$ =	0.20	**OK**	$M_y^*/\varnothing M_y$<1 ok	

α_m = 1

Comments

combined defl with G3 = 5.6+9.5 = 15mm - consider OK over 9m span

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.2 < 1.0 **OK**

Comments

Reactions

R_1 =	1.16	kN	**1.35G**
	No Uplift		
R_2 =	1.16	kN	**1.35G**
	No Uplift		
$R_y = V^*_y$ =	13.7	kN	**Wind**

Comments

Comments

200 x 6 SHS 350

On northern gable

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Project:		Page:
Reference:	Date: 8/04/25	By:

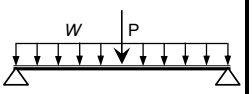
V 5 Element Name: M2

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall			0.0		
Other			0.0		
Self			0.3		
		Sum	0.3		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		Cfig = -1.1
Misc					
SLS			0		
ULS			0		

Assumptions:

1. *Loads distributed evenly along beam*
2. *Beam is simply supported*
3. *Point loads act at midspan*
4. *Governing SLS determined from largest deflection*
5. *Governing ULS determined by largest M**
6. *Live loads on floors are considered to be from* — Other Floors
7. *Live loads on roofs are considered to be from* — Other Roofs
8. *Structural element is considered a:* — Beam & Girt
9. *Vertical loads are applied to:* — Major axis (i.e. strong direction)
10. *Horizontal loads are applied to:* — Minor axis (i.e. weak direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	5.7	0.93	-5.301	
EQ			0	
Fire			0	

Cfig = -1

R_{SLS}/R_{ULS} = 0.25

Table 3.1 AS/NZS 1170.1:2002

Comments

Beam properties

Span (L) = 4.9 m

Try: 150 x 6 SHS Steel beam

E = 200 GPa Steel Grade 350 MPa

I_x = 11.3 $\times 10^6$ mm^4 *AISC Tables*

I_y = 11.3 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **1.08** **mm** < 1 mm **NOT OK**

Comments

Check Deflection *L/Δ>400 ok*

$\Delta_{max,\ vertical}$ =	**0.85**	**mm**	L/Δ = 5740	**OK**	**G + ψsQ**
$\Delta_{max,\ horizontal}$ =	**13.20**	**mm**	L/Δ = 371	~~**NOT OK**~~	**Wind**

Comments

Check Bending Strength

M^*_x =	**1.0**	**kN.m**		**1.35G**	q_m = 1
Le_x =	4.90	m	*Effective length*	**Beam**	
$\varnothing M_{bx}$ =	**55.13**	**kN.m**			
$M^* < \varnothing M_{bx}$ =	0.02	**OK**	$M^*/\varnothing M_n$<1 ok		
$M^*_{b,\ uplift}$ =	**No Uplift**	**kN.m**			
Le_b =	4.90	m	*Effective length*		
$\varnothing M_{bx}$ =	**55.13**	**kN.m**			
$M^*_{b,\ uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok		
M^*_y =	**15.9**	**kN.m**		**Wind**	
$\varnothing M_y$ =	**55.13**	**kN.m**		**Girt**	
$M_y^* < \varnothing M_y$ =	0.29	**OK**	$M_y^*/\varnothing M_y$<1 ok		

Consider OK >L/300

Comments

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.3 < 1.0 **OK**

Comments

Reactions

R_1 =	0.85	kN	**1.35G**	*Comments*
	No Uplift			
R_2 =	0.85	kN	**1.35G**	
	No Uplift			
$R_y = V^*_y$ =	13.0	kN	**Wind**	

Comments

150 x 6 SHS 350

MAXIMUM WALL HEIGHTS

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4.1m for full -height walls

TABLE 6: INTERNAL NON-LOAD BEARING WALLS – L/240 PLASTERBOARD

STUD WIDTH		51mm		64mm			76mm			92mm			150mm	
BMT		0.50	0.75	0.50	0.75	1.15	0.55	0.75	1.15	0.55	0.75	1.15	0.75	1.15
PLASTERBOARD LININGS (mm)		**SINGLE STUDS @ 600mm CENTRES**												
LINED BOTH SIDES	1x10mm	2770	2910	3330	3930	4170	3700	4430	4650	4540	4830	5110	6550	7220
	1x13mm	3200	3320	3720	4220	4430	4130	5020	5220	4940	5500	5750	6990	7540
	1x16mm	3380	3520	3910	4350	4520	4300	5250	5420	5180	5710	5920	7190	7650
LINED ONE SIDE	1x10mm	2320	2600	2720	3130	3530	3200	3580	4050	3610	4130	4690	5330	6810
	1x13mm	2320	2600	2720	3250	3580	3240	3820	4050	3610	4180	4690	5370	6810
	1x16mm	2320	2600	2750	3280	3590	3250	3870	4050	3610	4200	4690	5370	6810
PLASTERBOARD LININGS (mm)		**SINGLE STUDS @ 450mm CENTRES**												
LINED BOTH SIDES	1x10mm	3020	3200	3580	4180	4460	4020	4780	5070	4850	5270	5620	7140	7750
	1x13mm	3420	3570	3930	4430	4690	4410	5330	5570	5210	5890	6190	7520	8040
	1x16mm	3550	3710	4130	4600	4820	4580	5580	5790	5450	6120	6390	7620	8130
LINED ONE SIDE	1x10mm	2520	2860	2930	3410	3870	3500	3910	4450	4050	4520	5150	6510	7400
	1x13mm	2520	2860	2930	3530	3930	3580	4170	4450	4050	4610	5150	6510	7400
	1x16mm	2520	2860	3020	3560	3950	3600	4220	4450	4050	4630	5150	6510	7400
PLASTERBOARD LININGS (mm)		**SINGLE STUDS @ 400mm CENTRES**												
LINED BOTH SIDES	1x10mm	3130	3320	3690	4280	4590	4160	4930	5240	4990	5460	5840	7340	7970
	1x13mm	3510	3680	4020	4530	4810	4530	5450	5720	5330	6050	6380	7610	8190
	1x16mm	3620	3750	4220	4710	4950	4700	5710	5950	5560	6280	6580	7750	8300
LINED ONE SIDE	1x10mm	2630	2970	3070	3540	4020	3640	4070	4620	4210	4700	5360	6740	7650
	1x13mm	2630	2970	3070	3660	4090	3740	4320	4620	4210	4800	5360	6740	7650
	1x16mm	2630	2970	3140	3700	4100	3760	4380	4620	4210	4820	5360	6740	7650
PLASTERBOARD LININGS (mm)		**SINGLE STUDS @ 300mm CENTRES**												
LINED BOTH SIDES	1x10mm	3390	3620	3960	4570	4930	4510	5310	5690	5340	5930	6390	7840	8570
	1x13mm	3730	3940	4260	4780	5120	4830	5770	6110	5640	6450	6860	8110	8740
	1x16mm	3800	4020	4450	4980	5270	5010	6030	6330	5860	6690	7070	8230	8850
LINED ONE SIDE	1x10mm	2890	3270	3380	3900	4430	4010	4480	5090	4630	5180	5900	7350	8290
	1x13mm	2890	3270	3380	4010	4490	4130	4730	5090	4640	5290	5920	7350	8290
	1x16mm	2890	3270	3460	4050	4510	4150	4790	5090	4640	5310	5930	7350	8290

NOTES:

1. *Deflection Limit is span/240 (or span/360 as applicable) to a maximum of 30mm at 0.25 kPa, in accordance with the BCA Specification C1.8 – 2005.*
2. *Maximum wall heights refer to the structural wall heights only. Maximum wall heights may be reduced from those in the table for fire rated walls, refer to your plasterboard manufacturer for this information.*
3. *The tabulated heights are not for axial loads but do include self weight and lateral pressures.*
4. *Shelf loading is not permitted on the tabulated wall heights.*
5. *Loadings: a. Pultimate = 0.375 kPa*
   b. Pservice = 0.25 kPa
6. *These walls are not for external applications.*
7. *All loading in accordance with AS1170:2002.*
8. *Walls analysed in accordance with AS4600:2005.*
9. *Noggings in accordance with table shown on facing page.*
10. *BMT = Base Metal Thickness.*
11. *The above wall heights are suitable for up to two layers of the nominated thickness.*
12. *See table on Page 22 for Nogging requirement.*
13. *Table assumes the same or like gauge is used for both Stud and Track sections. The above wall heights may change if using dissimilar gauge product*

Channel supporting steel studs

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Project:		Page:
Reference:	Date: 10/04/25	By:

V 5 Element Name

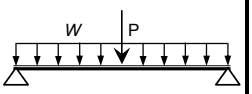
Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor			0.0		
Wall			0.0		
Other			0.0		
Self			0.2		
		Sum	0.2		0.0
Q					
Roof	0		0		
Floor	0		0		
Other			0		
		Sum	0		0
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Cfig = -1.1

Assumptions:

1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from largest deflection
5. Governing ULS determined by largest M*
6. Live loads on floors are considered to be from: Other Floors
7. Live loads on roofs are considered to be from: Other Roofs
8. Structural element is considered a: Beam & Girt
9. Vertical loads are applied to: Minor axis (i.e. weak direction)
10. Horizontal loads are applied to: Major axis (i.e. strong direction)



Lateral Loads	Trib width	Load (kPa)	W	Load (kN)
Wind	2.1	0.93	0.5859	
EQ			0	
Fire			0	

Cfig = 0.3

R_{SLS}/R_{ULS} = 0.75

Table 3.1 AS/NZS 1170.1:2002

Comments

Beam properties

Span (L) = 6.4 m

Try: 150 PFC Steel beam

E = 200 GPa 350

I_x = 1.29 $\times 10^6$ mm^4 *AISC Tables*

I_y = 8.34 $\times 10^6$ mm^4 *AISC Tables*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = P \times L^3/(48EI)$ = **21.17** **mm** < 1 mm **NOT OK**

Comments

Check Deflection *L/Δ>400 ok*

$\Delta_{max,\ vertical}$ =	**14.70** **mm**	L/Δ = 435	**NOT OK**	**G + ψsQ**
$\Delta_{max,\ horizontal}$ =	**5.76** **mm**	L/Δ = 1112	**OK**	**Wind**

Comments

Check Bending Strength

M^*_x =	**3.0**	**kN.m**		**Wind**	α_m = 1
Le_x =	6.40	m	*Effective length*	**Girt**	
$\varnothing M_{bx}$ =	**12.32**	**kN.m**			
$M^* < \varnothing M_{bx}$ =	0.24	**OK**	$M^*/\varnothing M_n$<1 ok		
$M^*_{b,\ uplift}$ =	**N/A**	**kN.m**		**N/A**	
Le_b =	6.40	m	*Effective length*		
$\varnothing M_{bx}$ =	**12.32**	**kN.m**			
$M^*_{b,\ uplift} < \varnothing M_{bx}$ =	0.00	**OK**	$M^*/\varnothing M_n$<1 ok		
M^*_y =	**1.2**	**kN.m**		**1.35G**	
$\varnothing M_y$ =	**11.10**	**kN.m**		**Beam**	
$M_y^* < \varnothing M_y$ =	0.11	**OK**	$M_y^*/\varnothing M_y$<1 ok		

Comments

Check Biaxial Bending *Clause 8.3.4.1 of NZS3404*

$M_x^*/\varnothing M_{sx} + M_y^*/\varnothing M_{sy}$ = 0.2 < 1.0 **OK**

Comments

Reactions

R_1 =	0.75	kN	**1.35G**	
	No Uplift			
R_2 =	0.75	kN	**1.35G**	
	No Uplift			
$R_y = V^*_y$ =	1.9	kN	**Wind**	

Comments

Comments

150 PFC

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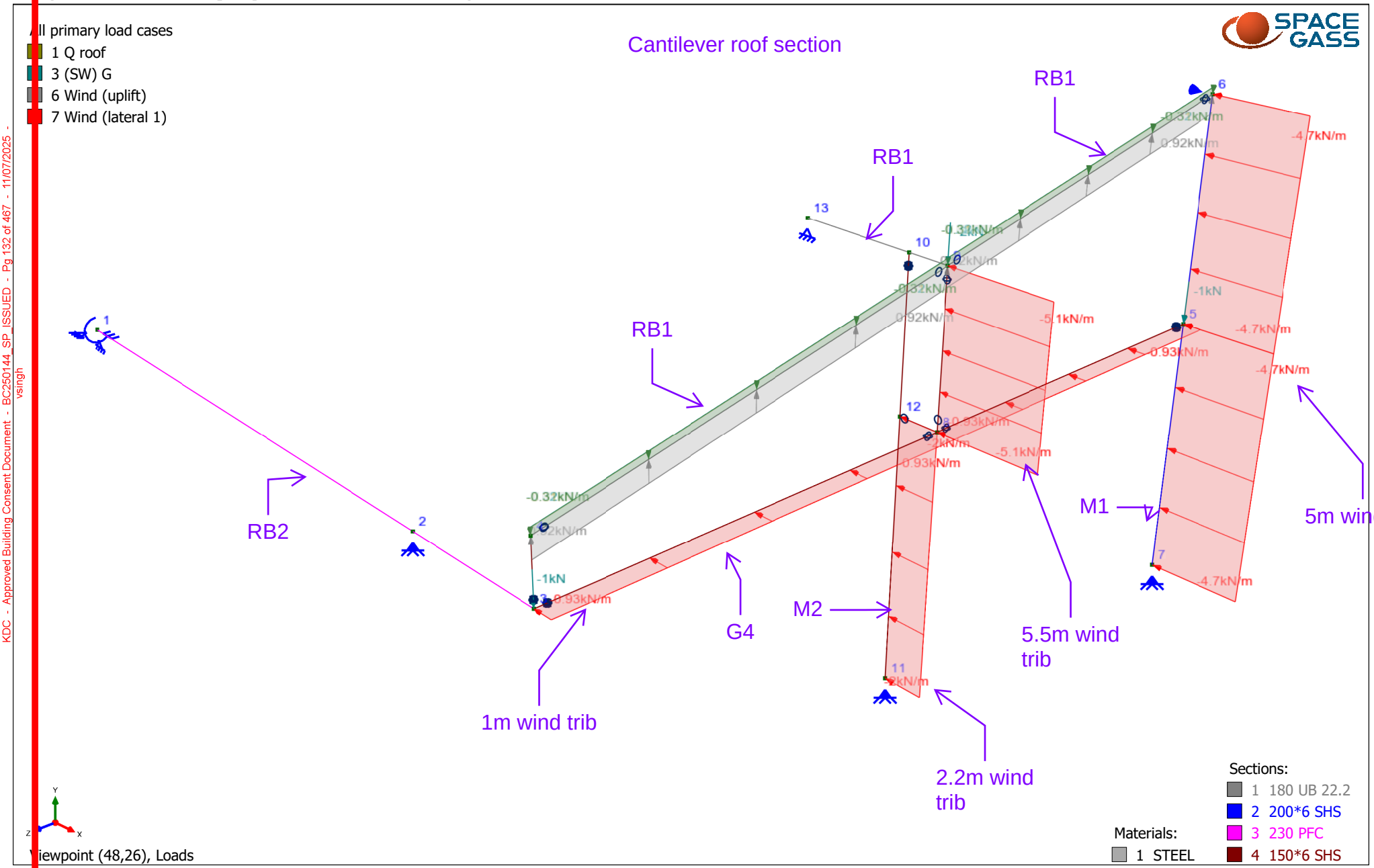

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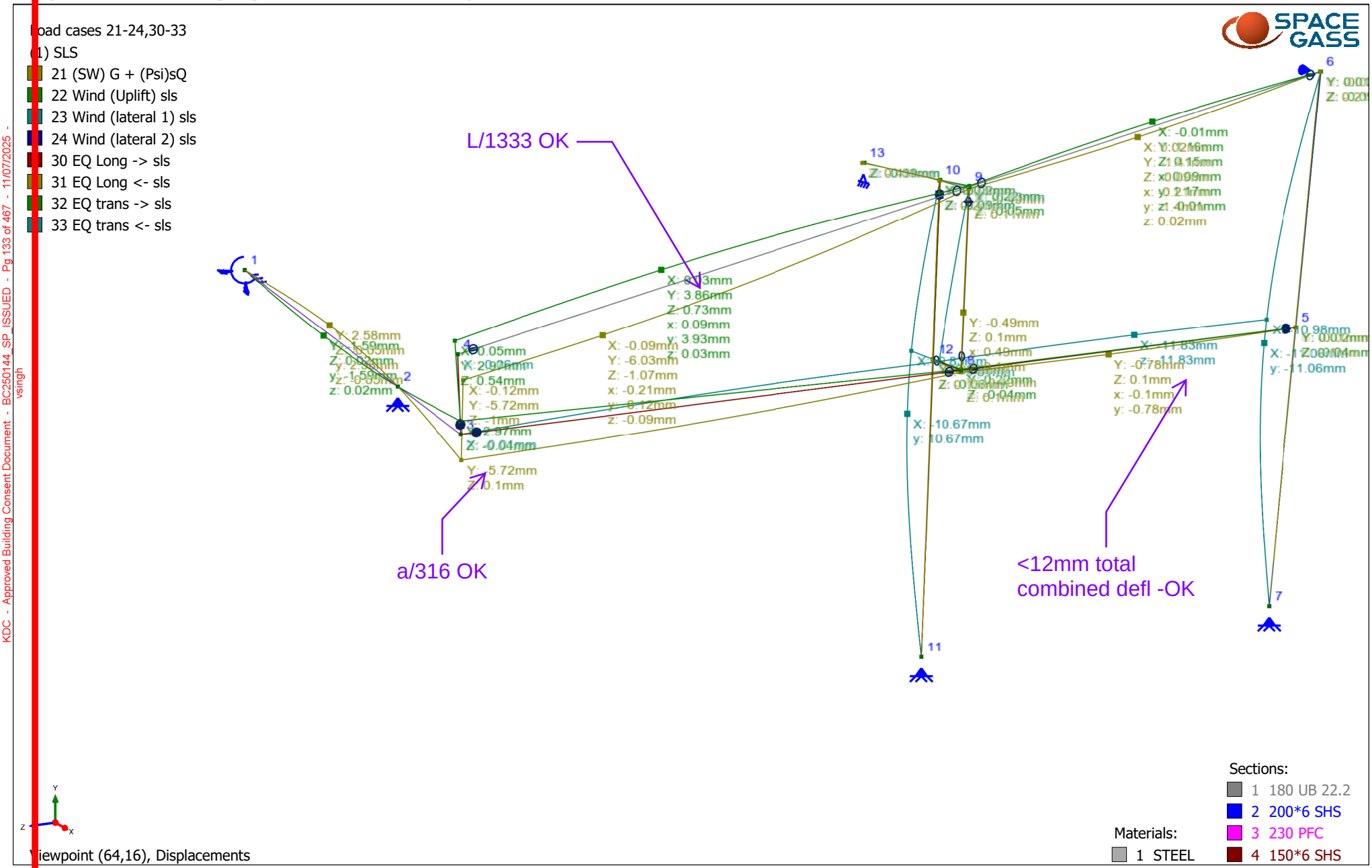

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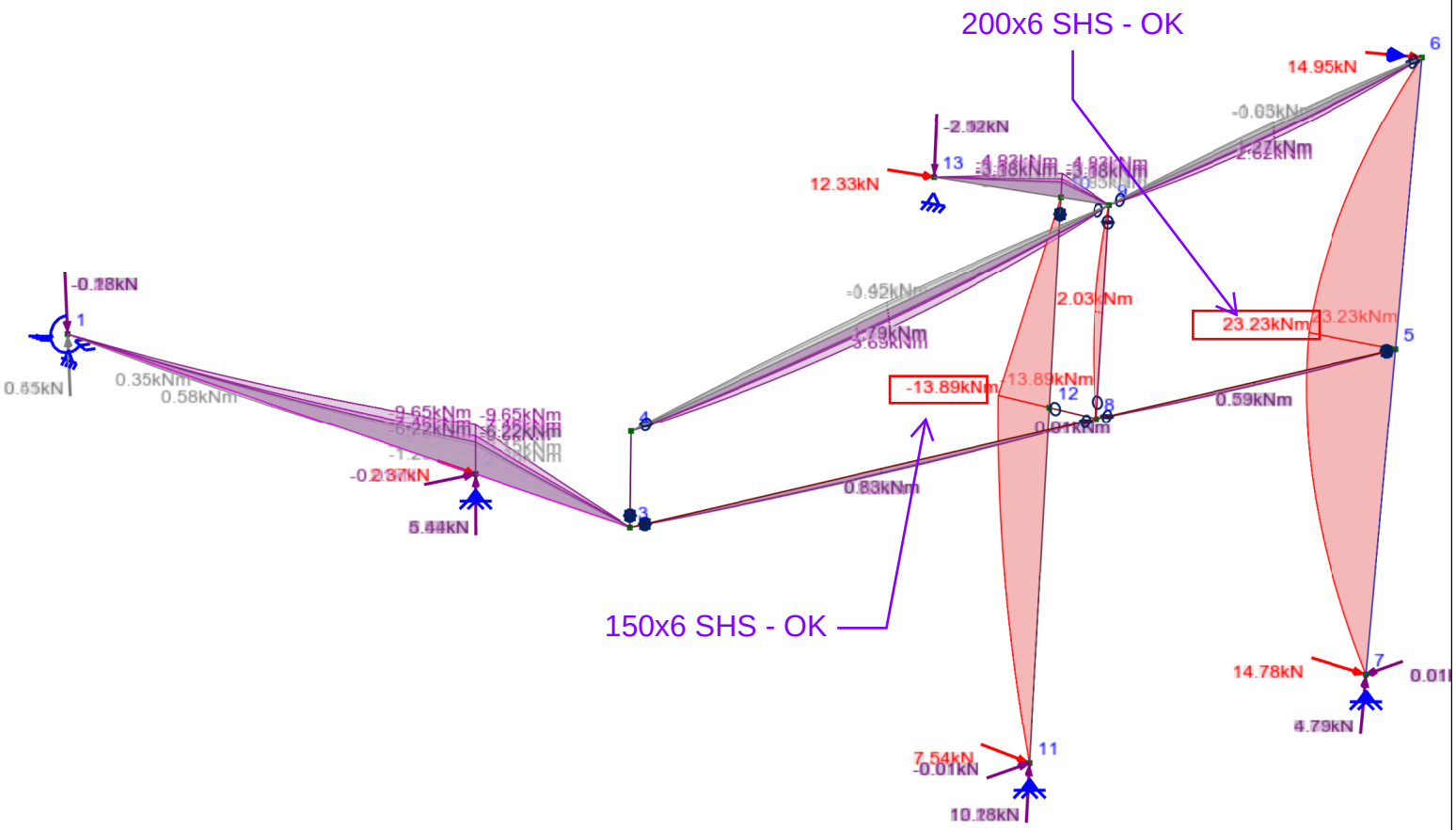
Load cases 25-29,35-38,46-48,101-104,106-109
(2) ULS
25 (SW) 1.2G + 1.5Q
26 (SW) 0.9G + Wind (uplift)
27 (SW) 0.9G + Wind (lateral 1)
28 (SW) 0.9G + Wind (lateral 2)
29 (SW) 1.2G + Snow + (Psi)cQ
35 (SW) G + EQ long -> + (Psi)eQ
36 (SW) G + EQ long <- + (Psi)eQ
37 (SW) G + EQ Trans -> + (Psi)eQ
38 (SW) G + EQ Trans <- + (Psi)eQ
46 (SW) 1.2G+Wind (uplift) + (Psi)cQ
47 (SW) 1.2G+Wind (lateral 1) + (Psi)cQ
48 (SW) 1.2G+Wind (lateral 2) + (Psi)cQ
101 (SW) G+EQlong+0.3EQtrans+(Psi)eQ
102 (SW) G+EQlong-0.3EQtrans+(Psi)eQ
103 (SW) G-EQlong+0.3EQtrans+(Psi)eQ
104 (SW) G-EQlong-0.3EQtrans+(Psi)eQ
106 (SW) G+0.3EQlong+EQtrans+(Psi)eQ
107 (SW) G-0.3EQlong+EQtrans+(Psi)eQ
108 (SW) G+0.3EQlong-EQtrans+(Psi)eQ
109 (SW) G-0.3EQlong-EQtrans+(Psi)eQ



Viewpoint (52,14), Moments, Reactions

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Project:	7 Eagle Ray Road, Mangawhai		
Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

SECTION 2:
Bracing Design

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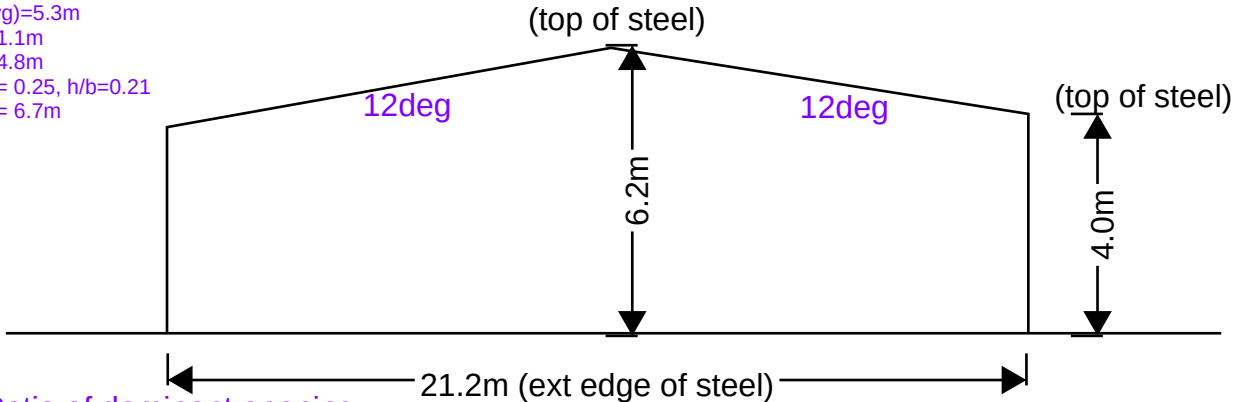
RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road		
Reference:	A24362	By:	EN
Date:	18/03/2025	Page:	

PORTAL FRAME DESIGN

site wind pressure = 0.93kPa

h(avg)=5.3m
d=21.1m
b=24.8m
h/d = 0.25, h/b=0.21
trib = 6.7m



Ratio of dominant opening:
36.6/ (31.1+12.8+15.5) = 0.6.
Assume 0.5 as there will be some permeability in walls also

Note: Ka x Kc >= 0.8

WORST CASE WIND IN TRANSVERSE

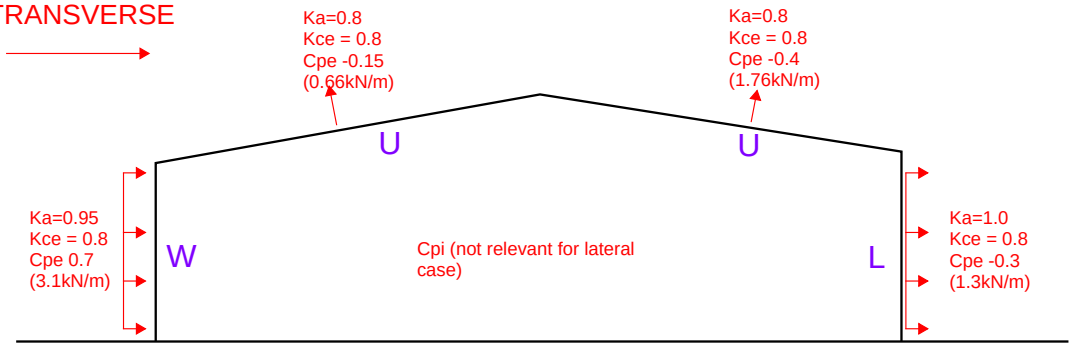


Table 5.3(B) — Roofs — External pressure coefficients ($C_{p,e}$) for rectangular enclosed buildings — Upwind slope (U) $\alpha \geq 10°$

-0.6,-0.15

Upwind slope, (U)	Ratio h/d	External pressure coefficients ($C_{p,e}$) Roof pitch (α) degrees						
		10	15	20	25	30	35	≥ 45
$\alpha \geq 10°$	≤ 0.25	−0.7, −0.3	−0.5, 0.0	−0.3, 0.2	−0.2, 0.3	−0.2, 0.4	0.0, 0.5	0, 0.8 sin α
	0.5	−0.9, −0.4	−0.7, −0.3	−0.4, 0.0	−0.3, 0.2	−0.2, 0.3	−0.2, 0.4	
	≥ 1.0	−1.3, −0.6	−1.0, −0.5	−0.7, −0.3	−0.5, 0.0	−0.3, 0.2	−0.2, 0.3	

Table 5.3(C) — Roofs — External pressure coefficients ($C_{p,e}$) for rectangular enclosed buildings — Downwind slope (D), and (R) for hip roofs, for $\alpha \geq 10°$

-0.4

Roof type and slope		Ratio h/d	External pressure coefficients ($C_{p,e}$) Roof pitch (α), degrees			
Crosswind slope for hip roofs (R)	Downwind slope (D)		10	15	20	≥ 25
$\alpha \geq 10°$	$\alpha \geq 10°$	≤ 0.25	-0.3	-0.5	−0.6	For $h/d \leq 3$; −0.6
		0.5	−0.5	−0.5	−0.6	For $3 < h/d < 8$; $-0.06\,(7 + h/d)$
		≥ 1.0	−0.7	−0.6	−0.6	For $h/d \geq 8$; −0.9

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Table 5.4 — Area reduction factor (K_a)

Tributary area (A), m²	Roofs and side walls (K_a)	Windward walls (K_a) $h < 25$ m	Leeward walls (K_a) $h < 25$ m
≤ 10	1.0	1.0	1.0
25	0.9	0.95	1.0
≥ 100	0.8	0.9	0.95

5.9mx21m ->Ka = 0.8

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WORST CASE WIND IN LONGITUDINAL

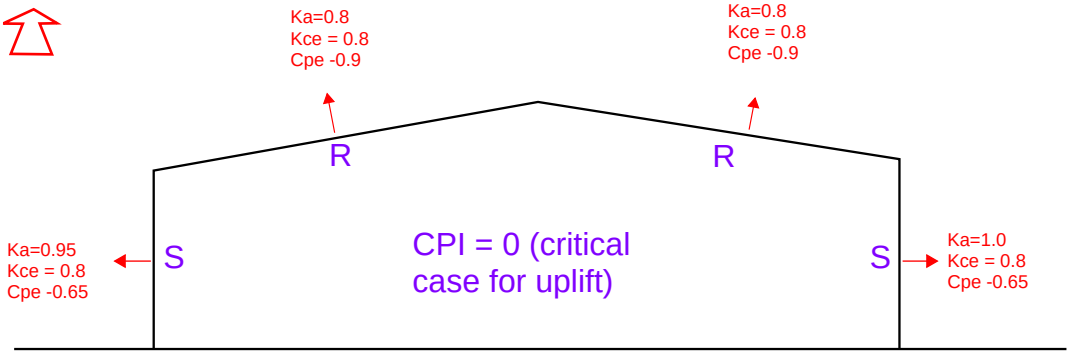

Table 5.2(C) — Walls — External pressure coefficients ($C_{p,e}$) for rectangular enclosed buildings — Side walls (S)

Horizontal distance from windward edge	External pressure coefficients ($C_{p,e}$)
0 to 1h	−0.65
1h to 2h	−0.5
2h to 3h	−0.3
> 3h	−0.2
NOTE The design wind speed to be used with these pressure coefficients should be taken at the average roof height ($z = h$).	

Table 5.3(A) — Roofs — External pressure coefficients ($C_{p,e}$) for rectangular enclosed buildings — For upwind slope (U), and downwind slope (D) and (R) for roofs with $\alpha < 10°$, and monoslope roofs

Roof type and slope		Horizontal distance from windward edge of roof	External pressure coefficient ($C_{p,e}$)	
Crosswind slopes for gable roofs, and downwind slopes of monoslope roofs (R)	Upwind slope, (U), downwind slope, (D)		$h/d \leq 0.5$	$h/d \geq 1.0$
All α	$\alpha < 10°$	0 to 0.5h	−0.9, −0.4	−1.3, −0.6
		0.5 to 1h	−0.9, −0.4	−0.7, −0.3
		1h to 2h	−0.5, 0	(−0.7), (−0.3)
		2h to 3h	−0.3, 0.1	see Note
		> 3h	−0.2, 0.2	
NOTE The values given in parentheses are provided for interpolation purposes.				

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EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS	Project:	7 Eagle Ray Road	Page:	
	Reference:	A24362	Date: 1/04/2025	By: EN

Earthquake Design Loads NZS 1170.5

V2.9

Site Data

Location =	Auckland	
Soil Type =	D	Deep or soft soil
Nearest Fault =	Mohaka	Figure 3.5
D (km) =		Table 3.3
$N_{max}(s)$ =	1.00	Table 3.7
Design Work Life	50	
Importance level	2	

Building Data

Period T_1 =	0.46	s	Clause 4.3
Ductility m =	1.25		
Return Period ULS=	500	yrs	Table 3.3 NZS1170.0
Return Period SLS=	25	yrs	
S_p =	0.925		Clause 4.4
k_m =	1.16		Clause 5.2.1.1

Elastic Site Spectra

$C_h(T)$ =	3.00		Table 3.1
Z =	0.13		Table 3.3
R_u =	1.00	R_s = 0.25	Table 3.5 with B1 amendments
N(T,D) =	1.00		

$C(T_1,ULS)$ = 0.39 $C(T_1,SLS)$ = 0.10 $C(T) = C_h(T) Z R N(T,D)$ Eq. 3.1(1)

Horizontal design action coefficient

$C_d(T_1, ULS)$ = **0.31** $C_d(T_1, SLS)$ = **0.07** Eq. 5.2(1)

Check: $Cd(T1)_{ULS} \geq (Z/20+0.02)Ru$ & $0.03Ru$ = 0.03 **OK** Eq. 5.2(2)

Equivalent Static Seismic Forces

Level i	G+Qu (kN)	$h_i - h_{i-1}$ (m)	h_i (m)	h_iW_i (kNm)	$h_iW_i / S(H_iW_i)$	F_i (kN)	V_i (kN)
TYP							
ROOF	428	5.3	5.3	2270	1.00	133	133
1	0		0.0	0	0.00	0	133
GRD		0.0					
SUM	428			2270	1.00	133	

$C_d(SLS)/Cd(ULS)$ = 0.2203

Rayleigh's Method:					
	Wi (N)	di (m)	widi2	fi (N)	fi fidi
Roof	98530.85	0.01614	25.66725	30529.45	492.7453
Level 1	0	0	0	0	0
		sum	25.66725	sum	492.7453
				Period	0.457851

Seismic Weight, W_t **428.4** **kN**

Base Shear **132.7** **kN**

Base Shear SLS **29.2** **kN**

23% of total building weight

23% of total building EQ load

critical PF1 takes 23% of total

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road		Page:	
Reference:	A24362	Date:	1/04/2025	By: EN

Notes:

0.1 cladding
0.05 purlin
0.1 suspended ceiling
0.1 services

Seismic Weights

Live load considered on roof: yes

$$W_i = G_i + \sum \psi_a \psi_E Q_i$$ Eq 4.2(1)

	Item	G kPa	Q kPa	Length m	Height/ Width m	Area m^2	Quantity #	ψ_a -	$\psi_{E(1)}$ -	G kN	$\psi_a\psi_E Q$ kN
Roof	Roof	0.35	0	-	-	603.0	1.1	0.5	0.3	232.2	0
	Portal rafters	0.5	0	22	1	22.0	5.5	0.9396	0.3	60.5	0
	Portal columns	0.50	0	4	1	4.0	5.5	1	0.3	11.0	0
	Ext wall	0.45	0	56	2.1	117.6	1.1	0.5766	0.3	58.2	0
	Ext wall gable	0.45	0	42	3.2	134.4	1.1	0.5588	0.3	66.5	0
									W_i =	428.4	kN
Floor 1									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN

girt (0.05) + cladding (0.1) + timber framing and lining (0.3)

Note (1): B1/VM1 2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: "0.3 is the earthquake imposed action (live load) combination factor for all other applications" add the following: "except roofs. ψE = 0.0 is the earthquake imposed action (live load) combination factor for roofs."

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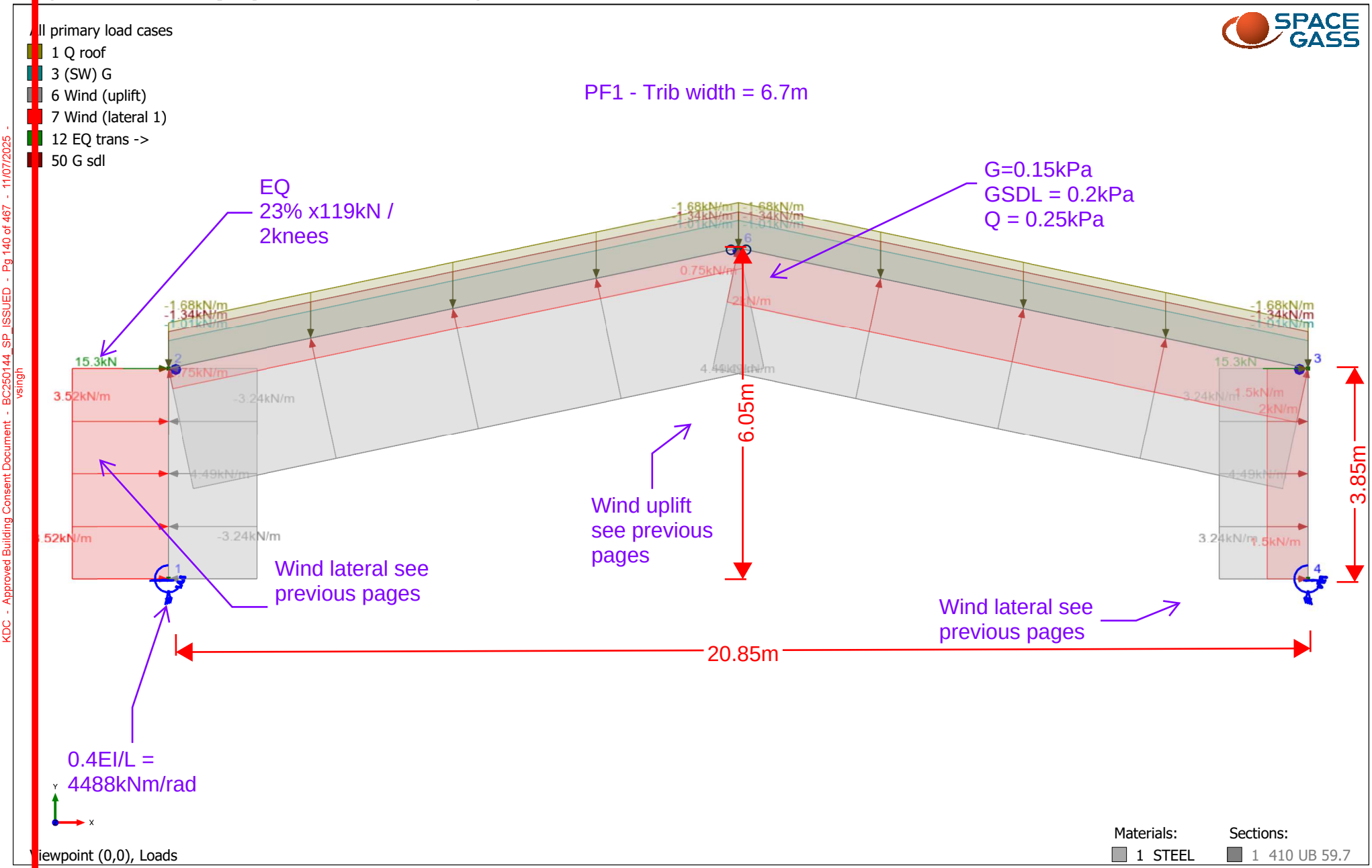

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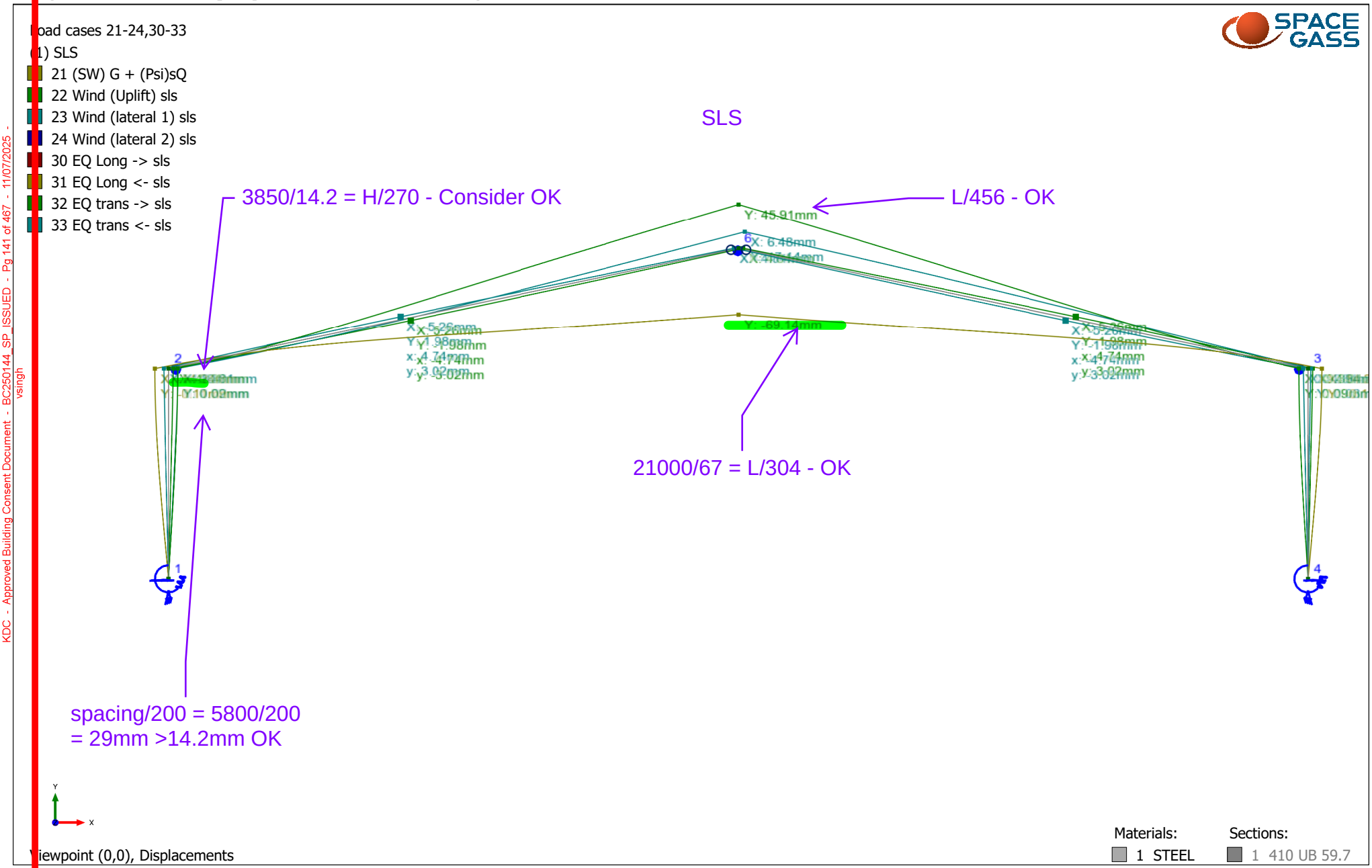

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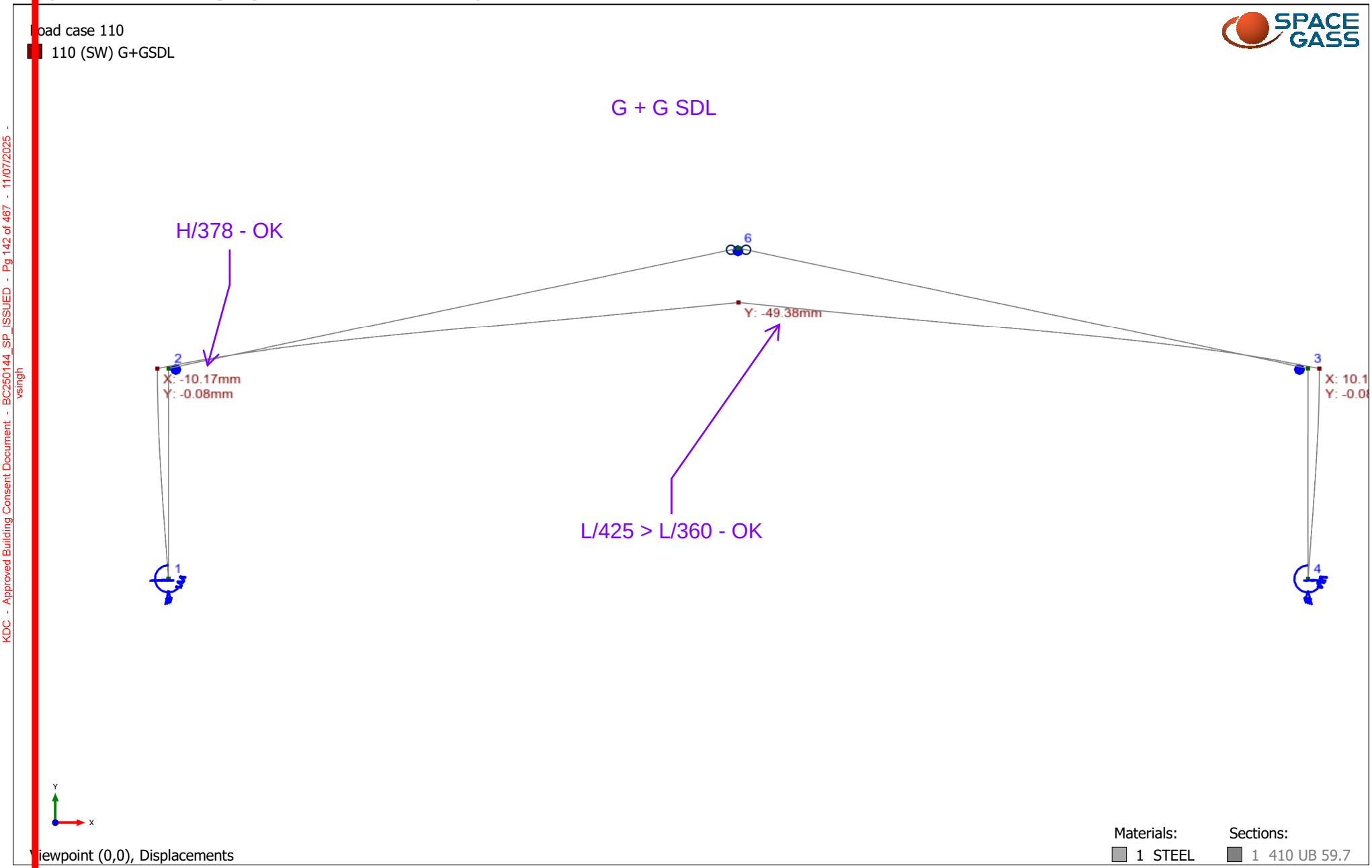

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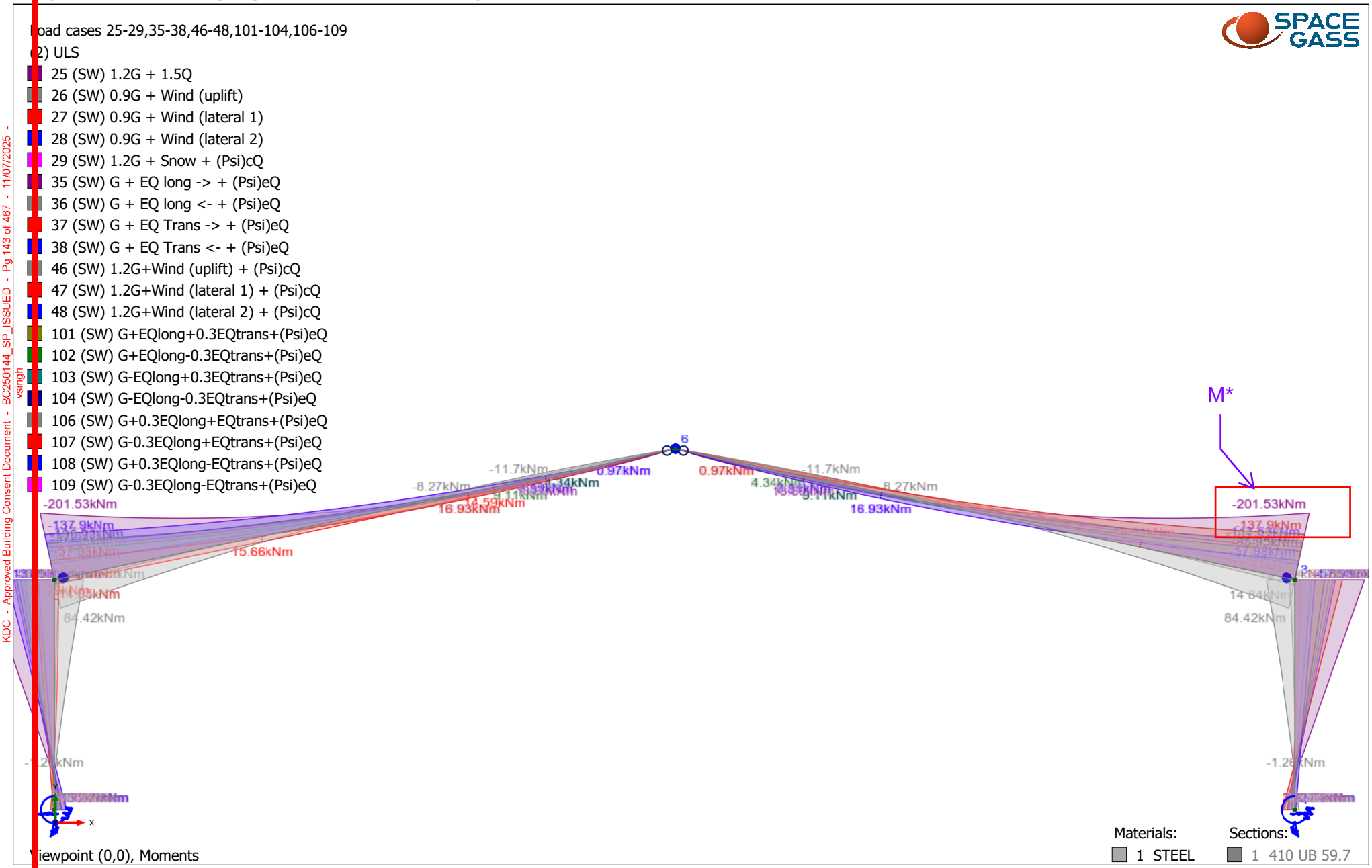

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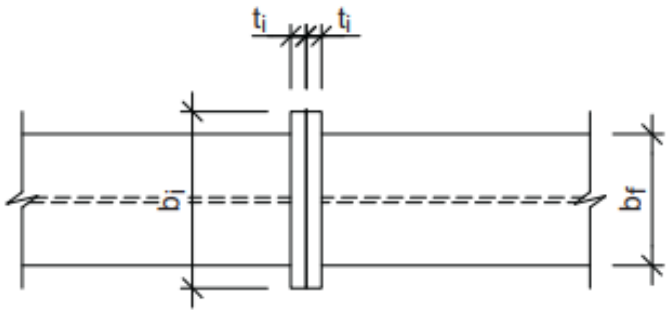
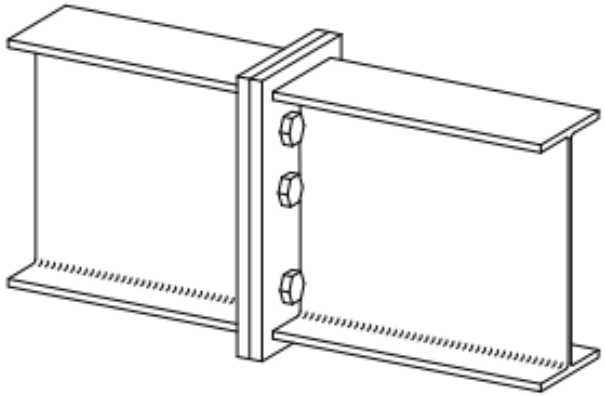
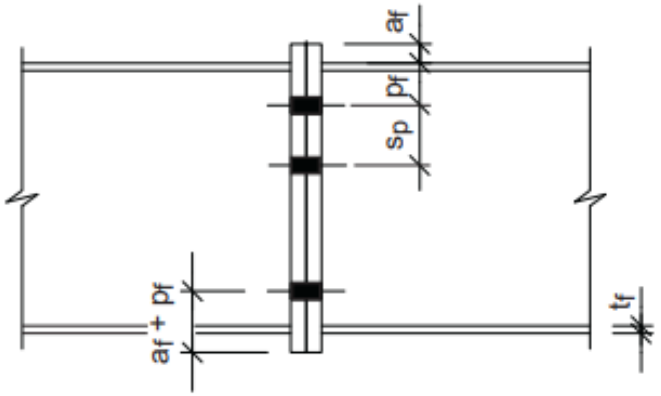
PF1 Splice

General Note : Refer to Tables & Detailing Constants in SCNZ 14.2: 2007 "Structural Steelwork Connections Guide", for plate, weld and bolt specifications not otherwise shown on this drawing

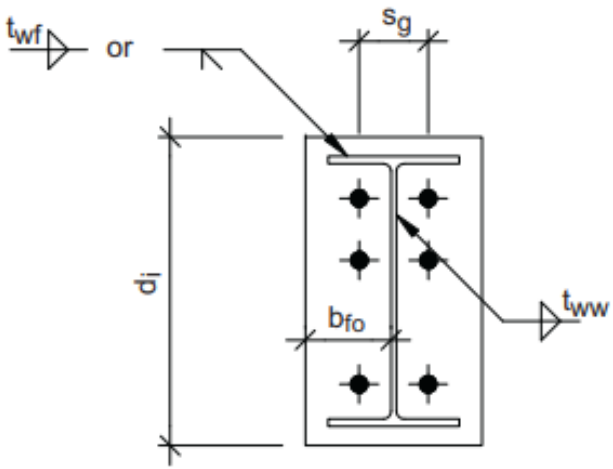


Plan





Elevation



Section

No.	Date	Details
1	2/08	SCNZ - 14 : 2007 RE-ISSUE
0	9/03	R4 - 100 : 2003

Revisions

Structural Steelwork Connections Guide SCNZ-14: 2007

MEPS - F6

Moment End Plate Splice Flush

Steel Construction New Zealand Inc.
PO Box 76403, Manukau City, New Zealand
ph : +64-9-263-5635 fax : +64-9-263-5638
email : info@scnz.org

DRAWN	JB	Drawing No.	Rev.
SCALE	NTS	MEPS - F6	1

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>M* - OK

Moment End Plate Splice - Flush

70/35 % Moment / Shear Elastic

Member	Section	G300	410UB
	Mass	kg/m	59.7
	Depth (d)	mm	406
	Flange Width	mm	178
	Flange Thickness	mm	12.8
	Web Thickness	mm	7.8
Plate	Grade		G350
End Plates	Width (b_i)		200
	Length (d_i)	mm	440
	Thickness (t_i)	mm	25
Bolts	Property Class		8.8/TB
	Diameter (d_f)	mm	24
	Number : Top (n_{tb})	No	4
	Number : Bottom (n_{bb})	No	2
welds	Flange : Fillet	mm	12
	Web Fillet (t_{ww})	mm	8

Design Capacity of Connection

Moment	kNm	221
Moment - Bottom	kNm	145
Shear	kN	266

Estimated Cost of Connection

Fabrication	575
Fittings	85
Total NZ$	660

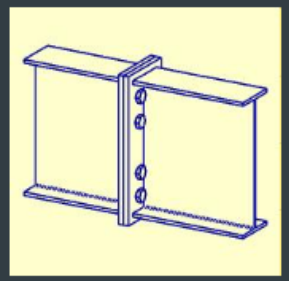
Detailing Constants (mm)

s_g	90
a_f	15
s_p	90
a	15
p_f	75

Estimating Quantities

Fittings:
Plate Weight

Detailed Drawing



Notes

1. Estimate is for connection only
2. Drawing shows the general arrangement only. Bolt number may vary.

SCNZ STEEL CONSTRUCTION NEW ZEALAND

Structural Steelwork Connection Guide SCNZ-14

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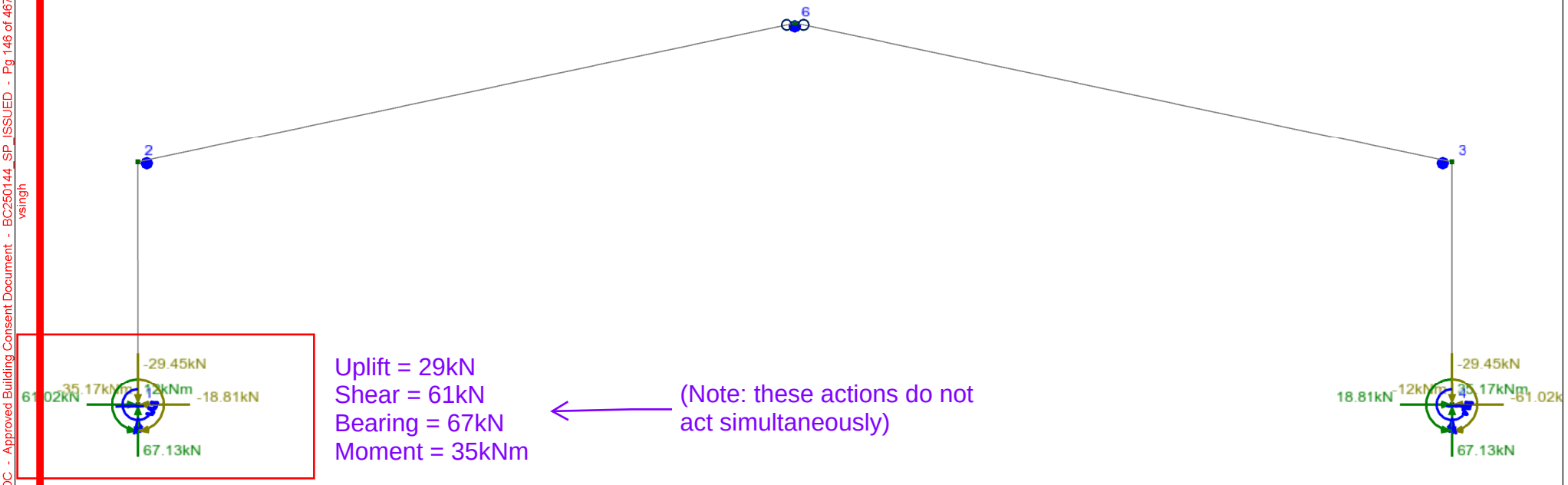
Envelope of both for Load cases 25-29,35-38,46-48,101-104,106-109
(2) ULS
Min
Max

PF1 base reactions



Uplift = 29kN
Shear = 61kN
Bearing = 67kN
Moment = 35kNm

(Note: these actions do not act simultaneously)

Viewpoint (0,0), Reactions

Materials: 1 STEEL
Sections: 1 410 UB 59.7

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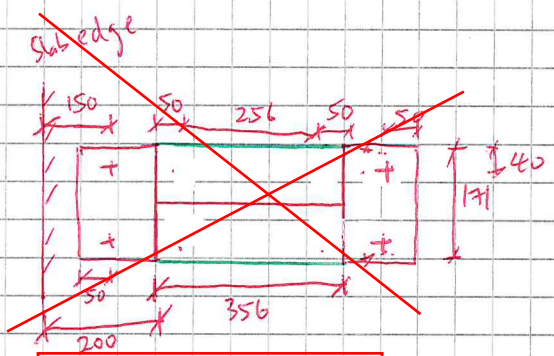
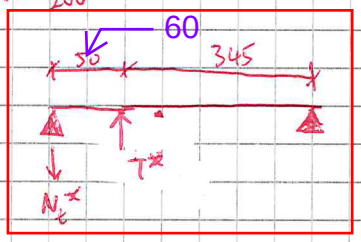
Design PPI base plate - EQ case (base actions govern due to large M^*_{base})

Uplift = ~~37kN~~ 0kN
Shear = ~~45kN~~ 45 kN
Bearing = ~~65kN~~ 37 kN
Moment = 35 kNm



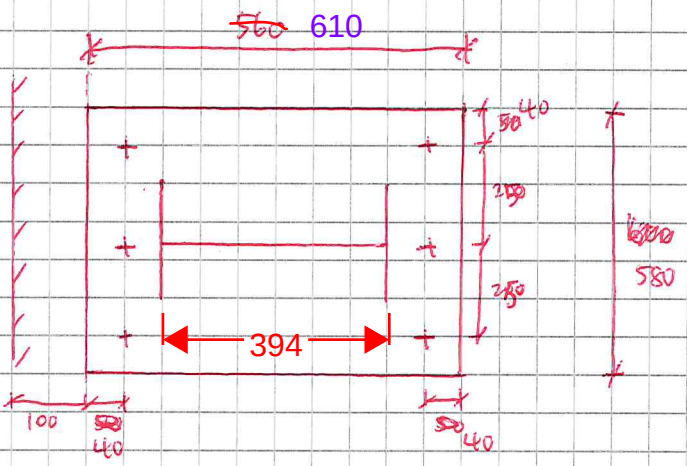


uplift on critical anchor:
~~(27kNm / 2)~~
$T^* = 27kNm / (356mm - 41mm)$
$= 39 kN$

$N_t^* = 39kN \times 345mm / 395mm = 34kN$
$V^* = ~~47kN/4 = 11.8 kN~~ \quad 36kN/4 = 9kN$

N.G

Try 3 anchors per side
T^* = 35kNm /3 / 394mm
$T^* = ~~36kN~~ \quad 30$
$N_t^* = ~~30kN \times 345mm / 395mm~~ = ~~25kN~~ \quad 394$



Try ~~M20~~ M16 w/ 320 embedment:
see next page
$\phi N_t = ~~34.5kN \times 0.7 \times 0.7 = 17kN$ N.G
$= 37kN \times 0.85 \times 0.86$
$= 27kN > 25kN$ - OK ~~-OK~~

NOTE: assume the three anchors on the compression side takes 45kN shear (15kN each)

Check baseplate bending: M^* = 30kN x 60mm x 410mm/(60+410) = 1.6kNm

Try 12mm plate
$\phi M_x = 0.85 \times 300MPa \times 0.58m \times 0.012^2/6$
$= 3.6kNm$ - OK

⇒ Use 580x560x ~~16~~ 12mm baseplate with 6/M16 Epoxy C8 Xtrem anchors with 350mm embedment.

additional 30mm chemset embedment allowed for as Nt*/ØNt is at 93%

EPCON™ C8 Xtrem™

STRENGTH LIMIT STATE DESIGN

Seismic Anchors - EPCON™ C8 Xtrem™ Anchor Studs
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STEP 2 Verify seismic C1& C2 cracked concrete combined pull-out and concrete cone tensile resistance - per anchor

Table 2a - Seismic Cracked concrete combinded Pull-out and concrete cone resistance, tension

$N^0_{Rd,p,seis} = \alpha_{N,seis} N^0_{Rk,p,seis} / \gamma_{Msp}$ (kN), $\gamma_{Msp} = 1.8$, $\alpha_{N,seis} = 0.85$, $f'_c = 30$ MPa

where $N^0_{Rk,p,seis} = \pi * d_b * h * \tau_{Rk,cr,seis}$

Anchor size, d_b	C1 Seismic Data			C2 Seismic Data		
	M10	M12	M16	M16	M20	M24
Drill hole dia, d_h (mm)	12	14	18	18	25	28
Effective depth, h (mm)						
60	5.8					
70	6.8	7.5				
80	7.7	8.5	13.7	9.3		
90	**8.7**	9.6	15.4	10.4	9.7	
100	9.7	10.7	17.1	11.6	10.8	
110	10.6	**11.7**	18.8	12.7	11.9	
120	11.6	12.8	20.5	13.9	13.0	14.4
125	12.1	13.3	**21.4**	**14.5**	13.5	15.0
140	13.5	14.9	24.0	16.2	15.1	16.8
150	14.5	16.0	25.7	17.4	16.2	18.0
160	15.5	17.0	27.4	18.5	17.3	19.2
170	16.4	18.1	29.1	19.7	**18.4**	20.5
180	17.4	19.2	30.8	20.8	19.4	21.7
190	18.3	20.2	32.5	22.0	20.5	22.9
200	19.3	21.3	34.2	23.1	21.6	24.1
210		22.4	35.9	24.3	22.7	**25.3**
240		25.6	41.1	27.8	25.9	28.9
280			47.9	32.4	30.2	33.7
320			54.7	37.0	34.5	38.5
400					43.2	48.1
450						54.1
480						57.7

Bold values are at ChemSet™ Anchor Stud nominal depths

Flooded Holes: Multiply $N^0_{Rd,p,seis}$ *0.68

For single anchor values: Multiply $N^0_{Rd,p,seis}$*1.17

For optimised performance data, please use Ramset iExpert Anchoring Software.

Table 2b-1 - Seismic Cracked concrete service temperature limits effect, tension, X_{ns}

Service temperature (˚C)	X_{ns}
-40˚C to +40˚C	1.00
-40˚C to +80˚C	0.53

Table 2b-2 - Seismic Cracked concrete compressive strength effect, tension, X_{nc}

	Concrete compressive strength effect, tension, Xnc				
Anchor size, d_b	M10	M12	M16	M20	M24
f'c (MPa)					
20	0.95	0.95	0.94	0.93	0.92
25	0.97	0.97	0.97	0.96	0.95
30	1.00	1.00	1.00	1.00	1.00
40	1.03	1.04	1.05	1.07	1.06
50	1.05	1.07	1.08	1.09	1.10

EPCON™ C8 Xtrem™

STRENGTH LIMIT STATE DESIGN

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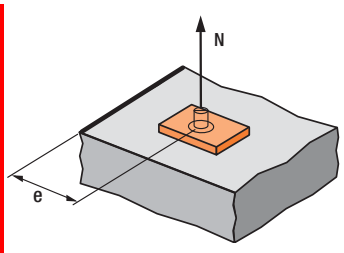
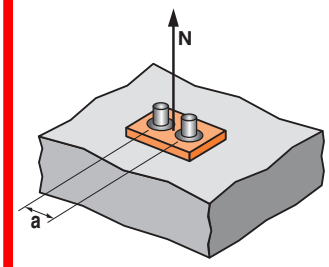


$X_{ne} = 0.25 + 0.5*(e/h)$
Where $e_m \le e \le e_c$
$e_c = 1.5*h$
Note: Tabled values are based on the nominal effective depth, h shown in the installation details. For other values of X_{ne}, please use equation shown above.

Table 2c - Concrete Edge distance effect, tension, X_{ne}

Anchor size, d_b	M10	M12	M16	M20	M24
Edge distance, e (mm)					
50	0.53				
60	0.58	0.52			
80	0.69	0.61	0.57		
90	0.75	0.66	0.61		
100	0.81	0.70	0.65	0.54	
120	0.92	0.80	0.73	0.60	0.54
135	1.00	0.86	0.79	0.65	0.57
165		1.00	0.91	0.74	0.64
187			1.00	0.80	0.70
255				1.00	0.86
315					1.00

0.85



$X_{na} = 0.5 + a/(6*h)$
Where $a_m \le a \le a_c$
$a_c = 3*h$
Note: Tabled values are based on the nominal effective depth, h shown in the installation details. For other values X_{na}, please use equation shown above.

Table 2d - Seismic Cracked concrete anchor spacing effect, tension, X_{na}

Anchor size, d_b	M10	M12	M16	M20	M24
Anchor spacing, a (mm)					
50	0.59				
60	0.61	0.59			
80	0.65	0.62	0.61		
100	0.69	0.65	0.63	0.60	
120	0.72	0.68	0.66	0.62	0.60
140	0.76	0.71	0.69	0.64	0.61
160	0.80	0.74	0.71	0.66	0.63
200	0.87	0.80	0.77	0.70	0.66
270	1.00	0.91	0.86	0.76	0.71
330		1.00	0.94	0.82	0.76
375			1.00	0.87	0.80
510				1.00	0.90
630					1.00

0.86

Checkpoint 2

Design seismic cracked concrete combined pull-out and concrete cone resistance, $N_{Rd,p,seis}$
$N_{Rd,p,seis} = N^0_{Rd,p,seis} * X_{ns} * X_{nc} * X_{ne} * X_{na}$

STEP 3

Verify Seismic C1 & C2 tensile resistance - per anchor

Table 3a - Seismic Cracked Concrete steel resistance, tensile, $N_{Rd,s,seis} = \alpha_{seis} N_{Rk,s,seis}/\gamma_{Ms}$ (kN) where α_{seis} = 1.0

γ_{Ms} = 1.5 for Grade 5.8 and Grade 8.8 Carbon Steel
γ_{Ms} = 1.87 for A4 316 Stainless Steel
γ_{Ms} = 2.6 for HCR 1.4529 Stainless Steell

Anchor size, d_b	M10	M12	M16	M20	M24
Grade 5.8 Carbon Steel	19.3	28.0	52.7	82.0	118.0
Grade 8.8 Carbon Steel	30.7	44.7	84.0	130.7	188.0
A4 316 Stainless Steel	21.9	31.6	58.8	92.0	132.1
HCR 1.4529 Stainless Steel	14.6	21.2	39.2	61.2	88.1

Checkpoint 3

Design Seismic C1 & C2 cracked concrete tensile resistance, $N_{Rd,seis}$
$N_{Rd,seis}$ = minimum of $N_{Rd,p,seis}$, $N_{Rd,s,seis}$
Check $N^*/N_{Rd,seis} \le 1$,
if not satisfied return to step 1

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Seismic Anchors - EPCON™ C8 Xtrem™ - Anchor Studs
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Check 3 anchors to take 12kN each

STEP 4

Verify Seismic C1& C2 cracked concrete edge shear resistance - per anchor

Table 4a - Seismic cracked concrete edge resistance, $V^0_{Rd,c,seis} = \alpha_{seis} V^0_{Rk,c,seis} / \gamma_{Mc}$ (kN)

$\gamma_{Mc} = 1.5$, $\alpha_{seis} = 0.85$, $f'_c = 30$ MPa

Anchor size, d_b	M10	M12	M16	M20	M24
Effective depth, h (mm)	90	110	125	170	210
Edge distance, e_m					
50	1.8				
60		2.4			
80			3.8		
100				5.7	
120					7.8

ØV = 3.8kN x 1x1x2.41x1.88 = 17kN >15kN - OK

Note: Data includes annular gap reduction factor of 0.5

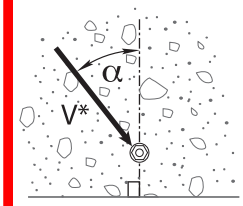
For optimised performance data, please use Ramset iExpert Anchoring Software.

Table 4b - Seismic cracked concrete compressive strength effect, shear, X_{vc}

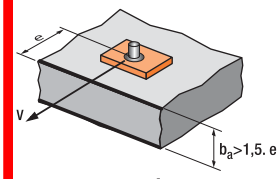
f'c (MPa)	20	25	30	40	50
X_{vc}	0.82	0.9	1.0	1.16	1.27

Table 4c - Seismic cracked concrete load direction effect, concrete edge shear, X_{vd}

Angle, α°	0-55	60	70	80	90-180
X_{vd}	1	1.1	1.2	1.5	2



Load direction effect, conc. edge shear, X_{vd}



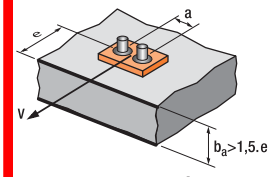
$X_{ve} = e/e_m * \sqrt{e/e_m}$

140/80

Table 4d - Seismic cracked concrete anchor spacing and edge distance effect, concrete edge shear, X_{ve}

For single anchor fastening X_{ve}

e/e_m	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
X_{ve}	1.00	1.31	1.66	2.02	2.41	2.83	3.26	3.72	4.19	4.69	5.20	5.72

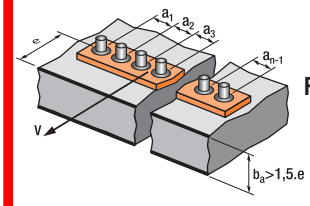


$X_{ve} = \frac{3*e+a}{6*e_m} * \sqrt{e/e_m}$

250/80

For 2 anchors fastening X_{ve}

e/e_m	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
a/e_m												
1.0	0.67	0.84	1.03	1.22	1.43	1.65	1.88	2.12	2.36	2.62	2.89	3.16
1.5	0.75	0.93	1.12	1.33	1.54	1.77	2.00	2.25	2.50	2.76	3.03	3.31
2.0	0.83	1.02	1.22	1.43	1.65	1.89	2.12	2.38	2.63	2.90	3.18	3.46
2.5	0.92	1.11	1.32	1.54	1.77	2.00	2.25	2.50	2.77	3.04	3.32	3.61
3.0	1.00	1.20	1.42	1.64	1.88	2.12	2.37	2.63	2.90	3.18	3.46	3.76
3.5		1.30	1.52	1.75	1.99	2.24	2.50	2.76	3.04	3.32	3.61	3.91
4.0			1.62	1.86	2.10	2.36	2.62	2.89	3.17	3.46	3.75	4.05
4.5				1.96	2.21	2.47	2.74	3.02	3.31	3.60	3.90	4.20
5.0					2.33	2.59	2.87	3.15	3.44	3.74	4.04	4.35
5.5						2.71	2.99	3.28	3.71	4.02	4.33	4.65
6.0						2.83	3.11	3.41	3.71	4.02	4.33	4.65



For 3 anchors fastening and more

$$X_{ve} = \frac{3*e + a_1 + a_2 + a_3 + \ldots + a_{n-1}}{3*n*e_m} * \sqrt{e/e_m}$$

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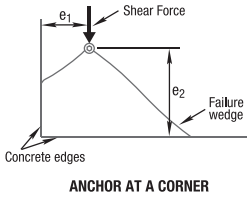
Table 4e - Seismic Cracked concrete Pryout failure, $V^0_{Rd,cp,seis} = \alpha_{seis} V_{Rk,cp} / \gamma_{Mpr}$ (kN)

$\gamma_{Mpr} = 1.5$, $\alpha_{seis} = 0.75$, $f'_c = 30$ MPa

Anchor size, d_b		M10	M12	M16	M20	M24
Effective depth, h (mm)		90	110	125	170	210
-40˚C to +40˚C	C1 Seismic Data	9.2	12.4	22.6	-	-
	C2 Seismic Data	-	-	15.3	19.4	26.8
-40˚C to +80˚C	C1 Seismic Data	5.3	7.0	12.0	-	-
	C2 Seismic Data	-	-	6.2	7.0	8.7

Note: Data includes annular gap reduction factor of 0.5

For single anchor values: Multiply $V^0_{Rd,cp,seis}$*1.13



ANCHOR AT A CORNER

Table 4f - Anchor at a corner effect, concrete edge shear, X_{VS}

Note: For $e_1/e_2 > 1.25$, $X_{VS} = 1.0$

N/A

Edge distance, e_2 (mm)	50	60	75	125	200	300	400	600	900
Edge distance, e_1 (mm)									
50	0.86	0.77	0.67	0.52	0.44	0.39	0.37	0.35	0.33
60	0.97	0.86	0.75	0.57	0.47	0.41	0.38	0.36	0.34
75	1.00	1.00	0.86	0.64	0.51	0.44	0.41	0.37	0.35
125	1.00	1.00	1.00	0.86	0.65	0.53	0.48	0.42	0.38
200	1.00	1.00	1.00	1.00	0.86	0.67	0.58	0.49	0.42
300	1.00	1.00	1.00	1.00	1.00	0.86	0.72	0.58	0.49
400	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.67	0.55
500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77	0.61
600	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.67
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86

Checkpoint 4a

Design seismic cracked concrete edge shear resistance, $V_{Rd,c,seis}$
$= V^0_{Rd,c,seis} * X_{vc} * X_{vd} * X_{ve} * X_{vs}$

Checkpoint 4b

Design seismic cracked concrete Pryout failure,
$V_{Rd,cp,seis} = V^0_{Rd,cp,seis} * X_{nc} * X_{ne} * X_{na}$

STEP 5

Verify Seismic C1 & C2 cracked concrete shear resistance - per anchor

Table 5a - Seismic Cracked Concrete steel shear resistance, $V_{Rd,s,seis} = \alpha_{seis} V_{Rk,s,seis} / \gamma_{Ms}$ (kN)

where $\alpha_{seis} = 0.85$

γ_{Ms} = 1.25 for Grade 5.8 and Grade 8.8 Carbon Steel

γ_{Ms} = 1.56 for A4 316 Stainless Steel

γ_{Ms} = 2.17 for HCR Stainless Steel

Anchor size, d_b	C1 Seismic Data			C2 Seismic Data		
	M10	M12	M16	M16	M20	M24
Grade 5.8 Carbon Steel	3.6	5.0	9.3	7.0	12.2	19.8
Grade 8.8 Carbon Steel	5.5	8.1	15.0	11.4	19.7	31.7
A4 316 Stainless Steel	3.8	5.7	10.5	7.9	13.8	22.3
HCR Stainless Steel	2.6	3.7	7.0	5.3	9.2	14.8

Note: Data includes annular gap reduction factor of 0.5

For single anchor values: Multiply $V^0_{Rd,s,seis}$*1.17

Checkpoint 5

Design seismic C1 & C2 cracked concrete shear resistance, $V_{Rd,\ seis}$
$V_{Rd,\ seis}$ = minimum of $V_{Rd,c,\ seis}$, $V_{Rd,cp,\ seis}$, $V_{Rd,s,\ seis}$
Check $V^*/V_{Rd,\ seis} \leq 1$,
if not satisfied return to step 1

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MemDes Calculations @ 12:09:32 01-04-2025 by EN
Project : 7 Eagle Ray
Description : PF1 column
Segment : S1

Section : 410UB59 Grade 300+

Major Axis Bending
Design Action M^*_x = 201.0 kNm
$\alpha_{m\ (5.6.2)} = 1.132 * \alpha_{m\ (prev)} - 0.86 = 1.199$
$\alpha_s = 0.60$
$\alpha_m * \alpha_s < 1.0$, => Segment NOT Fully Restrained
$M_{bx} = 1.20 * 0.60 * 360.0 = 259.9$ kNm
Major axis capacity Ratio = $M^*_x / \phi M_{bx}$
= 0.86, ---- OK ----

Shear Calculations (Unstiffened Web)
Design Action V^*_x = 61.0 kN
Nominal Shear Yield capacity V_w = 608.0 kN
α_v = 2.21 >= 1.0 => full web shear capacity
$V_u = V_w$ = 608.0 kN
Shear capacity ratio = $V^*_x / \phi V_u$
= 0.11, ---- OK ----

for rafters, locate fly braces at 4m crs also

Axial Calculations
Design Action N_d = 67.0 kN [Comp], LeAxx = 4.00 m, LeAyy = 4.00 m
= 2207.7 kN
Major axis buckling : Minor axis buckling : Minimum Capac. $N_c$min = 1076.0 kN
Axial buckling capac. Ratio = $N_d / \phi N_c$min
= 0.069, ---- OK ----

Combined Actions Checks

Clause 8.3.3/4 :
$M_{ry} = M_{sy} (1 - (N^*/\phi N_s)^2) * 1.19$, =< M_{sy} [Alt. Prov. OK]
= 60.9 kNm
Load / Capacity Ratio = $M^*_x / (0.9 M_{rx})$
= 0.62, ---- OK ----

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Clause 8.4.2.2 : Major : M_{ix} = 347.3 kNm

Load / Capacity Ratio = $M^*_m/\varphi M_i$

= 0.643 ---- OK ----

Clause 8.4.4.1 : α_{bc} = 1.82

N_{oz} = 2880.96

M_{ox} = 360.00

Load / Capacity Ratio = $M^*_x/\varphi M_{ox}$,

= 0.620, ---- OK ----

========== SUMMARY ==========

**** U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.86 ---- OK ----

==========

PF1 PAD DESIGN

RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray		Page:	
Reference:	0	Date:	1/04/25	By: EN

Design Actions & Dimensions

	Mb	
Design Moment at ground level	35	(kNm)
Design Shear (H) at ground level	45	(kN)
Design Vertical load	60	(kN)
Footing Length	1.5	(m)
Footing Breadth	1.5	(m)
Footing Thickness	0.6	(m)
X	0.75	(m)
Y	0.75	(m)
Depth of water table below ground	2.5	(m)
Depth of footing below ground Df	0	(m)
Effective Area A'	0.73812095	
L'	0.49	
B'	1.50	

EQ ACTIONS

37kN + allowance for slab above

Footing and Soil Properties

Condition = **Drained**

Footing type = **Rectangular**

Note, rectangular footings not covered

Cohesionless soil

Φ =	30	*Angle of shear stress resistance (degrees)*
γ sat =	18	*Saturated unit weight of the soil (kN/m3)*
γ =	18	*Unit weight of the soil (kN/m3)*
γ_bf =	18	*Unit weight of backfill soil (kN/m3)*
S_u =	70	*Undrained shear strength (kPa)*
C'	0	*Cohesion (kPa)*
K_p =	3	*Coefficient of passive earth pressure*

ω = 0 *Slope, downhill from edge of foundation (degrees).*

D_e = 0 *Minimum horizontal distance from the underside edge of the foundation to the adjacent downward slope (m)*

Check Bearing capacity

q*	94	kPa			Wf =	33.75	kN
					Wpole =	60	kN
q_ult	305	kPa			Bearing Width =	0.42	m
Φq_ult	137	kPa	0.69	OK	Pole leaver arm =	0.54	m
					Footing leaver arm =	0.54	m
Φq_ult (geotech report)	150	kPa	0.6273	OK	ΦM_resisting =	45.70	kNm
Overturning Sensitivity Check	0.77	OK			M* driving =	35.0	kNm

Check Sliding Capacity

S*	45	kN	
Sliding resistance S	40	kN	
ΦS	32	kN	1.40 NOT OK

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Design cross braces for wall

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road		Page:
Reference:	A24362	Date: 31/03/2025	By: EN

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Earthquake Design Loads NZS 1170.5

V2.9

Site Data

Location =	Auckland	
Soil Type =	D	Deep or soft soil
Nearest Fault =	Mohaka	Figure 3.5
D (km) =		Table 3.3
$N_{max}(s)$ =	1.00	Table 3.7
Design Work Life	50	
Importance level	2	

Building Data

Period T_1 =	0.4	s	Clause 4.3
Ductility m =	1		
Return Period ULS=	500	yrs	Table 3.3 NZS1170.0
Return Period SLS=	25	yrs	
S_p =	1		Clause 4.4
k_m =	1.00		Clause 5.2.1.1

Elastic Site Spectra

$C_h(T)$ =	3.00			Table 3.1
Z =	0.13			Table 3.3
R_u =	1.00	R_s =	0.25	Table 3.5 with B1 amendments
N(T,D) =	1.00			

$C(T_1,ULS)$ = 0.39 $C(T_1,SLS)$ = 0.10 $C(T) = C_h(T) Z R N(T,D)$ Eq. 3.1(1)

Horizontal design action coefficient

$C_d(T_1, ULS)$ = **0.39** $C_d(T_1, SLS)$ = **0.07** Eq. 5.2(1)

Check: $Cd(T1)_{ULS} \geq (Z/20+0.02)Ru$ & $0.03Ru$ = 0.03 **OK** Eq. 5.2(2)

Equivalent Static Seismic Forces

Level i	G+Q_u (kN)	$h_i - h_{i-1}$ (m)	h_i (m)	h_iW_i (kNm)	h_iW_i / S (H_iW_i)	F_i (kN)	V_i (kN)
TYP							
ROOF	429	5.3	5.3	2275	1.00	167	167
1	0		0.0	0	0.00	0	167
GRD		0.0					
SUM	429			2275	1.00	167	

$C_d(SLS)/Cd(ULS)$ = 0.175

Seismic Weight, W_t 429.2 kN

Base Shear 167.4 kN

Base Shear SLS 29.3 kN

Tensile Capacities - kN (ReidBrace™ System)

ϕN_u = Reduced Characteristic Capacity (UTS Tested) where ϕ = 0.9

ϕN_t = Limit State Design of System (Yield Theory) where ϕ = 0.9

Diameter	Tested Capacity* (ϕN_u) per brace	Design Capacity** (ϕN_t) per brace
12mm	63kN	51kN
16mm	112kN	91kN
20mm	180kN	141kN
25mm	255kN	221kN

*Note: Tested Capacity demonstrates suitability of Recommended Design Capacity as per procedure of NZS3404 C17.5 & AS/NZS1170.0 Appendix B.
**Note: The Recommended Design Capacity is based on nominal yield strength of Grade 500E ReidBar™ used as part of the ReidBrace™ System.

167kN / 4 bays
Nt* per brace = 42kN / cos 40 = 55kN
->Use RB16

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS	Project:	7 Eagle Ray Road		Page:	
	Reference:	A24362	Date:	31/03/2025	By: EN

Notes:

Seismic Weights

Live load considered on roof: yes

$$W_i = G_i + \sum \psi_a \psi_E Q_i$$ Eq 4.2(1)

	Item	G kPa	Q kPa	Length m	Height/ Width m	Area m^2	Quantity #	ψ_a -	$\psi_{E(1)}$ -	G kN	$\psi_a\psi_E Q$ kN
Roof	Roof	0.35	0	-	-	605.0	1.1	0.5	0.3	232.9	0
	Portal rafters	0.5	0	22	1	22.0	5.5	0.9396	0.3	60.5	0
	Portal columns	0.50	0	4	1	4.0	5.5	1	0.3	11.0	0
	Ext wall	0.45	0	56	2.1	117.6	1.1	0.5766	0.3	58.2	0
	Ext wall gable	0.45	0	42	3.2	134.4	1.1	0.5588	0.3	66.5	0
									W_i =	429.17	kN
Floor 1									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN

Note (1): B1/VM1 2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: "0.3 is the earthquake imposed action (live load) combination factor for all other applications" add the following: "except roofs. ψE = 0.0 is the earthquake imposed action (live load) combination factor for roofs."

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Design cross braces for roof

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road		Page:
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Earthquake Design Loads NZS 1170.5

V2.9

Site Data

Location =	Auckland	
Soil Type =	D	Deep or soft soil
Nearest Fault =	Mohaka	Figure 3.5
D (km) =		Table 3.3
$N_{max}(s)$ =	1.00	Table 3.7
Design Work Life	50	
Importance level	2	

Building Data

Period T_1 =	0.4	s	Clause 4.3
Ductility m =	1		
Return Period ULS=	500	yrs	Table 3.3 NZS1170.0
Return Period SLS=	25	yrs	
S_p =	1		Clause 4.4
k_m =	1.00		Clause 5.2.1.1

Elastic Site Spectra

$C_h(T)$ =	3.00			Table 3.1
Z =	0.13			Table 3.3
R_u =	1.00	R_s =	0.25	Table 3.5 with B1 amendments
N(T,D) =	1.00			

$C(T_1,ULS)$ = 0.39 $C(T_1,SLS)$ = 0.10 $C(T) = C_h(T) Z R N(T,D)$ Eq. 3.1(1)

Horizontal design action coefficient

$C_d(T_1, ULS)$ = **0.39** $C_d(T_1, SLS)$ = **0.07** Eq. 5.2(1)

Check: $Cd(T1)_{ULS} \geq (Z/20+0.02)Ru$ & $0.03Ru$ = 0.03 **OK** Eq. 5.2(2)

Equivalent Static Seismic Forces

Level i	G+Qu (kN)	$h_i - h_{i-1}$ (m)	h_i (m)	h_iW_i (kNm)	h_iW_i / S (H_iW_i)	F_i (kN)	V_i (kN)
TYP							
ROOF	363	5.3	5.3	1922	1.00	141	141
1	0		0.0	0	0.00	0	141
GRD		0.0					
SUM	363			1922	1.00	141	

$C_d(SLS)/Cd(ULS)$ = 0.175

Seismic Weight, W_t 362.7 kN
Base Shear 141.5 kN
Base Shear SLS 24.8 kN

Tensile Capacities - kN (ReidBrace™ System)

ϕN_u = Reduced Characteristic Capacity (UTS Tested) where ϕ = 0.9
ϕN_t = Limit State Design of System (Yield Theory) where ϕ = 0.9

Diameter	Tested Capacity* (ϕN_u) per brace	Design Capacity** (ϕN_t) per brace
12mm	63kN	51kN
16mm	112kN	91kN
20mm	180kN	141kN
25mm	255kN	221kN

*Note: Tested Capacity demonstrates suitability of Recommended Design Capacity as per procedure of NZS3404 C17.5 & AS/NZS1170.0 Appendix B.
**Note: The Recommended Design Capacity is based on nominal yield strength of Grade 500E ReidBar™ used as part of the ReidBrace™ System.

Roof brace:
142kN / 4 bays = 36kN
36kN / sin 25 = 84kN
-> Use RB16

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS	Project:	7 Eagle Ray Road		Page:	
	Reference:	A24362	Date:	31/03/2025	By: EN

Notes:

Seismic Weights

Live load considered on roof: No

$$W_i = G_i + \sum \psi_a \psi_E Q_i$$ Eq 4.2(1)

	Item	G kPa	Q kPa	Length m	Height/ Width m	Area m^2	Quantity #	ψ_a -	$\psi_{E(1)}$ -	G kN	$\psi_a\psi_E Q$ kN
Roof	Roof	0.35	0	-	-	605.0	1.1	0.5		232.9	
	Portal rafters	0.5	0	22	1	22.0	5.5	0.9396		60.5	
	Gable	0.45		-	-	70.0	2.2	0.6586		69.3	
									W_i =	362.73	kN
Floor 1									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN

Note (1): B1/VM1 2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: "0.3 is the earthquake imposed action (live load) combination factor for all other applications" add the following: "except roofs. ψE = 0.0 is the earthquake imposed action (live load) combination factor for roofs."

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Check strut
Strut load = 167kN / 4 = 42kN -> use 150x6 SHS

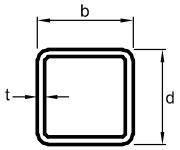
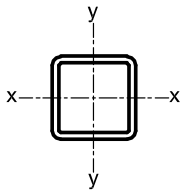


TABLE 5.2-5(1)

DESIGN CAPACITIES FOR MEMBERS SUBJECT TO AXIAL COMPRESSION



***Tubeline*® SQUARE HOLLOW SECTIONS: GRADE C350L0**
buckling about x- and y-axis

Designation d b t	Mass per m	Design Capacities for Axial Compression ϕN_c (kN) Effective Length (L_e) in metres													
mm mm mm	kg/m	0.0	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0	8.0	10.0	12.0
250 x 250 x 9.0 SHS	65.9	2650	2650	2620	2590	2560	2520	2470	2410	2270	2100	1880	1650	1200	882
6.0 SHS	45.0	1540	1540	1530	1520	1500	1480	1450	1430	1360	1280	1180	1060	810	607
200 x 200 x 9.0 SHS	51.8	2080	2070	2040	2010	1960	1910	1850	1780	1600	1370	1140	928	630	448
6.0 SHS	35.6	1430	1420	1400	1380	1350	1320	1280	1230	1110	960	801	658	449	320
5.0 SHS	29.9	1070	1070	1060	1040	1020	998	971	940	862	763	652	544	377	271
150 x 150 x 9.0 SHS	37.7	1510	1490	1460	1410	1350	1280	1190	1090	857	652	500	391	256	180
6.0 SHS	26.2	1050	1040	1010	985	947	900	842	774	617	474	364	286	188	132
5.0 SHS	22.1	886	876	857	833	801	762	714	658	527	406	313	245	161	114
125 x 125 x 9.0 SHS	30.6	1230	1200	1160	1110	1040	944	835	718	515	374	281	218	142	99.4
6.0 SHS	21.4	861	843	817	781	735	676	604	525	382	279	210	163	106	74.5
5.0 SHS	18.2	729	715	693	663	625	576	516	451	329	241	181	141	91.8	64.4
4.0 SHS	14.8	593	581	564	540	510	471	424	371	272	199	150	117	76.1	53.4
100 x 100 x 9.0 SHS	23.5	944	907	858	787	692	579	469	378	254	180	134	103	67.0	46.9
6.0 SHS	16.7	672	648	616	570	508	433	356	290	196	139	104	80.2	51.9	36.4
5.0 SHS	14.2	571	552	525	488	437	374	309	252	171	122	90.7	70.1	45.4	31.8
4.0 SHS	11.6	467	451	430	400	360	310	257	210	143	102	76.0	58.7	38.1	26.7
3.0 SHS	8.96	359	348	332	310	280	242	202	166	113	80.8	60.3	46.6	30.2	21.2
2.5 SHS	7.53	269	262	251	236	217	192	164	137	95.1	68.2	51.0	39.5	25.6	18.0
2.0 SHS	6.07	172	169	163	156	146	134	120	104	75.0	54.6	41.1	31.9	20.8	14.6
89 x 89 x 6.0 SHS	14.6	588	560	524	471	400	323	256	203	135	95.4	70.8	54.7	35.4	24.8
5.0 SHS	12.5	502	479	449	405	347	282	224	179	119	83.9	62.4	48.1	31.1	21.8
3.5 SHS	9.06	363	348	327	297	257	211	168	135	89.8	63.6	47.2	36.5	23.6	16.5
75 x 75 x 6.0 SHS	12.0	483	449	405	340	263	198	151	118	77.4	54.4	40.3	31.1	20.1	14.0
5.0 SHS	10.3	414	386	350	296	232	176	134	105	68.9	48.5	35.9	27.7	17.9	12.5
4.0 SHS	8.49	341	319	290	247	196	149	114	89.7	58.8	41.4	30.7	23.6	15.3	10.7
3.5 SHS	7.53	302	283	258	221	176	134	103	80.9	53.1	37.4	27.7	21.4	13.8	9.66
3.0 SHS	6.60	265	249	227	196	156	120	92.5	72.6	47.6	33.5	24.9	19.2	12.4	8.67
2.5 SHS	5.56	223	210	192	166	133	103	79.1	62.1	40.8	28.7	21.3	16.4	10.6	7.43
2.0 SHS	4.50	172	162	150	131	107	83.2	64.5	50.8	33.5	23.6	17.5	13.5	8.72	6.10

Notes : 1. ϕ = 0.9
2. ϕN_c = $\phi \alpha_c N_s$ (Clause 6.3.3 of AS 4100)
3. α_b = - 0.5 (Table 6.3.3 of AS 4100)

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onesteel market mills

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RICHARDS CONSULTING | ENGINEERS

Project:	7 Eagle Ray Road, Mangawhai		
Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

SECTION 3:
Mezzanine design

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS	Project: 7 Eagle Ray Road		Page:
	Reference: A24362	Date: 9/04/2025	By: EN

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Earthquake Design Loads NZS 1170.5

V2.9

Site Data

Location =	Auckland	
Soil Type =	D	Deep or soft soil
Nearest Fault =	Mohaka	Figure 3.5
D (km) =		Table 3.3
$N_{max}(s)$ =	1.00	Table 3.7
Design Work Life	50	
Importance level	2	

Building Data

Period T_1 =	0.4	s	Clause 4.3
Ductility m =	3.5		
Return Period ULS=	500	yrs	Table 3.3 NZS1170.0
Return Period SLS=	25	yrs	
S_p =	0.7		Clause 4.4
k_m =	2.43		Clause 5.2.1.1

Elastic Site Spectra

$C_h(T)$ =	3.00			Table 3.1
Z =	0.13			Table 3.3
R_u =	1.00	R_s =	0.25	Table 3.5 with B1 amendments
N(T,D) =	1.00			

$C(T_1,ULS)$ = 0.39 $C(T_1,SLS)$ = 0.10 $C(T) = C_h(T) Z R N(T,D)$ Eq. 3.1(1)

Horizontal design action coefficient

$C_d(T_1, ULS)$ = **0.11** $C_d(T_1, SLS)$ = **0.07** Eq. 5.2(1)

Check: $Cd(T1)_{ULS} \geq (Z/20+0.02)Ru$ & $0.03Ru$ = 0.03 **OK** Eq. 5.2(2)

Equivalent Static Seismic Forces

$C_d(SLS)/Cd(ULS)$ = 0.6071

Level i	$G+Q_u$ (kN)	$h_i - h_{i-1}$ (m)	h_i (m)	h_iW_i (kNm)	$h_iW_i / S(H_iW_i)$	F_i (kN)	V_i (kN)
TYP							
ROOF	72	5.3	5.3	381	1.00	8	8
1	0		0.0	0	0.00	0	8
GRD		0.0					
SUM	72			381	1.00	8	

Seismic Weight, W_t **71.8** **kN**
Base Shear **8.1** **kN**
Base Shear SLS **4.9** **kN**

=160BU

EARTHQUAKE LOADS APPLIED TO STRUCTURE

RICHARDS CONSULTING | ENGINEERS	Project: 7 Eagle Ray Road		Page:	
	Reference: A24362	Date: 9/04/2025	By:	EN

Notes:

Seismic Weights

Live load considered on roof: yes

$$W_i = G_i + \sum \psi_a \psi_E Q_i$$ Eq 4.2(1)

	Item	G kPa	Q kPa	Length m	Height/ Width m	Area m²	Quantity #	ψ_a -	$\psi_{E(1)}$ -	G kN	$\psi_a\psi_E Q$ kN
Roof	mezzanine	0.4	3	-	-	55.0	1.1	0.7045	0.3	24.2	38.36111
	internal wall	0.3	0	20	1.4	28.0	1.1	0.8669	0.3	9.2	0
									W_i =	71.801	kN
Floor 1									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN
									W_i =	0	kN

Note (1): B1/VM1 2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: "0.3 is the earthquake imposed action (live load) combination factor for all other applications" add the following: "except roofs. ψE = 0.0 is the earthquake imposed action (live load) combination factor for roofs."

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GIB EzyBrace® Bracing Software

Single Level Along Resistance Sheet

Job Name:

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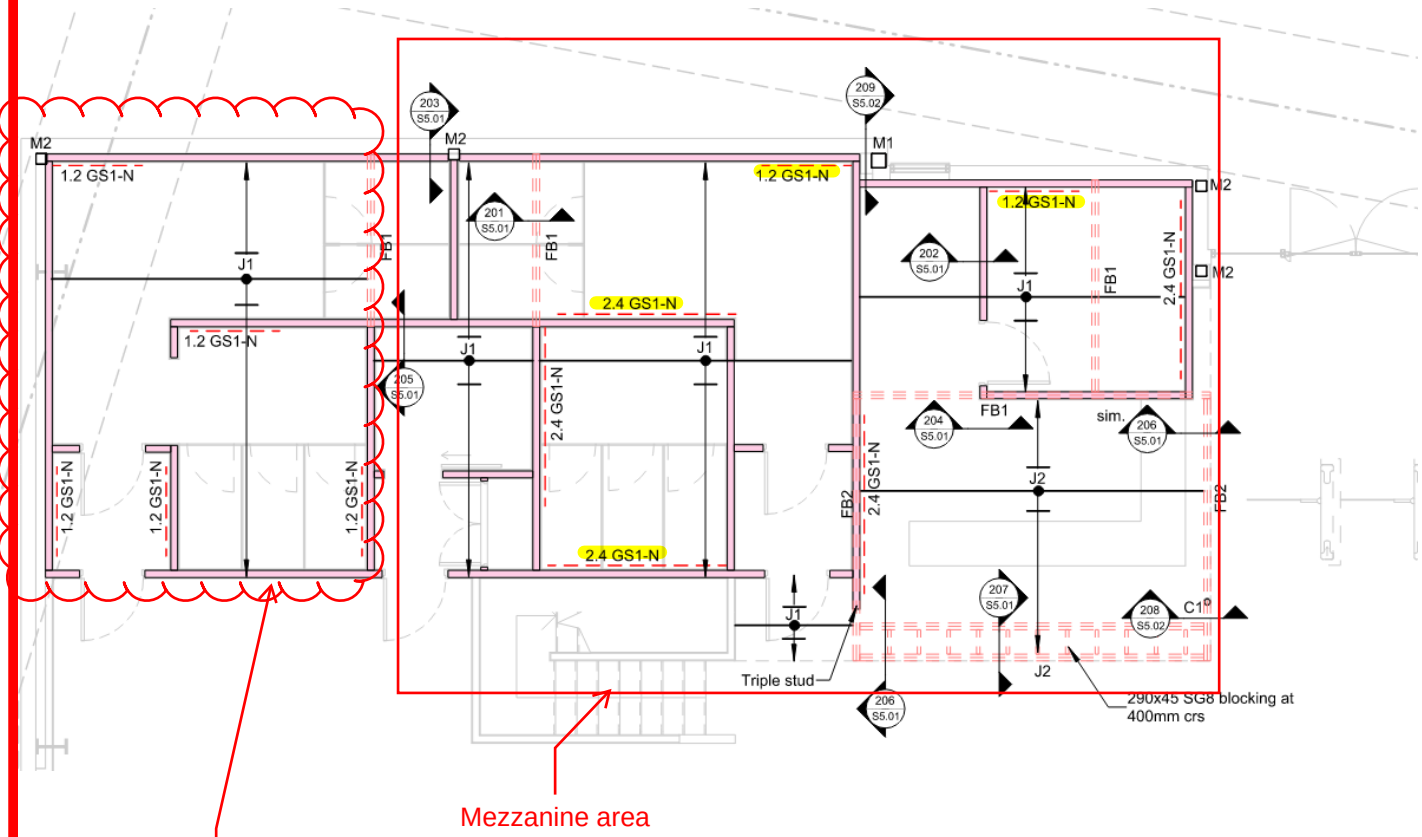
									Wind	EQ
									Demand	
									~~258~~	~~264~~ 160
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	~~442~~ ~~171%~~	384 ~~145%~~ 240%
a	1	1.20	0	2.7	GS1-N	GIB®	74	64		
	2	1.20	0	2.7	GS1-N	GIB®	74	64		
									147 OK	128 OK
b	1	2.40	0	2.7	GS1-N	GIB®	147	128		
									147 OK	128 OK
c	1	2.40	0	2.7	GS1-N	GIB®	147	128		
									147 OK	128 OK



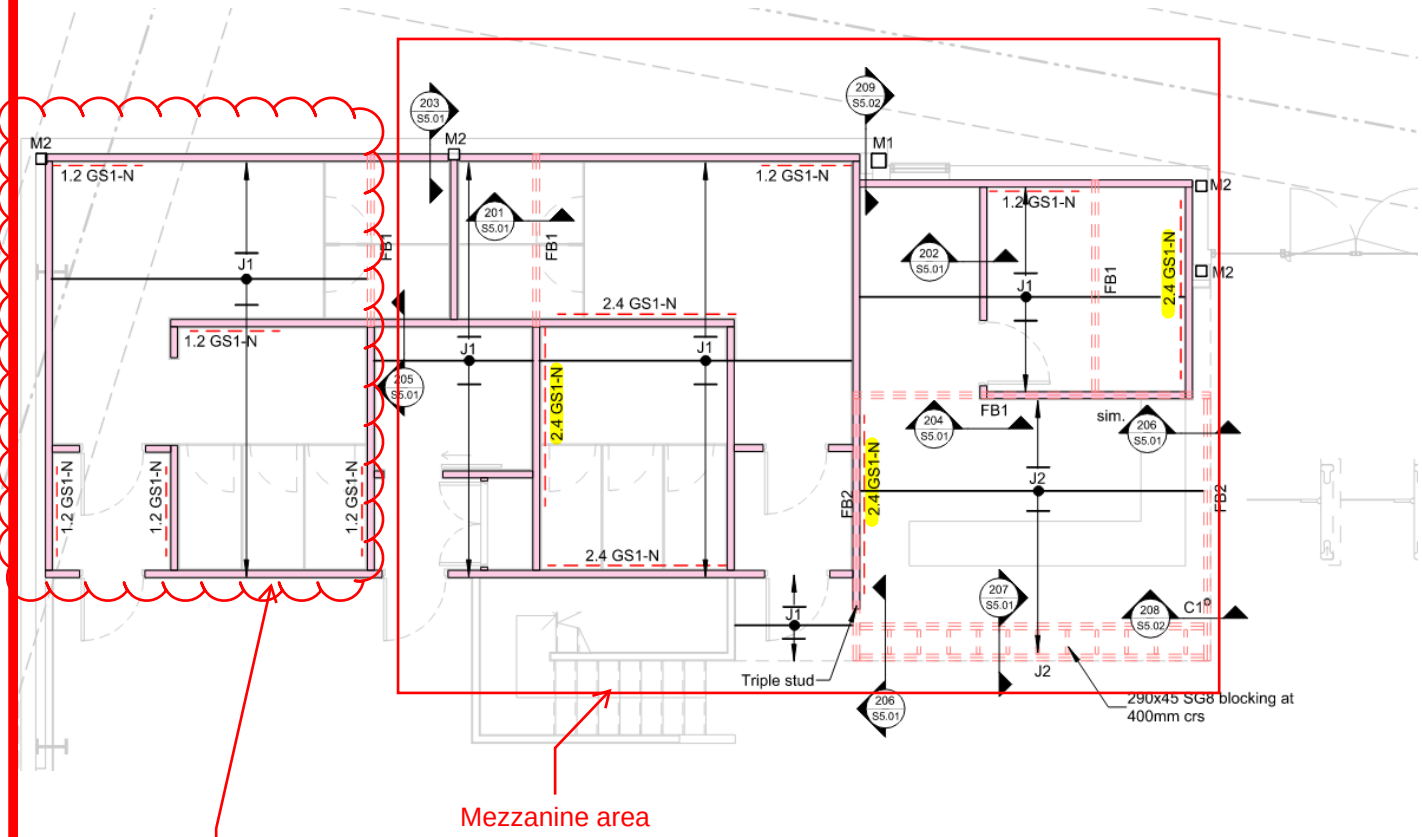
GIB EzyBrace® Bracing Software

Single Level Across Resistance Sheet

Job Name:

KDC - Approved Building Consent Document - BC250144 SP ISSUED - Pg 164 of 467 - 11/07/2025 - vsingh

									Wind	EQ
									Demand	
									~~222~~	~~264~~ 160
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	~~442~~ ~~199%~~	384 ~~145%~~ 240%
m	1	2.40	0	2.7	GS1-N	GIB®	147	128		
									147 OK	128 OK
n	1	2.40	0	2.7	GS1-N	GIB®	147	128		
									147 OK	128 OK
o	1	2.40	0	2.7	GS1-N	GIB®	147	128		
									147 OK	128 OK



Mezzanine area

Nominal bracing for non mezzanine area - OK

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RICHARDS CONSULTING | ENGINEERS

Project:		Page:
Reference:	Date: 21/04/25	By:

V 3.6 Element name J1

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor	0.4	0.4	0.2		
Wall			0.0		
Other			0.0		
Self			0.1		
		Sum	0.2		0.0
Q					
Roof	0		0		
Floor	0.4	3	1.2	2.1	2.7
Other			0		
		Sum	1.2		2.7
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Assumptions
1. *Loads distributed evenly along beam*
2. *Beam is simply supported*
3. *Point loads act at midspan*
4. *Governing SLS determined from deflection*
5. *Governing ULS determined by largest M**
6. *Confined deflections (i.e joists, rafters):* Yes
7. *Service condition* Dry
8. *Floor live loads are considered to be from* Office Floors
9. *Roof live loads are considered to be from* Other Roofs

No

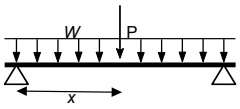


Table 3.1 AS/NZS 1170.1:2002

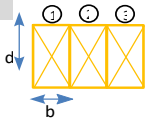
Cfig = -1.1

Member Properties

Try Timber d = 290 mm, b = 45 mm, No. = 1

Span (L) = 4.2 m

Timber grade SG 8



A =	13050	mm²	f_c =	18	MPa
Zx =	630750	mm³	f_b =	14.00	MPa
Ix =	91458750	mm⁴	E =	8	GPa

Amendment 4 NZS3603:1993

Check Vibration (floor only) apply point load of 1kN — Appendix C AS/NZS 1170.0

$\Delta = PxL^3/(48EI)$ = **2.1 mm** < 2 mm $\Delta_{vibration}$ < 2 mm ~~NOT OK~~ ~2mm OK

Check Deflection

Governing Δ = G + φsQ

Δ = **11.6 mm** L/Δ= 362 *L/Δ>400 ok & 12mm* ~~NOT OK~~ >L/300 OK

Check Bending Strength

M^*_a =	**4.85**	**kN.m**	**1.2G+1.5Qpt**	
$M^*_{b\ (Uplift)}$ =	**0.00**	**kN.m**	**1.2G+1.5Qpt**	
ϕ=	0.8			*NZS 3603: 1993*
k_1 =	0.8			
$k_{1\ (uplift)}$ =	0.8			*Table 2.4 NZS 3603:1993*
K_4=	1			*Table 2.7 NZS 3603:1993*
K_5=	1			*Eq 2.5 NZS 3603:1993*
k_{24}=	1.00			

determine K_8: L_{ay} = 400 mm; s = 10; k_{8a} = 1.00033

$L_{ay\ (uplift)}$ = 1200 mm; s = 18; k_{8b} = 0.78762 — *Spacing of compression restraints*

Eq 3.5 NZS 3603:1993

Eq 2.10 NZS 3603:1993

ϕMn_a (Compression edge on top) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$ = **5.65 kN.m** *Eq 3.4*

ϕMn_b (uplift) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$ = **4.45 kN.m** *Eq 3.4*

$M^*_a < \phi Mna$ =	0.86	**OK**	M*/ϕMn<1 ok
$M^*_b < \phi Mnb$ =	0.00	**OK**	M*/ϕMn<1 ok

Reactions

R_1 =	4.35 kN	**1.2G+1.5Q**	No Uplift
R_2 =	4.35 kN	**1.2G+1.5Q**	No Uplift

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V 3.6 Element name ~~J1~~ J2

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor	0.4	0.4	0.2		
Wall			0.0		
Other			0.0		
Self			0.1		
		Sum	0.3		0.0
Q					
Roof	0		0		
Floor	0.4	3	1.2	2.35	2.7
Other			0		
		Sum	1.2		2.7
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Assumptions
1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from deflection
5. Governing ULS determined by largest M*
6. Confined deflections (i.e joists, rafters): Yes
7. Service condition Dry
8. Floor live loads are considered to be from Office Floors
9. Roof live loads are considered to be from Other Roofs

No

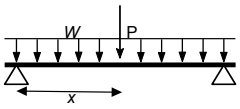


Table 3.1 AS/NZS 1170.1:2002

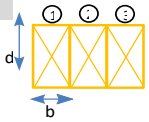
Cfig = -1.1

Member Properties

Try Timber: d = 290, b = 45 mm, No. = 2

Span (L) = 4.7 m

Timber grade SG 8



A =	26100	mm^2	f_c =	18	MPa
Zx =	1261500	mm^3	f_b =	14.00	MPa
Ix =	182917500	mm^4	E =	8	GPa

Amendment 4 NZS3603:1993

Check Vibration (floor only) apply point load of 1kN — Appendix C AS/NZS 1170.0

$\Delta_{vibration}$ < 2 mm

$\Delta = PxL^3/(48EI)$ = **1.5 mm** < 2 mm **OK**

Check Deflection

Governing Δ = G + φsQ — *L/Δ>400 ok & 12mm*

Δ = **8.9 mm** L/Δ= 528 **OK**

Check Bending Strength

M^*_a =	**5.93**	**kN.m**	**1.2G+1.5Q**	
$M^*_{b\ (Uplift)}$ =	**0.00**	**kN.m**	**1.2G+1.5Qpt**	
ϕ=	0.8			*NZS 3603: 1993*
k_1 =	0.8			
$k_{1\ (uplift)}$ =	0.8			*Table 2.4 NZS 3603:1993*
K_4=	1			*Table 2.7 NZS 3603:1993*
K_5=	1			*Eq 2.5 NZS 3603:1993*
k_{24}=	1.00			

determine K_8: L_{ay} = 400 mm; s = 10; k_{8a} = 1.00033

$L_{ay\ (uplift)}$ = 1200 mm; s = 18; k_{8b} = 0.78762 — *Spacing of compression restraints*

Eq 3.5 NZS 3603:1993

Eq 2.10 NZS 3603:1993

ϕMn_a (Compression edge on top) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$ = **11.31 kN.m** *Eq 3.4*

ϕMn_b (uplift) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$ = **8.90 kN.m** *Eq 3.4*

$M^*_a < \phi Mna$ =	0.52	**OK**	M*/ϕMn<1 ok
$M^*_b < \phi Mnb$ =	0.00	**OK**	M*/ϕMn<1 ok

Reactions

R_1 =	5.05 kN	**1.2G+1.5Q**	No Uplift
R_2 =	5.05 kN	**1.2G+1.5Q**	No Uplift

SG 8

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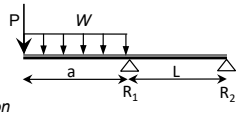
V 3 Element name FB2

Loads

	Trib width (m)	Load (kPa)	W kN/m	Load (kN)
G				
Roof			0.0	
Floor	2.3	0.4	0.9	
Wall			0.0	
Self			0.1	
		Sum	1.1	0.0
Q				
Roof	0		0	
Floor	2.3	3	6.9	2.7
		Sum	6.9	2.7
S (snow)				
Roof	0		0	1
		Sum	0	1
W (wind)				
Roof	0		0	
		Sum	0	0

Assumptions



1. Loads distributed evenly along cantilever
2. Point loads act at end of cantilever
4. Governing SLS determined from deflection
5. Governing ULS determined by largest M*
6. Confined deflections (i.e joists, rafters): No
7. Service condition Dry
8. Live loads are considered to be from Office Floors
9. Dead loads are applied to both cantilever and back span Yes

Table 3.1 AS/NZS 1170.1:2002

Cfig = 1
SLS factor 0.75

Load Cases *In accordance with AS/NZS 1170.0: 2002*

Serviceability	Q Distributed (w)		Q Point (P)		
K_2×G+ φ_lQ =	4.9 kN/m	0.0 kN	2.1 kN/m	1.6 kN	*k2 =2 (Table 2.5 NZS3603:1993)*
G + φ_sQ =	5.9 kN/m	0.0 kN	1.1 kN/m	2.7 kN	●●
Ws =	0.0 kN/m	0.0 kN			
Ultimate					
1.2G+1.5Q =	11.6 kN/m	0.0 kN ●●	1.3 kN/m	4.1 kN	
1.2G +S+φ_cQ =	4.0 kN/m	1.0 kN	1.3 kN/m	2.1 kN	
0.9G + W =	0.9 kN/m	0.0 kN			
1.35G =	1.4 kN/m	0.0 kN			

	w	p
φ_s =	0.7	1
φ_l =	0.4	0.6
φ_c =	0.4	0.4

Governs = ●● *Table 4.1 AS/NZS 1170.0:2002*

Beam properties

Cantilever (a) 0.8 m
Span (L) 2.8 m

Try timber Lintel 290 mm X 90 mm
Elb = 8 GPa Timber grade Prolam® GL8 *ProWood 'Characteristic Strengths table'*

Check Vibration (floor only) apply point load of 1kN *Appendix C AS/NZS 1170.0*

$\Delta_{vibration}$ < 1 mm

$\Delta = Pxa^2x(a+L)/(3EI)$ = **0.5** **mm** < 1 mm **OK**

Check Deflection (at end of cantilever)

I_x = 182.9 $\times 10^6$ mm^4

a/ ⊿ >200 ok

$\Delta = Wa^3(4L+3a)/24EI$, = **2.1** **mm** a/⊿= 389 **OK**
$\Delta = Pxa^2(L+a)/3EI$

Check Bending Strength (over support)

M^*_a = **3.7** **kN.m** $W*a^2/2$ & P*a
$M^*_{b\ (Uplift)}$ = **0.3** **kN.m** $W*a^2/2$ & P*a
ϕ= 0.8 *NZS 3603: 1993*
k_1 = 0.8
$k_{1\ (uplift)}$ = 1 *Table 2.4 NZS 3603:1993*
K_4= 1 *Table 2.7 NZS 3603:1993*
K_5= 1 *Eq 2.5 NZS 3603:1993*

determine K_8
L_{ay} = 1200 mm
s = 9 k_{8a} = 1
$L_{ay\ (uplift)}$ = 1200 mm *spacing of compression restraints*
s = 9 k_{8b} = 1 *Eq 3.5 NZS 3603:1993*
Eq 2.10 NZS 3603:1993

fb = 19 MPa Timber grade Prolam® GL8 *ProWood 'Characteristic Strengths table'*
Zx = 1.26 10^6 mm^3

ϕMn_a (Compression edge on top) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$= **15.3 kN.m** *Eq 3.4*
ϕMn_b (uplift) $\phi \times K_1 \times K_4 \times K_5 \times K_{8a} \times f_b \times Zx$= **19.2 kN.m** *Eq 3.4*

M^*_a<ϕMna = 0.2 **OK** M*/ϕMn<1 ok
M^*_b<ϕMnb = 0.0 **OK** M*/ϕMn<1 ok

Reactions

$R_1 = V_1^* - V_2^*$ = 14.93 kN $R_2 = V_2^*$ = 26.87 kN
$R_{1,uplift}$ = $R_{2,uplift}$ =
Negative indicates upwards

Prolam® GL8

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And match FB1

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V 3.6 Element name: FB2

Loads

	Trib width (m)	Load (kPa)	W kN/m	x (m)	Load (kN)
G					
Roof			0.0		
Floor	2.3	0.4	0.9		
Wall			0.0		
Other			0.0		
Self			0.1		
		Sum	1.1		0.0
Q					
Roof	0		0		
Floor	2.3	3	6.9	1.4	2.7
Other			0		
		Sum	6.9		2.7
S (snow)					
Roof	0		0		
W (wind)					
Roof	0		0		
Misc					
SLS			0		
ULS			0		

Assumptions
1. Loads distributed evenly along beam
2. Beam is simply supported
3. Point loads act at midspan
4. Governing SLS determined from deflection
5. Governing ULS determined by largest M*
6. Confined deflections (i.e joists, rafters): No
7. Service condition: Dry
8. Floor live loads are considered to be from: Office Floors
9. Roof live loads are considered to be from: Other Roofs
10. The beam consists of multiple members: Yes

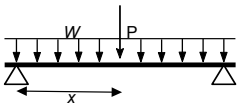


Table 3.1 AS/NZS 1170.1:2002

Cfig = -1.1

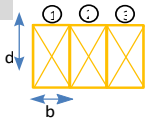
Member Properties

Try Timber: d = 290, b = 45 mm, No. = 2

Span (L) = 2.8 m

Timber grade: Prolam® PL8 (dry)

A = 26100 mm²
Zx = 1261500 mm³
Ix = 182917500 mm⁴



f_c = 24 MPa
f_b = 19.00 MPa
E = 8 GPa

Prolam 'Structural Timber Guid 2019'

Check Vibration (floor only) apply point load of 1kN — Appendix C AS/NZS 1170.0

$\Delta = PxL^3/(48EI)$ = **0.3 mm** < 1 mm ($\Delta_{vibration}$ < 1 mm) **OK**

Check Deflection

Governing Δ = G + φsQ

Δ = **4.1 mm** L/Δ= 690 **OK** *L/Δ>400 ok & 12mm*

Check Bending Strength

M^*_a =	**11.38**	**kN.m**	**1.2G+1.5Q**	
$M^*_{b\ (Uplift)}$ =	**0.00**	**kN.m**	**1.2G+1.5Qpt**	
ϕ=	0.8			*NZS 3603: 1993*
k_1 =	0.8			
$k_{1\ (uplift)}$ =	0.8			*Table 2.4 NZS 3603:1993*
K_4=	1			*Table 2.7 NZS 3603:1993*
K_5=	1			*Eq 2.5 NZS 3603:1993*
k_{24}=	1.00			
determine K_8	L_{ay} =	400 mm		
	s =	10	k_{8a} = 1.00033	
	$L_{ay\ (uplift)}$ =	1200 mm		*Spacing of compression restraints*
	s =	18	k_{8b} = 0.78762	*Eq 3.5 NZS 3603:1993*
				Eq 2.10 NZS 3603:1993
ϕMn_a (Compression edge on top)	$\phi x K_1 x K_4 x K_5 x K_{8a} x f_b x Z_x$ =		**15.34 kN.m**	*Eq 3.4*
ϕMn_b (uplift)	$\phi x K_1 x K_4 x K_5 x K_{8a} x f_b x Z_x$ =		**12.08 kN.m**	*Eq 3.4*
$M^*_a < \phi Mna$ =	0.74	**OK**	M*/ϕMn<1 ok	
$M^*_b < \phi Mnb$ =	0.00	**OK**	M*/ϕMn<1 ok	

Reactions

R_1 = 16.25 kN **1.2G+1.5Q** No Uplift

R_2 = 16.25 kN **1.2G+1.5Q** No Uplift

Balustrade Design (Side Mounted)

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V1.4

Environment Condition Dry

Assumptions:
1. Simple baluster arrangement
2. The top rail is simply supported
3. Balustrade loads will be spread to multiple joists
4. The design is based on DBH 'Guidance On Barrier Design' Nov 2011

Loading type S5
Type of occupancy: B,E Offices and work areas not included elsewhere including storage areas
Specific Uses: Areas not susceptible to overcrowding in office and institutional buildings also industrial storage buildings

Height of Barrier	H_1=	1.1	m	fig 1
Height of Rail	H_2=	N/A		fig 2
Applied height for live load	Ha=	1.1	m	
Baluster spacing	S=	1	m	
Boundary Joist height	D=	290	mm	fig 4
Boundary joist width	B=	90	mm	fig 4
Load eccentricity	x1=	0	mm	fig 2
Baluster eccentricity	x2=	0	mm	fig 3
Bolt Spacing	y=	150	mm	fig 3
Top of floor to first bolt	y1=	70	mm	fig 3

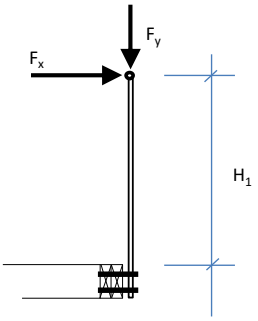

Figure 1

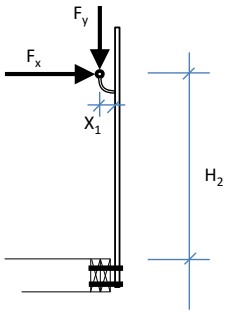

Figure 2

Rail Check

$Q_{Horizontal}$	0.75 kN/m	ULS 1.5Q		SLS 0.7Q	
$Q_{Vertical}$	0.75 kN/m	M*x	0.23 kN.m	$\Delta_x \bullet EI$=	0.00875
$Q_{Inward,Outward,Downward}$	0.6 kN	M*y	0.23 kN.m	$\Delta_y \bullet EI$=	0.00875

Try	90x45 SG8	ϕMnx	0.68 kN.m		> M*	**OK**
		ϕMny	0.34 kN.m		> M*	**OK**
		Δx=	0.57 mm	L/Δ_x= 1750	L/Δ_x>240	**OK**
		Δy=	2.29 mm	L/Δ_y= 437	L/Δ_y>400	**OK**

Baluster Check

UDL 1.5Q

F_x	1.13 kN (per balustrade)			SLS 0.7Q	
F_y	1.13 kN (per balustrade)			F_x=	0.53 kN (per Balustrade)
M*	1.32 kN.m (per Balustrade)			$\Delta_x \bullet EI$=	0.31622

Try	90x90 SG8	ϕMnx	1.36 kN.m		> M*	**OK**
		Δx=	10.3 mm	H/Δ_x= 113	H/Δ_x>60	**OK**

Bolt Demand Loads

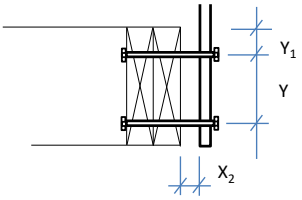

Figure 3

Reaction load top bolt N^*_{top} 9.90 kN
Reaction load bottom bolt N^*_{Bot} 8.78 kN

Framing Check (Perpendicular support Joist)

Moment from horizontal load	M*	1.40 kN.m	(per m)
Moment from vertical eccentricity	M^*_y	0.10 kN.m	(per m)
	V*	0.51 kN	(per joist)

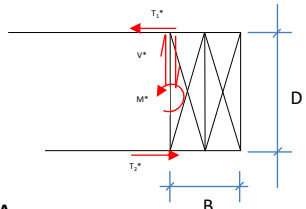

Figure 4

Try joist spacing 450 mm
Try joist type

ϕMnx	#N/A	kN.m	#N/A	**#N/A**

#N/A

Strap Demand Loads

T_1*	2.43 kN	(per joist)
T_2*	1.92 kN	(per joist)

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Reference:	A24362	By:	EN
Date:	18/03/25	Sketch:	

SECTION 4:
Foundation Design

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Dowel design

1.5 x 3.6kN (Gym design point load)

CANZAC DESIGN LOAD TRANSFER WITH SPEED PLATE DOWELS

IMPORTANT NOTE: Work from top to bottom in EVERY iteration. CHANGE numbers in YELLOW BOXES ONLY.

Input maximum design load (P_{ult} = 1.5P)	5.4	kN	(wheel load or racking leg load - ultimate limit state)
Input f'_c (MPa)	30	MPa	
Input slab thickness (D)	150	mm	
Input modulus of subgrade reaction (k)	40	kPa/mm	**(See Sheet 2 for tables)**

Calculated f_{cm}	38	MPa		
Poisson's ratio (v)	0.2			**NOTE: PRINT THE ABOVE PAGE IN A4 LANDSCAPE.**
Calculated short term E for concrete (E_{cm})	31161	MPa		
Calculated radius of relative stiffness	691	mm		
Calculated effective width of slab	1244	mm	}	All dowels within this width of slab are deemed to contribute equally to load transfer
Input effective width to be used in calculation	1000	mm	}	This will usually be the calculated width from the line above BUT use a lesser width
				when appropriate to account for point loads at close spacing.

Input max anticipated joint width (x)	20	mm		How much do you expect the joint to open in the life of the slab?
				Account for long term shrinkage and thermal effects but also consider restraint
Input assumed dowel spacing	1000	mm		If spacing less than slab thickness (D) plus 100mm, then bursting capacity will be
				affected because shear perimeters will overlap - **check manually if this is the case**
Calculated number of effective dowels	1.00		}	Effective width of slab divided by dowel spacing
Input adopted number of effective dowels	1		}	Round up or round down - designer's perogative but generally round down

Max design load per dowel 5.4 kN ultimate limit state

	100x6mm Speed Plate Dowels			100x10mm Speed Plate Dowels		
Input f_y for dowel steel (steel grade)	250	MPa	(250 min. Check if 300 available)	250	MPa	(250 min. Check if 300 available)
Dowel capacity in shear (P_{sh})	**78.3**	kN	(Must be **greater than** 5.4)	**130.4**	kN	(Must be **greater than** 5.4)
Dowel capacity in bending (P_{bend})	**19.6**	kN	(Must be **greater than** 5.4)	**54.3**	kN	(Must be **greater than** 5.4)
Factor for combined bending and shear	**0.35**		(Must be **less than or =** 1.4)	**0.14**		(Must be **less than or** 1.4)
Dowel capacity in bearing (P_{bear})	**60**	kN	(Must be **greater than** 5.4)	**100.0**	kN	(Must be **greater than** 5.4)
Dowel capacity in bursting	**32**	kN	(Must be **greater than** 5.4)	**37**	kN	(Must be **greater than** 5.4)

Canzac Phone 03-343-4254 Fax 03-343-4237. Please call if require further information.

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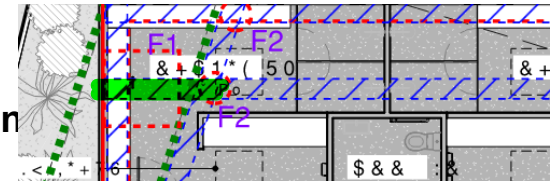
Check bridging beam

Concrete Beam Design



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Project:		Page:
Reference:	Date: 20/03/25	By:

V 1.4

Loads

	trib width (m)	load (kPa)	W kN/m	load (kN)
G				
Roof			0.0	
Floor			0.0	
Wall			0.0	
Self			7.2	
Q				
Roof	0		0	
Floor	0		0	
S (snow)				
Roof	0		0	
W (wind)				
Roof	0		0	

Assumptions
1. *Loads distributed evenly along beam*
2. *Beam is simply supported*
3. *Point loads act at midspan*
4. *Governing SLS determined from deflection*
5. *Governing ULS determined by largest M**
6. *Member is a beam or one-way slab with ribs*
7. *Live loads are considered to be from* Residential floors
8. Serviceably not considered with SED demands

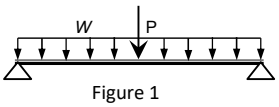


Figure 1

SED demands *Table 3.1 AS/NZS 1170.1:2002*
Moment 102 kNm
Shear 51 kN *AS/NZS 1170.3*

Cfig = *AS/NZS 1170.2*

Load Cases *In accordance with AS/NZS 1170.0: 2002*

Serviceability	Q Distributed (w)			Q Point (P)		
G+ ψ_lQ =	7.2 kN/m	0.0 kN	●●	7.2 kN/m	0.0 kN	●●
G + ψ_sQ =	7.2 kN/m	0.0 kN	●●	7.2 kN/m	0.0 kN	●●
Ws =	0.0 kN/m	0.0 kN	●●			

	w	p
ψ_s =	0.7	1
ψ_l =	0.4	0.4
ψ_c =	0.4	0.4

Table 4.1 AS/NZS 1170.0:2002

Ultimate				
1.2G+1.5Q =	8.6 kN/m	0.0 kN	8.6 kN/m	0.0 kN
1.2G +S+ψ_cQ =	8.6 kN/m	0.0 kN	8.6 kN/m	0.0 kN
0.9G + W =	6.5 kN/m	0.0 kN		
1.35G =	9.7 kN/m	0.0 kN		

Governs = ●●

Beam length L = 6 m

M*↑= 0.00 **kN.m** Ms↑ = 0.00 **kN.m**
M*↓= 102.00 **kN.m** Ms↓ = 32.40 **kN.m**
V*= 51.00 **kN**

Beam Properties

beam width	b =	400	mm
beam height	h =	750	mm
Shear reinforcing (no. of links & size)		2 No. R10	
Shear reo spacing	s =	250	mm
Steel top		3 No. H16	
Steel bottom		3 No. H16	
	d =	682	mm
	d' =	68	mm
Cover top		50	mm
Cover bottom		50	mm

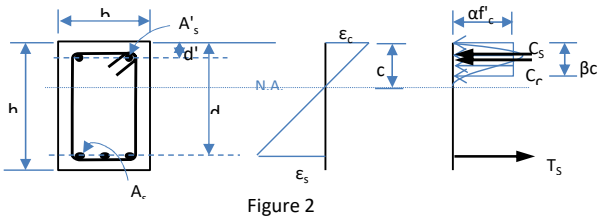


Figure 2

A's 603 mm^2 α 0.85 Eq. 7-2
As 603 mm^2 β 0.85 Eq. 7-3

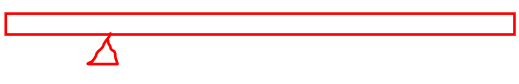
North end portal takes half the design load

Material Properties

Strength Reduction	ϕ_M =	0.85	
Strength Reduction	ϕ_V =	0.75	
Max Aggregate Size	d_a =	13	mm
Max Concrete Strain	ε_c =	0.003	
Modulus of Elasticity	E_s =	200	GPa

	f'c	25	MPa
Longitudinal	fy	500	MPa
Longitudinal (-ve)	fy	500	MPa
Shear	fyt	300	MPa

1.2G, 1.5Q from PF1
+3.1m return beam (6.5kN/m x 6.6m/2)
= 67kN/2 +21.5kN = 55kN
M* = 55kN x 2m = 110kNm



Concrete Beam Design

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Minimum Reinforcement Requirements

Does the flexural strength of the beam contribute to the lateral strength of the structure: yes

Min. Area of Tension Reinf.	$A_{s,min}$ =	764	mm²	= max {b × d × √f'c / (4 × fy), 1.4 × b × d / fy}	
Reduced Area of Tension Reinf.	$A_{s,min\ reduced}$ =	481	mm²	Reduced min. area based on min. required for strength x 1.33 (ref. 9.3.8.2.3)	
	$A'_{s,min}$ =	764	mm²	A_s < $A_{s,min}$	**NOT OK**
	$A'_{s,min\ reduced}$ =	0	mm²	A'_s < $A_{s,min}$	**NOT OK**

Check Concrete Failure

	a =	35	mm	$a = \beta c = \frac{A_s f_y}{\alpha f'_c b}$
Equiv. Stress Block Depth Limit	a_{max} =	237	mm²	= 0.75 × εc × Es × β1 × d / (εc × Es + fy)
	a_{max} > a			**OK, steel yields before concrete fails in compression.**

Check Flexural Failure

Section Flexural Strength	ϕMn =	170.29		= ϕM × As × fy (d - a / 2)
	ϕM Mn > M*			**OK, section flexural strength sufficient.**

(M) Utilisation = 60%

Shear

Effective Shear Area	A_{cv} =	2.73E+05	mm²	= b × d
Nominal Shear Stress	v_n =	0.19	MPa	= V* / Acv, ≤ 0.2 fc' or 8 Mpa =
Reinf. Ratio	p_w =	2.21E-03		= As / Acv
Concrete Shear Resistance	v_b =	0.461	MPa	= (0.07 + 10 × pw) √f'c, 0.08 √f'c ≤ vb ≤ 0.2 √f'c, f'c ≤ 50 MPa
Aggregate Size Factor	k_a =	0.895		= 1 - (20 - da) × 0.015 ≥ 0.85
Beam Depth factor	k_d =	1.000		= 1.0 when Av ≥ Av,min or d ≤ 400 mm, otherwise (400 / d)^0.25
Concrete Shear Resistance	v_c =	0.412	MPa	= kd × ka × vb when d ≥ 400 mm
				= max {kd × ka × vb, 0.17 × ka × √f'c} when d ≤ 200 mm
				= by interpolation otherwise
Nom. Shear Strength of Concrete	V_c =	112.4	kN	= vc × Acv
				Minimum shear reinforcement is required. Exceptions apply (ref. 9.3.9.4.13).
Area of Shear Reinf. Provided	A_v =	157	mm²	= nv × π × dbv² / 4
Min. Area of Shear Reinf.	$A_{v,min}$ =	104	mm²	= (1/16) x √f'c × (b × s) / fyt
A_v > $A_{v,min}$				**OK, reinforcement provided in excess of minimum code requirements.**

Av min / Av prov = 66%

Nom. Shear Strength of Reinf.	V_s =	128.6	kN	= Av × fyt × d / s
Section Shear Strength	ϕV Vn =	180.8	kN	= ϕV × (Vc + Vs)
ϕV Vn > V*				**OK, section shear strength sufficient.**

(V) Utilisation = 28%

Deflection

Service Moment	M_s =	32.4	**kN.m**	
Gross Section Modulus	Z_t =	3.75E+07	mm³	= b × h² / 6
Max. Service Moment	$M_{s,max}$ =	187.5	**kN.m**	= √f'c × Zt
Ms < $M_{s,max}$			**OK, service moment within limits.**	CL 2.4.3
Min. Beam Height			h_{min} = 300 mm	
h > h_{min}			**OK, deflection within limits.**	CL 2.4.3

Concrete Young Modulus	Ec =	23500	MPa	[=3320*SQRT(fc)+6900]
Modulus of rupture	fr =	3.00	MPa	[=0.6*SQRT(fc)]
Gross moment of inertia	Ig =	1.41E+10	mm⁴	[=b*h^3/12]
Neutral axis position in cracked section	ycs =	4.36	mm	[=1/b*(SQRT((Es/Ec*(As+Asp))^2+2*b*Es/Ec*(Asp*dp+As*d))-Es/Ec*(Asp+As))
Cracked moment of inertia	Icr =	2.39E+06	mm⁴	[=As*(d-ycs)^2*Es/Ec+Asp*(ycs-dp)^2*Es/Ec+ycs^3*b/4]
Cracking moment	Mcr =	112.50	kNm	[=2*fr*Ig/h*10^-6]
Effective moment of inertia	Ie =	1.41E+10	mm⁴	[=MIN(Ig,(Mcr/Ma)^3*Ig+(1-(Mcr/Ma)^3)*Icr)]
Additional long term deflection factor	Kcp =	1.82		[=(2/(1+50*p')]

Deflection Wind			
Deflection short term	$\delta_{Short\ term}$	0.37	mm
Deflection long term	$\delta_{long\ term}$	0.67	mm

Check F2 pile directly under portal frame along western bridging line

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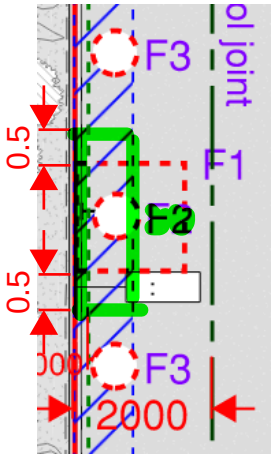
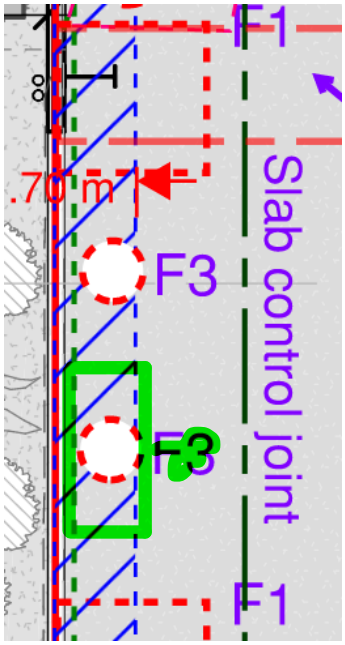
F2 (under portal pad + 1m of total external beam)
(17.5kN/m x1m + 67kN) / 0.283 = 298kPa -> need 600kPa bearing



F3 Intermediate piles supporting external beam only
17.5kN/m x (6.4m - 1.0m)/2 (trib)
=47kN

47kN / 0.159m^2 = 297kPa (GUBC 600kPa required)



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SECTION 5:
Post-fire stability design

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Check M1 (200x6 SHS) to cantilever for fire

M1 effective trib load: 1.5m + G3 load

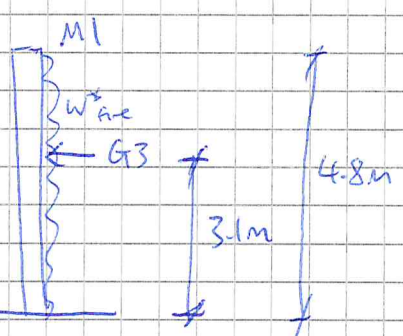
G3 = (5.2m/2) x 0.5kPa x 9.4m/2 = 6kN

w^*_{fire} = 1.5m x 0.5kPa = 0.75kN/m

M^* = 0.75kN/m x 4.8m x 4.8m/2 + 6 x 3.1m

= 27 kNm

ϕM_{bx} (1.5x4.8m eff. length) = 63 kNm > 27 kNm OK



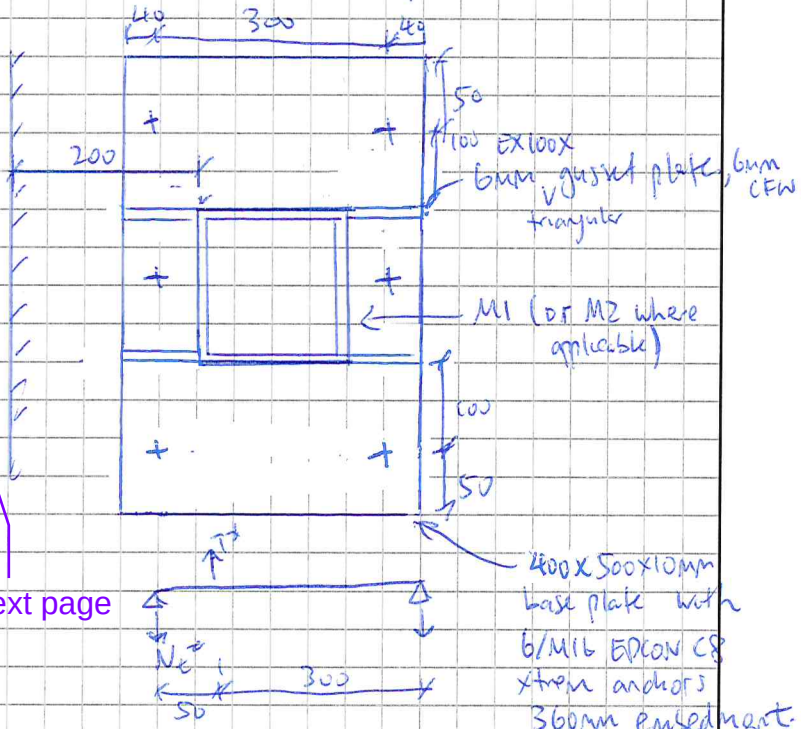
Design base forces: $\Rightarrow V^*$ = 9.6kN, M^* = 27 kNm

T^* = 27 kNm / 0.3m = 90 kN

N_c^* = 90kN x 300/350 = 77 kN

= 26kN per anchor

Assume other 3 anchors not in uplift can take 9.6kN/3 = 3.2kN shear each - OK.



See next page

Check PFI to cantilever:

H = 4m

w^* = 1.6m x 0.5kPa = 0.8kN/m

M^* = 0.8kN/m x 4m x 4m/2 = 6.4kNm

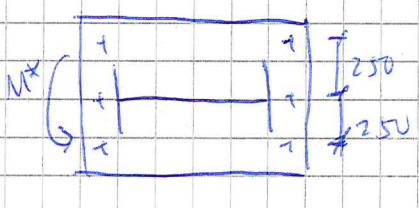
ϕM_y = 54.8 kNm (410UB60) > 6.4kNm - OK

Anchor (Hilti):

Approx 6.4kNm / 0.25m / 2 anchors

= 13kN $\Rightarrow$ M16 w/ 350mm embedment

$\therefore$ OK

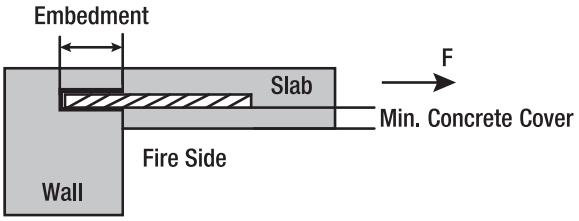


EPCON™ C8 Xtrem™

FIRE RATED CHEMICAL ANCHOR

Fire Rated Anchoring Systems - KDC - Approved Building Consent Document - BC250144_SP_ISSUED - Pg 177 of 467 - 11/07/2025 - vsingh

Reinforcing Bar Anchored with EPCON™ C8 Xtrem™



Design Case 3 — Fire resistance duration = 90 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 90 minutes (kN)														Rebar Max. Load (kN) in case of fire
10	12	25	1.7	5.4	-	11.1	-	13.4									25.3
12	16	25	2.1	5.5	8.6	13.4	-	-	17.0								36.4
16	20	25		5.8	8.9	17.8	-	-	22.7	25.9	27.1						64.8
20	25	25		13.4	18.2	22.3	25.3	-	28.4	-	-	34.4					101.2
24	30	25					30.6	-	36.7	-	-	-	-	55.7			145.8
25	30	25					30.6	-	36.7	-	-	-	-	55.7			158.1
32	40	32								51.8	-	55.0	-	71.2	81.1		259
40	50	40											80.9	-	-	112.3	404.7
Embedment (mm)			120	160	180	220	250	265	290**	320	335	340	400	440	500	555	

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

** Note: Values for Rebar Sizes 12, 16 and 20 are based on Embedment = 280 mm

Design Case 4 — Fire resistance duration = 120 minutes

Ensure 360mm embedment of anchor

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 120 minutes (kN)													Rebar Max. Load (kN) in case of fire
10	12	35	1.2	3.6	12.1	-	14.7									25.3
12	16	35	1.7	3.5	14.6	-	-	18.2								36.4
16	20	35		4.8	19.4	-	-	24.3	25.9	28.7						64.8
20	25	35		10.7	24.3	25.3	-	-	-	-	36.4					101.2
24	30	35				24.5	36.7	-	-	-	-	-	55.7	58.2		145.8
25	30	35				24.5	36.7	-	-	-	-	-	55.7	58.2		158.1
32	40	35							51.8	-	58.2	-	71.2	-	81.1	259
40	50	40										80.9	87.0	-	-	122.4	404.7
Embedment (mm)			120	160	240	250	290	300	320	355	360	400	440**	460	500	605	

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

** Note: Values for Rebar Size 40 are based on Embedment = 430 mm

Design method for resistance to fire according to Eurocode 2: Fire proof using design resistance: $R_{d,fi} \leq E_{d,fi}$

$R_{d,fi}$ Design resistance in the fire situation

$E_{d,fi}$ Design effect of actions in the fire situation. This value could be calculated from the calculation at normal temperature:

$$E_{d,fi} = \eta_{fi} \times F_{Rdu}$$

F_{Rdu} Design ultimate limit load at normal temperature for one rebar sealing at the anchorage depth (mm)

η_{fi} Reduction factor for design load level in the fire situation η_{fi} is equal to 0.7.

Results of Analysis by ColdSteel/4600, Version 2.2.14, 25 April 2018
==========
14/4/2025 5:37:13 pm

Check studs to span 4.8m in fire load case

Licence No. CS22.210

Check ID: Box Beam
Section Class: Lipped Channel
Section Designation: 92x50x1.15BMT
Material Grade: G450

Governing Capacity/Action Strength Check (>= 1.0 is SAFE)

Minimum Capacity/Action Ratio (ØRu/S*) = 1.912 (SAFE)
Member capacity (lateral buckling) in bending about x-axis (Mbx)
(AS NZS 4600:2005, Clause 3.3.3.2)

Units

Length: Metres
Force: KiloNewtons
Mass: Kilograms

Input Parameters

- Member and section capacity checks conducted.
- Design actions come first-order elastic structural analysis.
- Thin-walled theory is used for calculation of cross-section properties.
- Rounded corners are used for calculation of torsional section properties.
- Shear centre and warping constant are calculated on-the-fly.
- Principal (x-y) axes are used.
- Phi-factors from AS/NZS 4600:2005 are used in design calculations.
- Mox calculated using Clause 3.3.3.2 for bending strength check.
- Moy calculated using Clause 3.3.3.2 for bending strength check.
- Axial compression force (N*) is assumed to pass though full section centroid
- Noc calculated using the given effective lengths (Lex, Ley, Lez)
- The possibility of torsional or torsional-flexural buckling in compression is considered
- Distortional buckling strength in compression is considered if relevant (Clause 3.4.6)
- Distortional buckling stress in compression (if relevant) is calculated using simple analytical model
- Distortional buckling stress in bending about x-axis (if relevant) is calculated using simple analytical model
- Distortional buckling stress in bending about y-axis (if relevant) is calculated using simple analytical model

2E008 kPa	= E, Elastic modulus
8E007 kPa	= G, Shear modulus
4.5E005 kPa	= fy, Yield stress (nominal)
4.8E005 kPa	= fu, Ultimate tensile strength (nominal)
4.5E005 kPa	= fy, Yield stress (design)
4.8E005 kPa	= fu, Ultimate tensile strength (design)
7850 kg/m3	= rho, Mass density
4.8 m	= Lx, Actual member length for bending aboutx-axis
4.8 m	= Ly, Actual member length for bending abouty-axis
4.8 m	= Lebx, Beam effective length for buckling about x-axis
2.4 m	= Leby, Beam effective length for buckling about y-axis
2.4 m	= Lebz, Beam effective length for buckling about z-axis
4.8 m	= Lecx, Column effective length for buckling about x-axis
2.4 m	= Lecy, Column effective length for buckling about y-axis
2.4 m	= Lecz, Column effective length for buckling about z-axis
1	= kt, Tension factor
0 m	= Brem, Equivalent removed width
Fastened	= Bearing Support Condition
One-Flange End	= Bearing Load Case
0.15 m	= Lb, Bearing length
1.66	= Cbx, coefficient for calculation of buckling moment Mox
1	= 1/CTFy, coefficient for calculation of buckling moment Moy
1	= Cmx, Moment modification factor (combined tension/compression & bending)
1	= Cmy, Moment modification factor (combined tension/compression & bending)
0 kN	= N*, Design axial force (tension positive)
0.6 kNm	= Mx*, Design bending moment about x-axis
0 kNm	= My*, Design bending moment about y-axis
0.5 kN	= Vx*, Design shear force in direction of x-axis
0 kN	= Vy*, Design shear force in direction of y-axis
0 kN	= Rx*, Design bearing force in direction of x-axis
0 kN	= Ry*, Design bearing force in direction of y-axis

Capacity/Action Ratios for all Limit States

[-]	= (ØRu/S*)	(Nty) (Yielding in tension, Clause 3.2.1, Eq. 3.2.2(1))
[-]	= (ØRu/S*)	(Ntu) (Fracture in tension, Clause 3.2.1, Eq. 3.2.2(2))
3.4497	= (ØRu/S*)	(Msx) (Section capacity in bending about x-axis, Clause 3.3.2)
[-]	= (ØRu/S*)	(Msy) (Section capacity in bending about y-axis, Clause 3.3.2)
1.9121	= (ØRu/S*)	(Mblx) (Lateral buckling about x-axis, Clause 3.3.3.2)
[-]	= (ØRu/S*)	(Mbly) (Lateral buckling about y-axis, Clause 3.3.3.2)
2.7206	= (ØRu/S*)	(Mbdx) (Distortional buckling about x-axis, Clause 3.3.3.3)
[-]	= (ØRu/S*)	(Mbdy) (Distortional buckling about y-axis, Clause 3.3.3.3)
44.95	= (ØRu/S*)	(Vvx) (Shear in x-axis direction, Clause 3.3.4)
[-]	= (ØRu/S*)	(Vvy) (Shear in y-axis direction, Clause 3.3.4)
44.95	= (ØRu/S*)	(Vvx+Msy) (Combined shear and bending, Clause 3.3.5)
3.4497	= (ØRu/S*)	(Vvy+Msx) (Combined shear and bending, Clause 3.3.5)
[-]	= (ØRu/S*)	(Rbx) (Bearing in x-axis direction, Clause 3.3.6)
[-]	= (ØRu/S*)	(Rby) (Bearing in y-axis direction, Clause 3.3.6)
[-]	= (ØRu/S*)	(Rbx+Msy) (Bearing and bending, Clause 3.3.7)
3.4497	= (ØRu/S*)	(Rby+Msx) (Bearing and bending, Clause 3.3.7)
[-]	= (ØRu/S*)	(Ns) (Section capacity in compression, Clause 3.4.1(a))
[-]	= (ØRu/S*)	(Ncft) (Flexural or flexural-torsional buckling capacity in compression, Clause 3.4.1)
[-]	= (ØRu/S*)	(Ncd) (Distortional buckling capacity in compression, Clause 3.4.6)

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```
       1.9121        = (ØRu/S*)(Mx+My+Nc, Combined compression and bending, Clause 3.5.1(a))
       1.9121        = (ØRu/S*)(Mx+My+Nc, Combined compression and bending, Clause 3.5.1(b))
       1.9121        = (ØRu/S*)(Mx+My+Nc, Combined compression and bending, Clause 3.5.1, N*/phiNc <= 0.15)
       1.9121        = (ØRu/S*)(Mx+My+Nt, Combined tension and bending, Clause 3.5.2(a))
       4.7675        = (ØRu/S*)(Mx+My+Nt, Combined tension and bending, Clause 3.5.2(b))

Design Capacities
-----------------
       89.624 kN     = ØNty        (Ø = 0.90)
       81.259 kN     = ØNtu        (Ø = 0.90)
       2.0698 kNm    = ØMsx+       (Ø = 0.95)
       2.0698 kNm    = ØMsx-       (Ø = 0.95)
      0.76199 kNm    = ØMsy+       (Ø = 0.90)
      0.75837 kNm    = ØMsy-       (Ø = 0.95)
       1.1473 kNm    = ØMbx+       (Ø = 0.90)
       1.1473 kNm    = ØMbx-       (Ø = 0.90)
      0.29524 kNm    = ØMby+       (Ø = 0.90)
      0.75837 kNm    = ØMby-       (Ø = 0.95)
       2.8605 kNm    = ØMsfx+      (Ø = 0.95)
       2.8605 kNm    = ØMsfx-      (Ø = 0.95)
       1.7486 kNm    = ØMsfy+      (Ø = 0.90)
      0.80433 kNm    = ØMsfy-      (Ø = 0.95)
       22.475 kN     = ØVvx        (Ø = 0.90)
         16.6 kN     = ØVvy        (Ø = 0.90)
      -     ] kN     = ØRbx        (Ø = 0.85)
       5.9677 kN     = ØRby        (Ø = 0.85)
       47.991 kN     = ØNs         (Ø = 0.85)
        8.025 kN     = ØNcft       (Ø = 0.85)
       36.548 kN     = ØNcd        (Ø = 0.85)
       1.6323 kNm    = ØMbdx+      (Ø = 0.90)
       1.6323 kNm    = ØMbdx-      (Ø = 0.90)
      0.44877 kNm    = ØMbdy+      (Ø = 0.90)
      -     ] kNm    = ØMbdy-      (Ø = 0.90)

Cross-Sectional Dimensions
--------------------------
      0.00115 m      = Thickness (t)
        0.092 m      = Overall depth (D)
         0.05 m      = Overall flange width (B)
        0.005 m      = Stiffener length (L)
        0.005 m      = Internal corner radius (R)

Properties of Full Section
--------------------------
       0.192429 m      = Wf, Feed width
      0.000221293 m2   = A (full section)
      0.000221293 m2   = A (net section)
       0.0146006 m     = xc, x-ordinate of centroid (full section)
               0 m     = yc, y-ordinate of centroid (full section)
       0.0359431 m     = xo, x-ordinate of shear centre (referred to principal axes)
               0 m     = yo, y-ordinate of shear centre (referred to principal axes)
      3.7795E-007 m4   = Ix (full section)
      6.5209E-008 m4   = Iy (full section)
               0 m4    = Ixy (full section)
               0 deg   = Inclination of principal axes (full section)
       0.0372947 m     = rx (full section), radius of gyration
        0.017207 m     = ry (full section), radius of gyration
       0.0151756 m     = Extreme negative x-ordinate (full section)
       0.0348244 m     = Extreme positive x-ordinate (full section)
          -0.046 m     = Extreme negative y-ordinate (full section)
           0.046 m     = Extreme positive y-ordinate (full section)
      6.9119E-006 m3   = Zx+, Full section modulus (yield at extreme positive y-ordinate)
      6.9119E-006 m3   = Zx-, Full section modulus (yield at extreme negative y-ordinate)
      1.8146E-006 m3   = Zy+, Full section modulus (yield at extreme positive x-ordinate)
      1.1751E-006 m3   = Zy-, Full section modulus (yield at extreme negative x-ordinate)
      9.5534E-011 m4   = J, torsion constant (full section)
       0.0545575 m     = ro1 (full section)
               0 m     = betax, monosymmetry parameter (referred to principal axes)
        0.114488 m     = betay, monosymmetry parameter (referred to principal axes)
      1.7286E-011 m6   = Iw, warping constant (full section)
         1.73715 kg/m  = Mass per unit length
        0.387158 m     = Profile distance
        0.222869 m2/kg = Profile surface area (Area/Mass)

Properties of Effective Section
-------------------------------
      .00012547 m2     = Ae(fy) Effective area for uniform stress fy
      .00022129 m2     = Ae(fn) Effective area for uniform stress fn
      2.5048E-007 m4   = Iex+, effective 2nd moment of area (x+ bending, extreme fibre at yield)
      2.5048E-007 m4   = Iex-, effective 2nd moment of area (x- bending, extreme fibre at yield)
      6.5521E-008 m4   = Iey+, effective 2nd moment of area (y+ bending, extreme fibre at yield)
      .722E-008 m4     = Iey-, effective 2nd moment of area (y- bending, extreme fibre at yield)
      4.8418E-006 m3   = Zex+, effective section modulus at yield (x+ bending)
      4.8418E-006 m3   = Zex-, effective section modulus at yield (x- bending)
     1.8815E-006 m3    = Zey+, effective section modulus at yield (y+ bending)
      1.774E-006 m3    = Zey-, effective section modulus at yield (y- bending)

Miscellaneous Parameters
------------------------
     1.1916E005 kPa    = fox, Elastic buckling stress for buckling about principal x-axis
     1.0147E005 kPa    = foy, Elastic buckling stress for buckling about principal y-axis
          63214 kPa    = foz, Elastic buckling stress for torsional buckling about z-axis
          48647 kPa    = foc, Elastic buckling stress
          42664 kPa    = fn, Inelastic buckling stress
          26.37 kN     = Nox, Elastic flexural buckling load about x-axis (used for moment amplification)
```

M* = 0.5kPa x 0.4m crs x 4.8^2 / 8 = 0.6kNm - OK

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```
      22.454 kN      = Noy, Elastic flexural buckling load about y-axis (used for moment amplification)
       1.6051 kNm    = Mox+, Elastic lateral buckling moment for positive bending about x-axis
       1.6051 kNm    = Mox-, Elastic lateral buckling moment for negative bending about x-axis
      0.32804 kNm    = Moy+, Elastic lateral buckling moment for positive bending about y-axis
       3.3471 kNm    = Moy-, Elastic lateral buckling moment for negative bending about y-axis
   -0.0022974 m      = x-ordinate of C(full)->C(effective) (fy)
            0 m      = y-ordinate of C(full)->C(effective) (fy)
            0 m      = x-ordinate of C(full)->C(effective) (fn)
            0 m      = y-ordinate of C(full)->C(effective) (fn)
[     -      ] m4     = Ie_Mx*, Effective second moment of area for design Mx*
[     -      ] m3     = Ze_Mx*, Effective section modulus for design Mx*
[     -      ] m4     = Ie_My*, Effective second moment of area for design My*
[     -      ] m3     = Ze_My*, Effective section modulus for design My*
  .5245E005 kPa     = fodc, Distortional buckling stress in pure compression
  .2989E005 kPa     = fodx+, Distortional buckling stress in bending
  .2989E005 kPa     = fodx-, Distortional buckling stress in bending
  .7368E005 kPa     = fody+, Distortional buckling stress in bending
[     -      ] kPa     = fody-, Distortional buckling stress in bending
```

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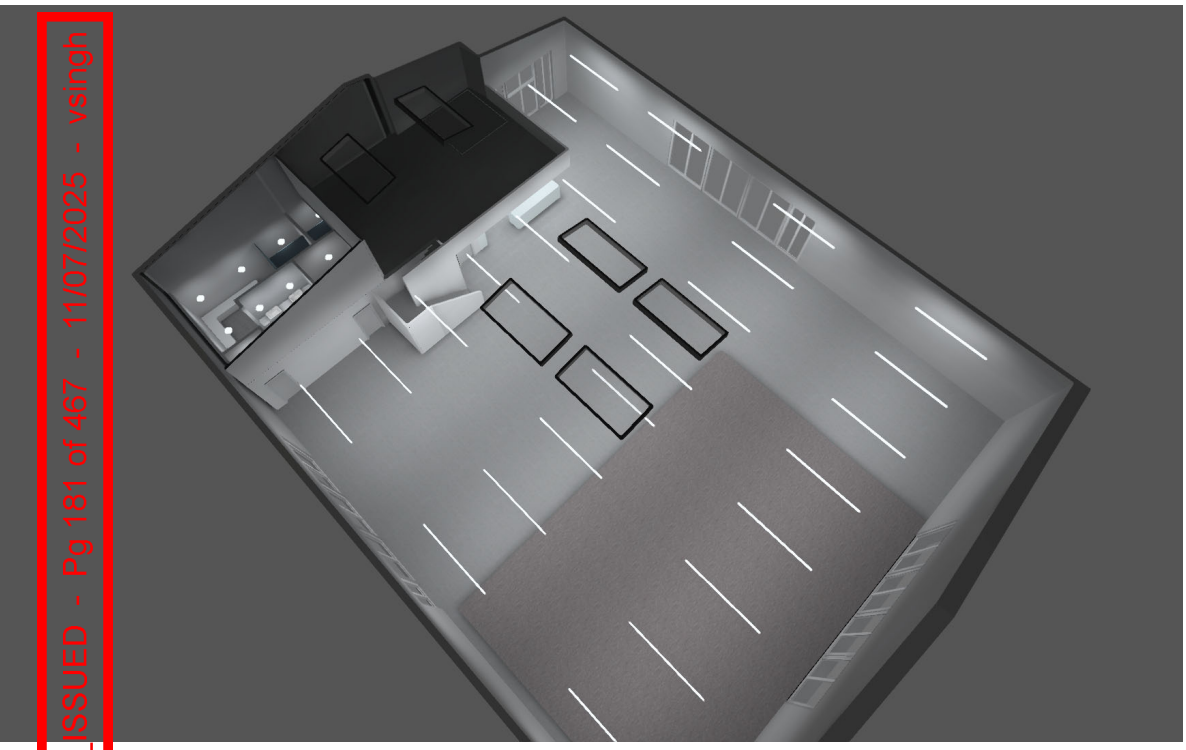

7 EAGLE RAY ROAD

GYM LUX STUDY

Object
7 EAGLE RAY ROAD
MANGAWHAI

Created with DIALux

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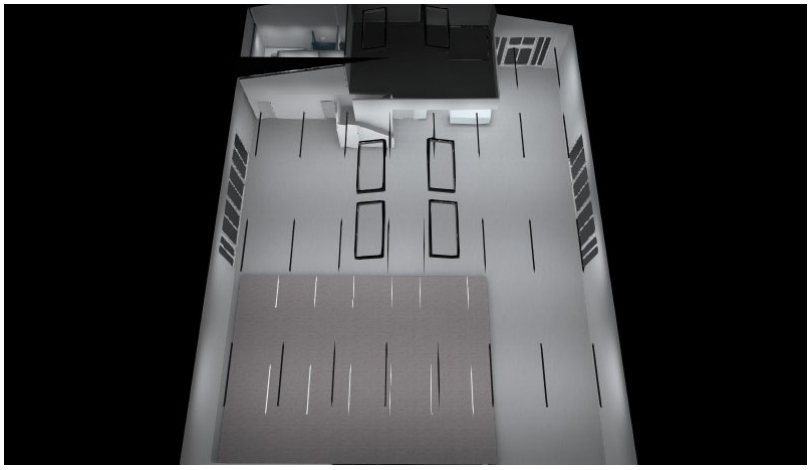
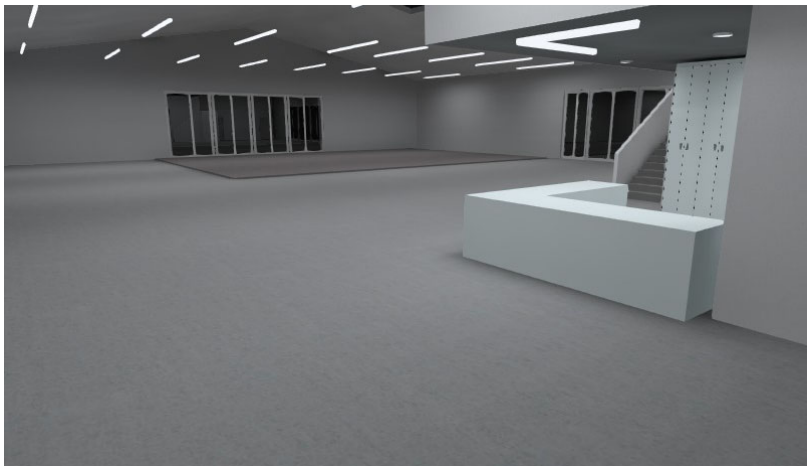
Images

Storey 1



Storey 1



Storey 1

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Luminaire list

Φ_{total}	P_{total}	Luminous efficacy
307778 lm	2881.8 W	106.8 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
54	NM LIGHTING		PRTL-66TLBK 42W 3000K	43.2 W	4472 lm	103.5 lm/W
10	FHAL	Fixed Downlights	FHALR-767 WH 4K Ra90 21W	20.5 W	2147 lm	104.8 lm/W
20	FHAL	Surface Mount Buttons	FHAL-291 W34A 4K Ra90 18W	17.2 W	2241 lm	130.3 lm/W

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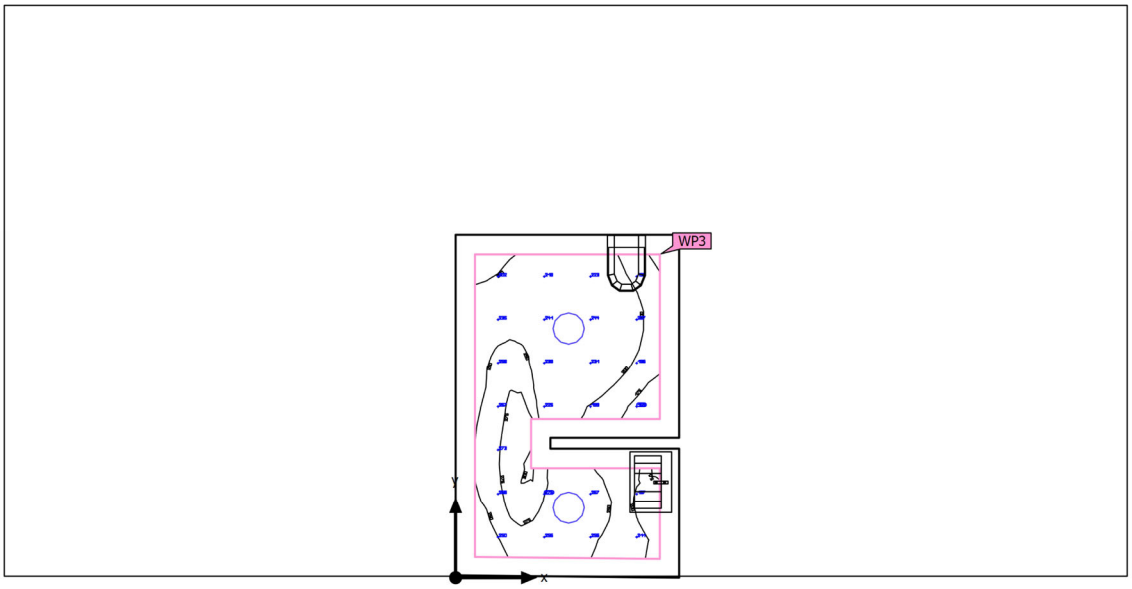
Building 1 · Storey 1 · ACC WC (Light scene 1)

Summary



Ground area	6.92 m²	Clearance height	2.600 m
Reflection factors	Ceiling: 46.6 %, Walls: 60.3 %, Floor: 34.2 %	Mounting height	2.600 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.185 m

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Building 1 · Storey 1 · ACC WC (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	234 lx	≥ 200 lx	✓	WP3
	U_o (g_1)	0.67	≥ 0.40	✓	WP3
	Lighting power density	7.50 W/m²	–		
		3.21 W/m²/100 lx	–		
Glare valuation(1)	$R_{UG, max}$	22	≤ 25	✓	
Energy estimation(2)	Consumption	[0 - 28] kWh/a	max. 50 kWh/a	✓	
Space	Lighting power density	4.97 W/m²	–		
		2.13 W/m²/100 lx	–		

(1) Based on a rectangular space of 3.298 m x 2.144 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
2	FHAL	Surface Mount Buttons	FHAL-291 W34A 4K Ra90 18W	22	17.2 W	2241 lm	130.3 lm/W

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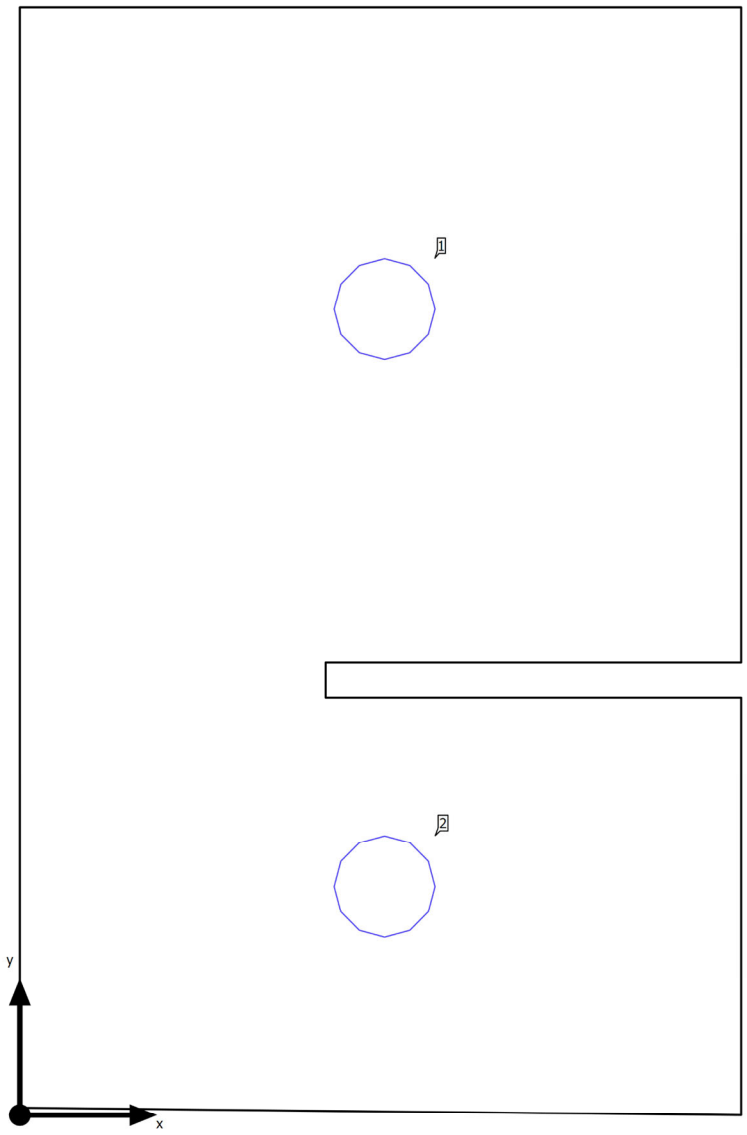
Building 1 · Storey 1 · ACC WC

Luminaire layout plan



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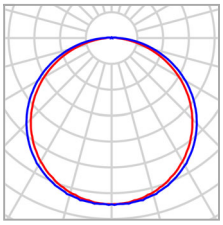
Building 1 · Storey 1 · ACC WC

Luminaire layout plan



Manufacturer	FHAL	P	17.2 W
Article No.	Surface Mount Buttons	$\Phi_{Luminaire}$	2241 lm
Article name	FHAL-291 W34A 4K Ra90 18W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
1.084 m	2.399 m	2.600 m	1
1.084 m	0.680 m	2.600 m	2

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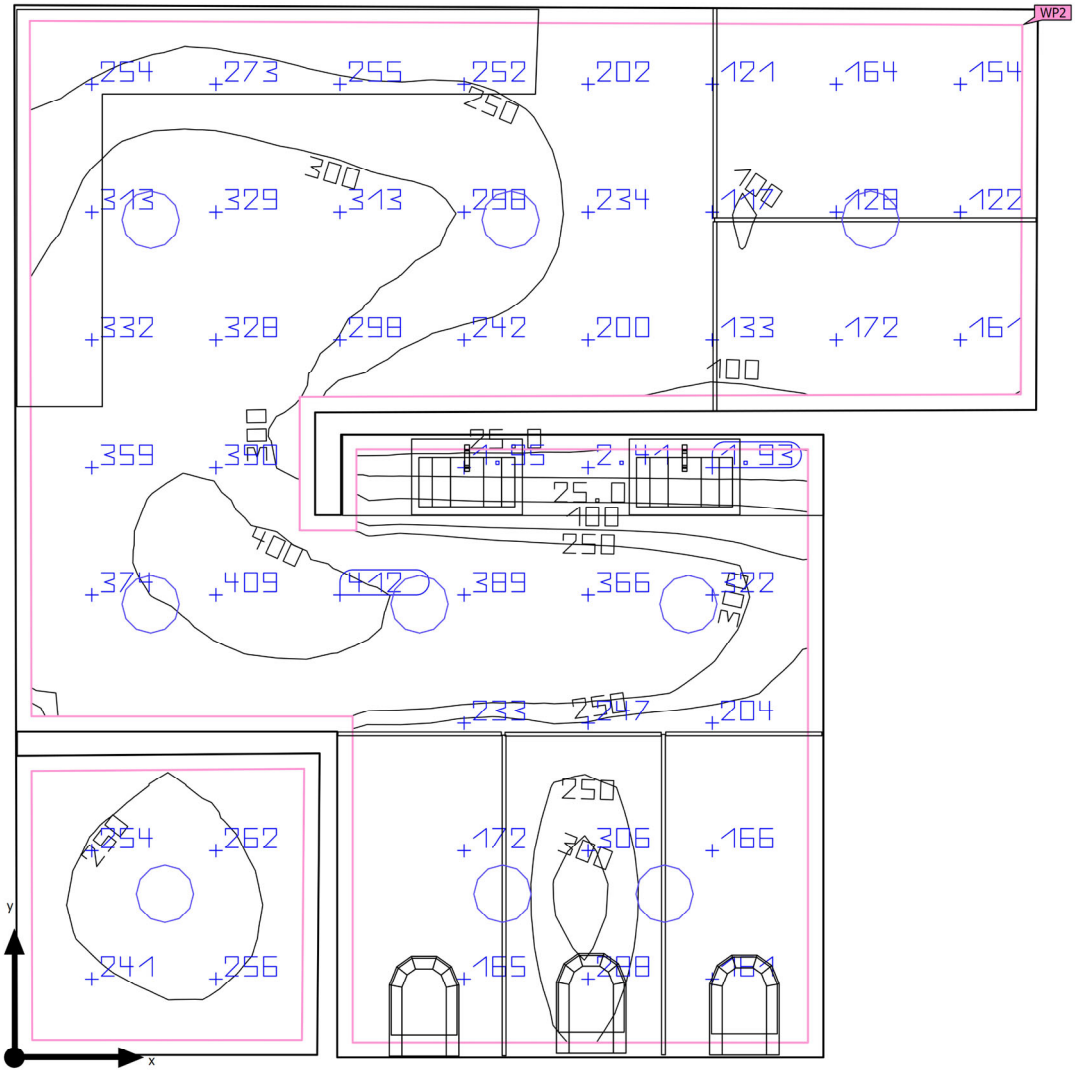
Building 1 · Storey 1 · Change Room 1 (Light scene 1)

Summary



Ground area	24.97 m²	Clearance height	2.600 m
Reflection factors	Ceiling: 46.6 %, Walls: 55.5 %, Floor: 34.2 %	Mounting height	2.600 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.081 m

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Building 1 · Storey 1 · Change Room 1 (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	242 lx	≥ 200 lx	✓	WP2
	U_o (g_1)	0.000	≥ 0.40		WP2
	Lighting power density	6.96 W/m²	–		
		2.88 W/m²/100 lx	–		
Glare valuation(1)	$R_{UG, max}$	25	≤ 25	✓	
Energy estimation(2)	Consumption	[0 - 128] kWh/a	max. 50 kWh/a		
Space	Lighting power density	6.20 W/m²	–		
		2.56 W/m²/100 lx	–		

(1) Based on a rectangular space of 5.520 m x 5.364 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
9	FHAL	Surface Mount Buttons	FHAL-291 W34A 4K Ra90 18W	25	17.2 W	2241 lm	130.3 lm/W

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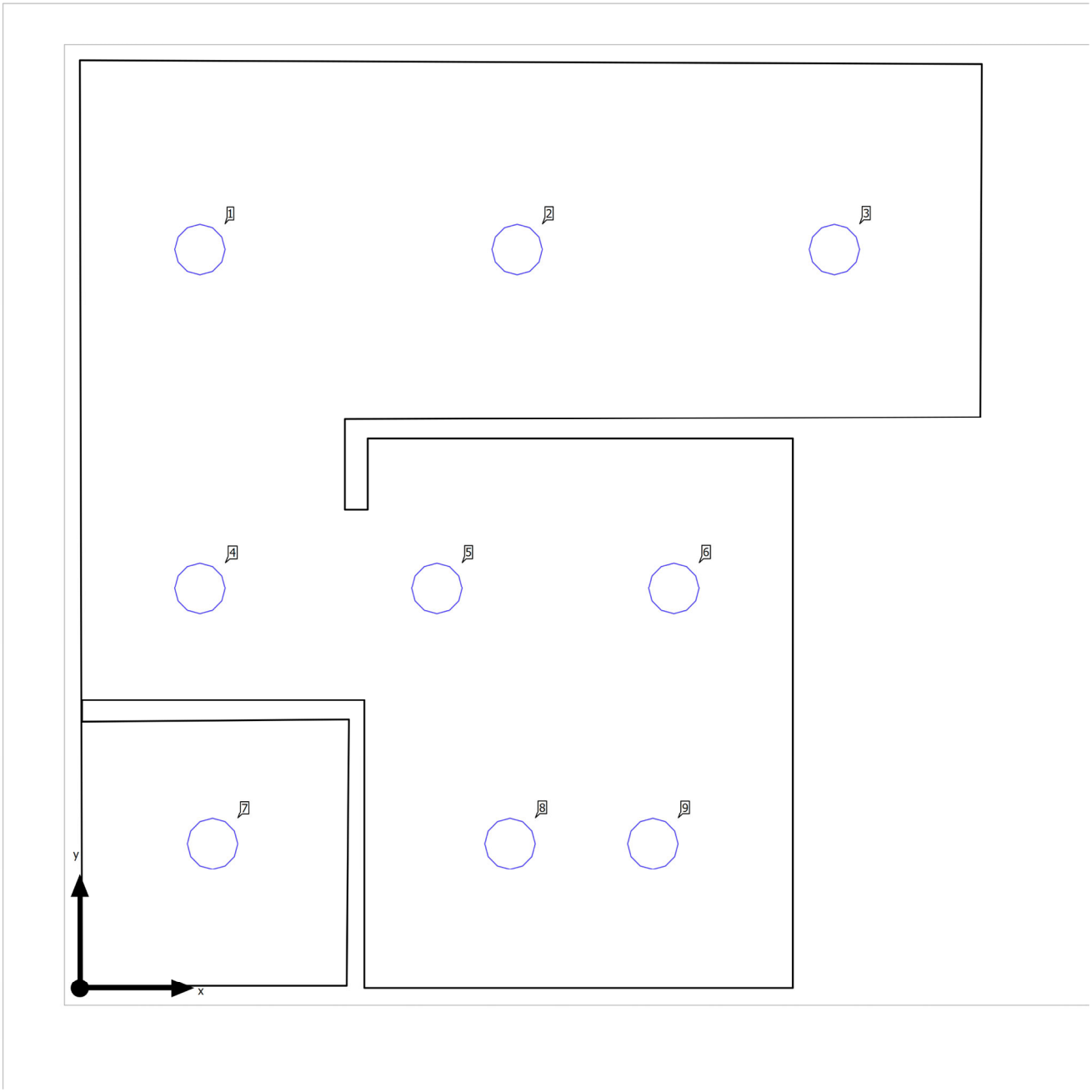
Building 1 · Storey 1 · Change Room 1

Luminaire layout plan



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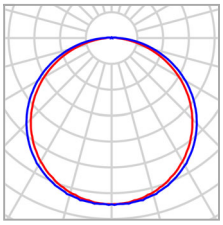
Building 1 · Storey 1 · Change Room 1

Luminaire layout plan



Manufacturer	FHAL	P	17.2 W
Article No.	Surface Mount Buttons	$\Phi_{Luminaire}$	2241 lm
Article name	FHAL-291 W34A 4K Ra90 18W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
0.714 m	4.399 m	2.600 m	1
2.601 m	4.399 m	2.600 m	2
4.487 m	4.399 m	2.600 m	3
0.714 m	2.380 m	2.600 m	4
2.123 m	2.380 m	2.600 m	5
3.533 m	2.380 m	2.600 m	6
0.789 m	0.861 m	2.600 m	7
2.558 m	0.861 m	2.600 m	8
3.408 m	0.861 m	2.600 m	9

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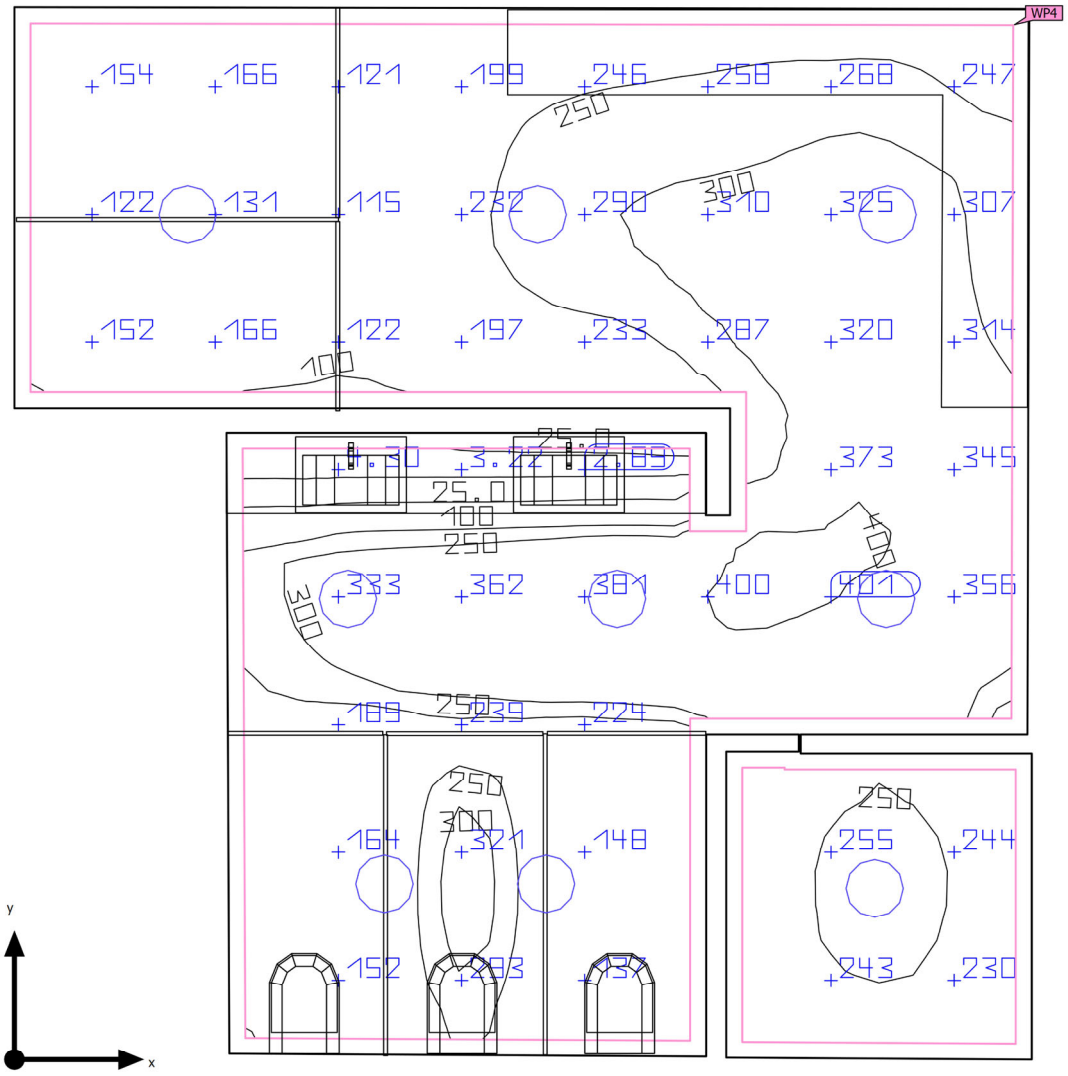
Building 1 · Storey 1 · Change Room 2 (Light scene 1)

Summary



Ground area	24.69 m²	Clearance height	2.600 m
Reflection factors	Ceiling: 46.6 %, Walls: 55.6 %, Floor: 34.2 %	Mounting height	2.600 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.084 m

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Building 1 · Storey 1 · Change Room 2 (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	235 lx	≥ 200 lx	✓	WP4
	U_o (g_1)	0.000	≥ 0.40		WP4
	Lighting power density	7.08 W/m²	–		
		3.01 W/m²/100 lx	–		
Glare valuation(1)	$R_{UG, max}$	25	≤ 25	✓	
Energy estimation(2)	Consumption	[0 - 128] kWh/a	max. 50 kWh/a		
Space	Lighting power density	6.27 W/m²	–		
		2.67 W/m²/100 lx	–		

(1) Based on a rectangular space of 5.519 m x 5.324 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
9	FHAL	Surface Mount Buttons	FHAL-291 W34A 4K Ra90 18W	25	17.2 W	2241 lm	130.3 lm/W

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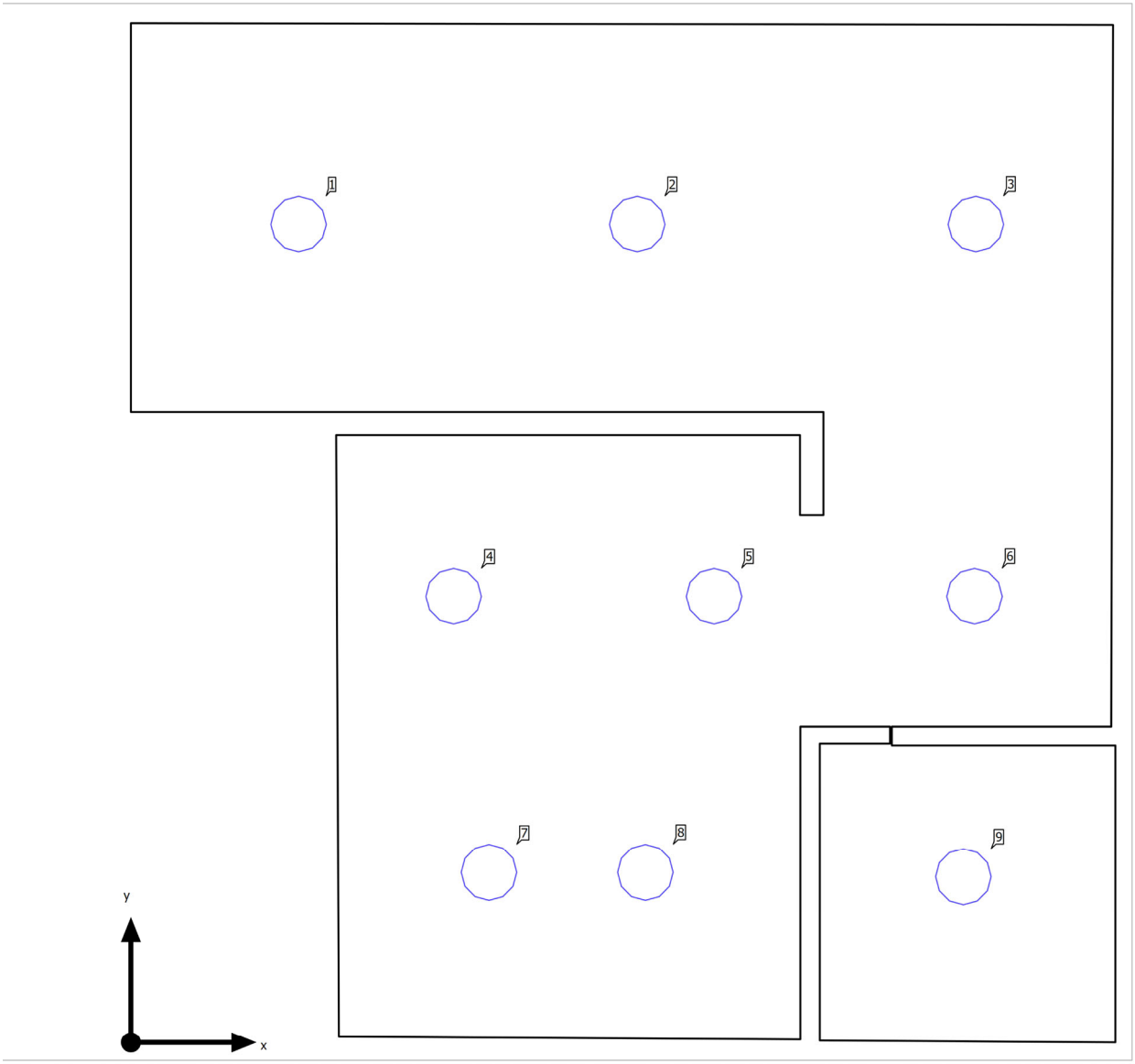
Building 1 · Storey 1 · Change Room 2

Luminaire layout plan



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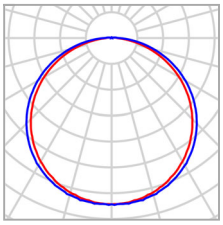
Building 1 · Storey 1 · Change Room 2

Luminaire layout plan



Manufacturer	FHAL	P	17.2 W
Article No.	Surface Mount Buttons	$\Phi_{Luminaire}$	2241 lm
Article name	FHAL-291 W34A 4K Ra90 18W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
0.907 m	4.430 m	2.600 m	1
2.738 m	4.430 m	2.600 m	2
4.569 m	4.430 m	2.600 m	3
1.745 m	2.415 m	2.600 m	4
3.154 m	2.415 m	2.600 m	5
4.562 m	2.415 m	2.600 m	6
1.936 m	0.922 m	2.600 m	7
2.782 m	0.922 m	2.600 m	8
4.502 m	0.899 m	2.600 m	9

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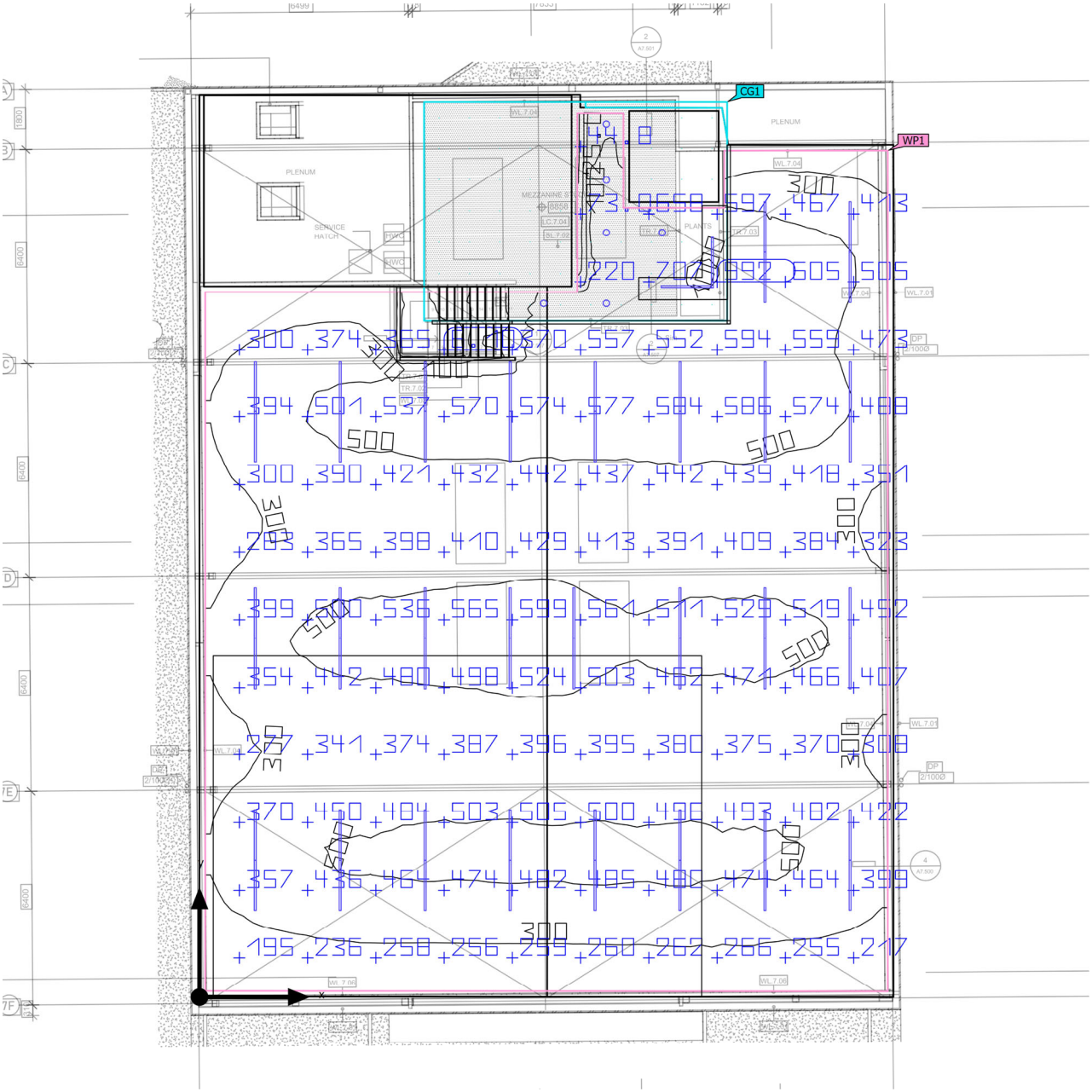
Building 1 · Storey 1 · GYM (Light scene 1)

Summary



Ground area	480.29 m²	Clearance height	2.120 m – 6.000 m
Reflection factors	Ceiling: 46.5 %, Walls: 60.0 %, Floor: 34.2 %	Mounting height	2.650 m – 4.000 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.171 m

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Building 1 · Storey 1 · GYM (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	433 lx	≥ 300 lx	✓	WP1
	U_o (g_1)	0.014	≥ 0.40		WP1
	Lighting power density	5.31 W/m²	–		
		1.23 W/m²/100 lx	–		
Energy estimation(2)	Consumption	[0 - 2321] kWh/a	max. 50 kWh/a		
Space	Lighting power density	5.11 W/m²	–		
		1.18 W/m²/100 lx	–		

(1) Based on a rectangular space of 27.007 m x 20.730 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: Places of public assembly - Trade fairs, exhibition halls (39.1 General lighting)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
54	NM LIGHTING		PRTL-66TLBK 42W 3000K	–	43.2 W	4472 lm	103.5 lm/W
6	FHAL	Fixed Downlights	FHALR-767 W34 WH 4K Ra90 21W	–	20.5 W	2147 lm	104.8 lm/W

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Building 1 · Storey 1 · GYM

Luminaire layout plan

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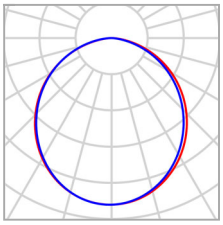
Building 1 · Storey 1 · GYM

Luminaire layout plan



Article name	PRTL-66TLBK 42W 3000K	P	43.2 W
Fitting	1x UP-DB66A-1500-42W-30	$\Phi_{Luminaire}$	4472 lm

Individual luminaires

X	Y	Mounting height	Luminaire
16.891 m	23.044 m	4.000 m	3
19.434 m	23.044 m	4.000 m	4
15.320 m	21.986 m	2.650 m	7
19.434 m	21.544 m	4.000 m	8
16.891 m	21.544 m	4.000 m	9
14.539 m	21.266 m	2.650 m	10
1.669 m	18.271 m	4.000 m	13
4.205 m	18.271 m	4.000 m	14
6.744 m	18.271 m	4.000 m	15
9.282 m	18.271 m	4.000 m	16
11.819 m	18.271 m	4.000 m	17
14.357 m	18.271 m	4.000 m	18
16.895 m	18.271 m	4.000 m	19

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Building 1 · Storey 1 · GYM

Luminaire layout plan

X	Y	Mounting height	Luminaire
19.438 m	18.271 m	4.000 m	20
6.744 m	16.774 m	4.000 m	21
1.669 m	16.773 m	4.000 m	22
9.282 m	16.773 m	4.000 m	23
11.819 m	16.772 m	4.000 m	24
19.438 m	16.772 m	4.000 m	25
16.895 m	16.771 m	4.000 m	26
14.357 m	16.771 m	4.000 m	27
4.205 m	16.768 m	4.000 m	28
1.665 m	11.489 m	4.000 m	29
4.201 m	11.489 m	4.000 m	30
6.740 m	11.489 m	4.000 m	31
9.278 m	11.489 m	4.000 m	32
11.183 m	11.489 m	4.000 m	33
14.353 m	11.489 m	4.000 m	34
16.891 m	11.489 m	4.000 m	35
19.434 m	11.489 m	4.000 m	36
1.665 m	9.988 m	4.000 m	37
4.201 m	9.988 m	4.000 m	38
6.740 m	9.988 m	4.000 m	39
9.278 m	9.988 m	4.000 m	40
11.183 m	9.988 m	4.000 m	41
14.353 m	9.988 m	4.000 m	42
16.891 m	9.988 m	4.000 m	43

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Building 1 · Storey 1 · GYM

Luminaire layout plan

X	Y	Mounting height	Luminaire
19.434 m	9.988 m	4.000 m	44
1.665 m	4.857 m	4.000 m	45
4.201 m	4.857 m	4.000 m	46
6.740 m	4.857 m	4.000 m	47
9.278 m	4.857 m	4.000 m	48
11.816 m	4.857 m	4.000 m	49
14.353 m	4.857 m	4.000 m	50
16.891 m	4.857 m	4.000 m	51
19.434 m	4.857 m	4.000 m	52
19.434 m	3.361 m	4.000 m	53
1.665 m	3.357 m	4.000 m	54
4.201 m	3.357 m	4.000 m	55
6.740 m	3.357 m	4.000 m	56
9.278 m	3.357 m	4.000 m	57
11.816 m	3.357 m	4.000 m	58
14.353 m	3.357 m	4.000 m	59
16.891 m	3.357 m	4.000 m	60

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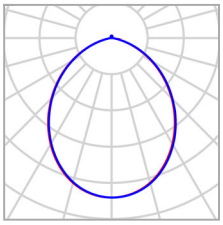
Building 1 · Storey 1 · GYM

Luminaire layout plan



Manufacturer	FHAL	P	20.5 W
Article No.	Fixed Downlights	$\Phi_{Luminaire}$	2147 lm
Article name	FHALR-767 W34 WH 4K Ra90 21W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
12.152 m	26.119 m	2.700 m	1
12.152 m	24.437 m	2.700 m	2
12.152 m	22.873 m	2.700 m	5
13.817 m	22.873 m	2.700 m	6
10.281 m	20.765 m	2.700 m	11
12.152 m	20.765 m	2.700 m	12

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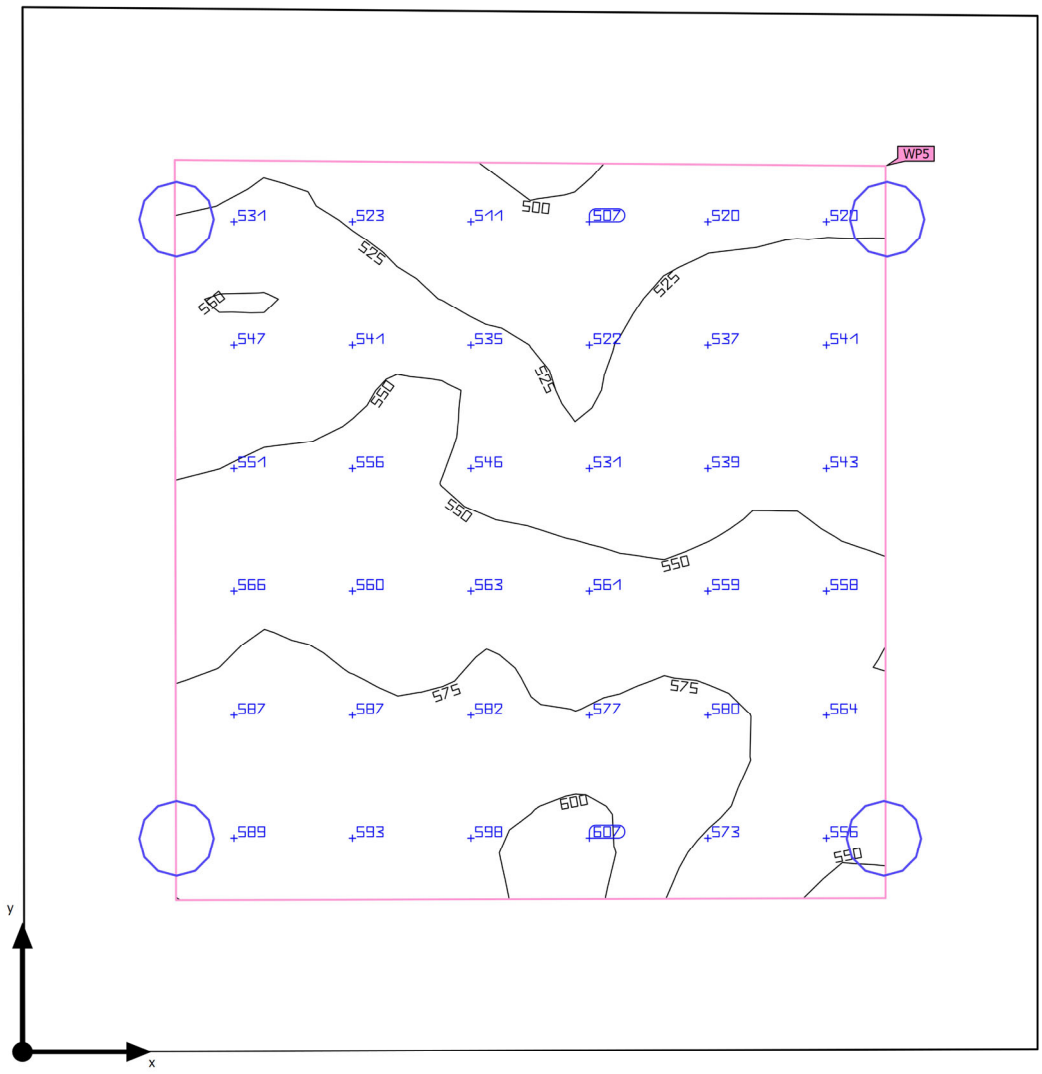
Building 1 · Storey 1 · Office (Light scene 1)

Summary



Ground area	7.07 m²	Clearance height	2.600 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 34.2 %	Mounting height	2.650 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.393 m

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Building 1 · Storey 1 · Office (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	554 lx	≥ 500 lx	✓	WP5
	U_o (g_1)	0.90	≥ 0.60	✓	WP5
	Lighting power density	23.39 W/m²	–		
		4.22 W/m²/100 lx	–		
Energy estimation(2)	Consumption	203 kWh/a	max. 250 kWh/a	✓	
Space	Lighting power density	11.60 W/m²	–		
		2.09 W/m²/100 lx	–		

(1) Based on a rectangular space of 2.709 m x 2.627 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: DIALux presetting (34.2 Standard (office))

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
4	FHAL	Fixed Downlights	FHALR-767 W34 WH 4K Ra90 21W	–	20.5 W	2147 lm	104.8 lm/W

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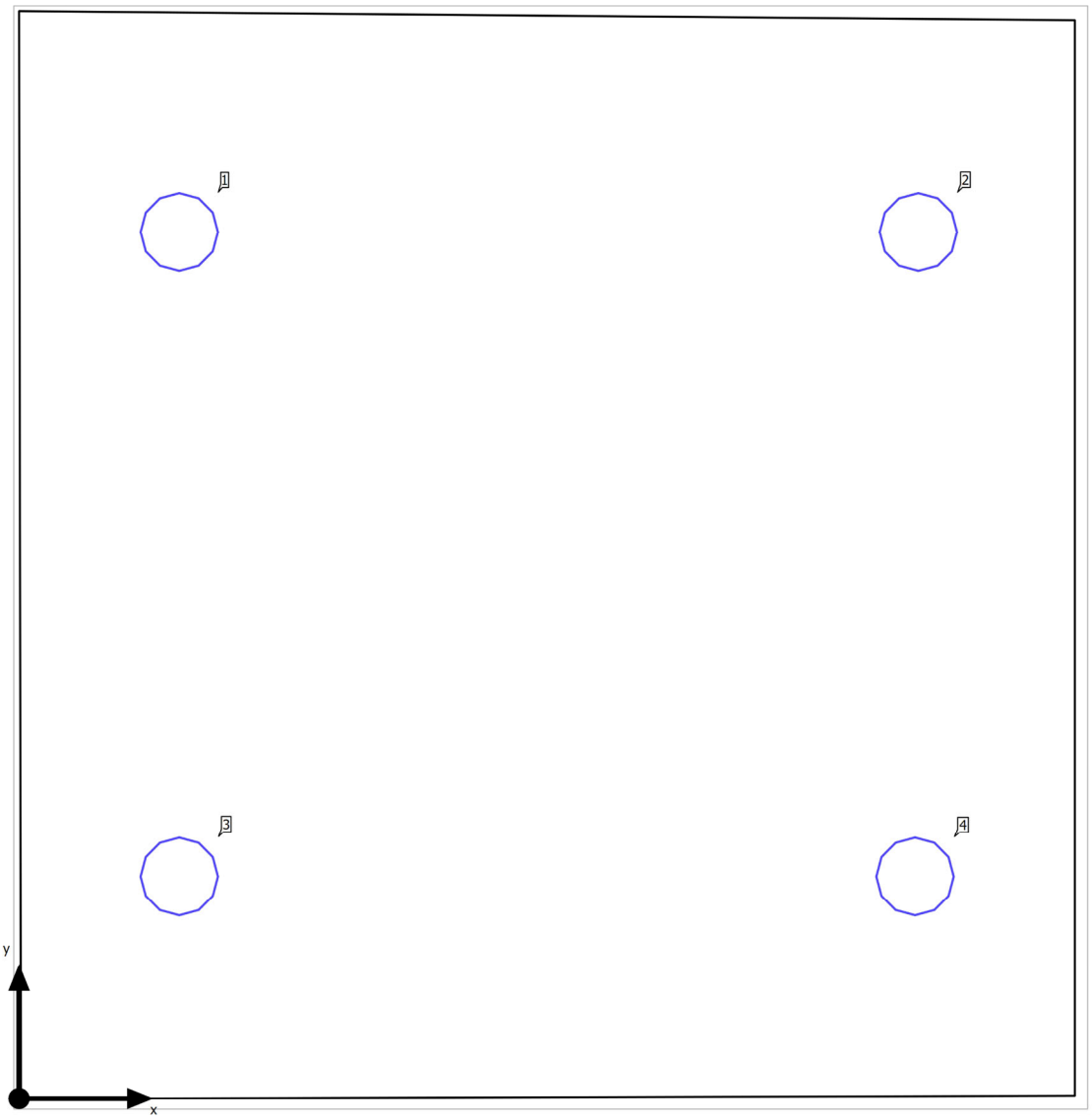
Building 1 · Storey 1 · Office

Luminaire layout plan



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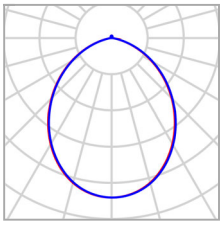
Building 1 · Storey 1 · Office

Luminaire layout plan



Manufacturer	FHAL	P	20.5 W
Article No.	Fixed Downlights	$\Phi_{Luminaire}$	2147 lm
Article name	FHALR-767 W34 WH 4K Ra90 21W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
0.399 m	2.158 m	2.650 m	1
2.238 m	2.158 m	2.650 m	2
0.399 m	0.553 m	2.650 m	3
2.229 m	0.553 m	2.650 m	4

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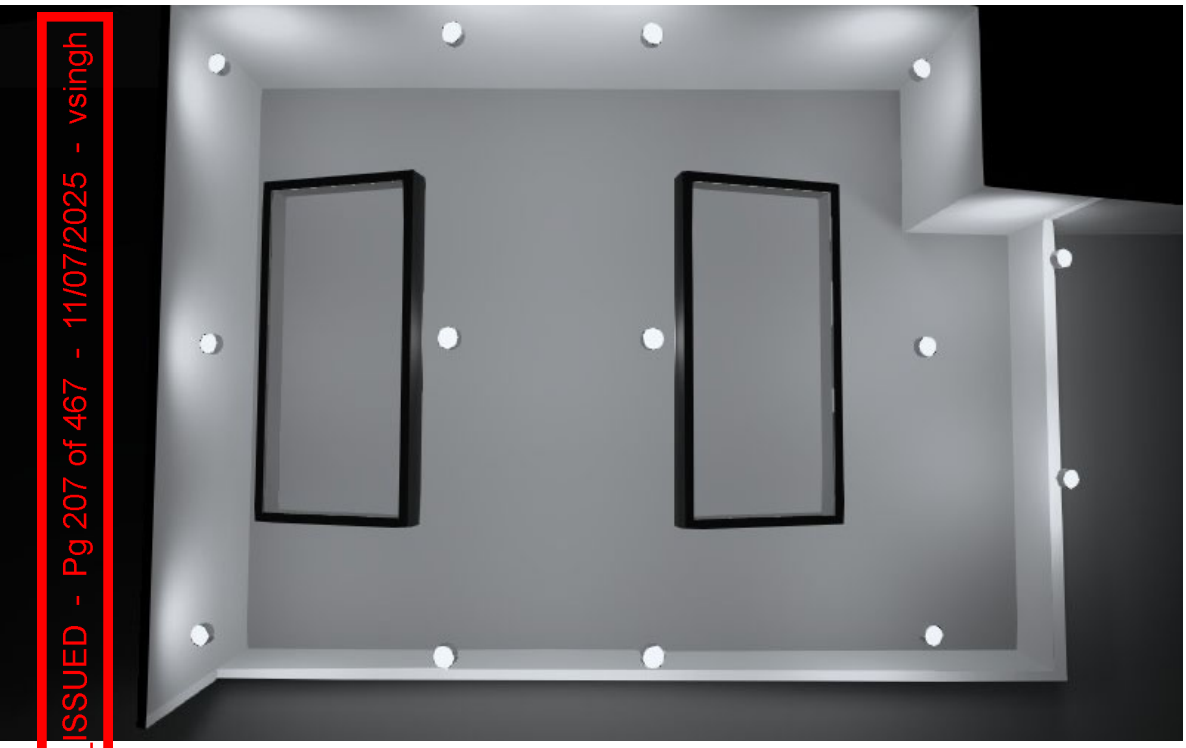

7 EAGLE RAY ROAD MEZZANINE

LUX STUDY FOR MEZZANINE STUDIO

Object
7 EAGLE RAY ROAD,
MANGAWHAI

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Luminaire list

Φ_{total}	P_{total}	Luminous efficacy
30058 lm	287.0 W	104.7 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
14	FHAL	Fixed Downlights	FHALR-767 W34 WH 4K Ra90 21W	20.5 W	2147 lm	104.8 lm/W

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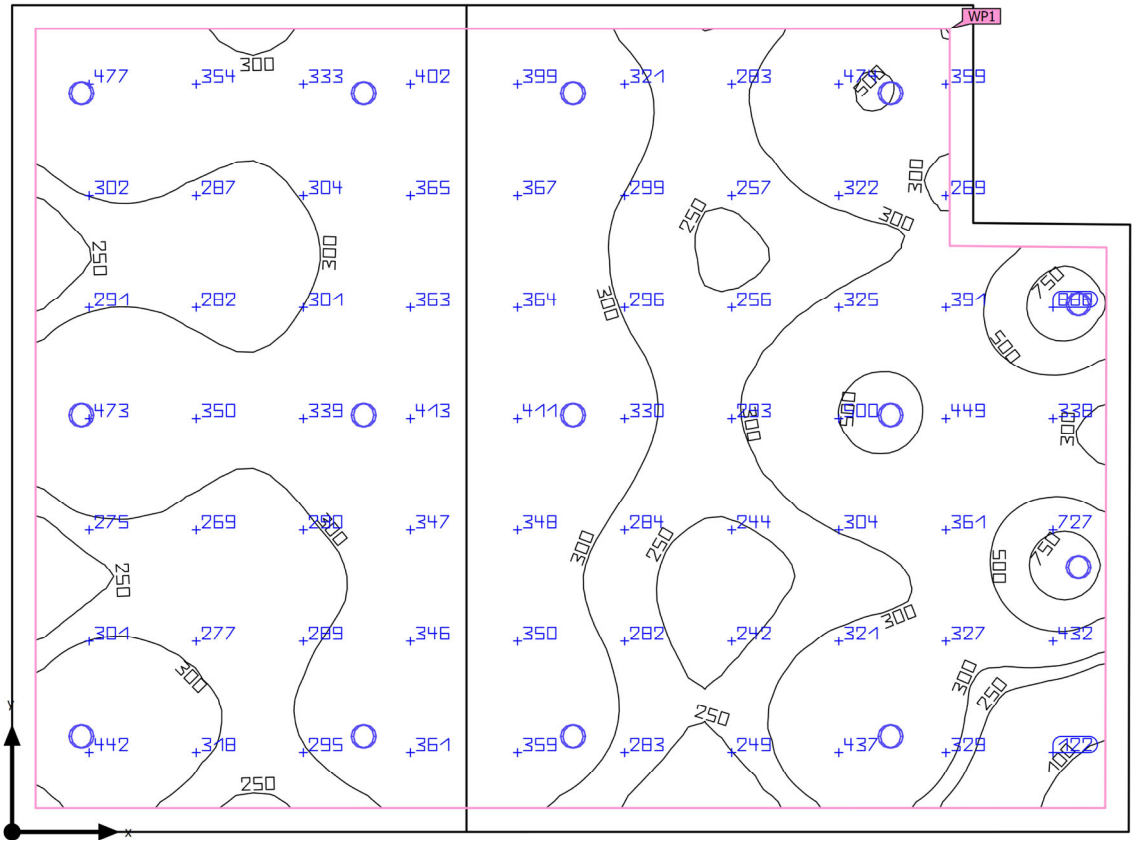
Building 1 · Storey 1 · Mezzanine (Light scene 1)

Summary



Ground area	60.97 m²	Clearance height	3.008 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %	Mounting height	1.780 m – 2.850 m
		Height Working plane	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.195 m

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Building 1 · Storey 1 · Mezzanine (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{perpendicular}$	343 lx	≥ 300 lx	✓	WP1
	U_o (g_1)	0.19	≥ 0.60		WP1
	Lighting power density	5.23 W/m²	–		
		1.53 W/m²/100 lx	–		
Energy estimation(2)	Consumption	[0 - 552] kWh/a	max. 50 kWh/a		
Space	Lighting power density	4.71 W/m²	–		
		1.37 W/m²/100 lx	–		

(1) Based on a rectangular space of 6.850 m x 9.248 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: Places of public assembly - Theatres, concert halls, cinemas, entertainment venues (38.1 Practice rooms)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
14	FHAL	Fixed Downlights	FHALR-767 W34 WH 4K Ra90 21W	–	20.5 W	2147 lm	104.8 lm/W

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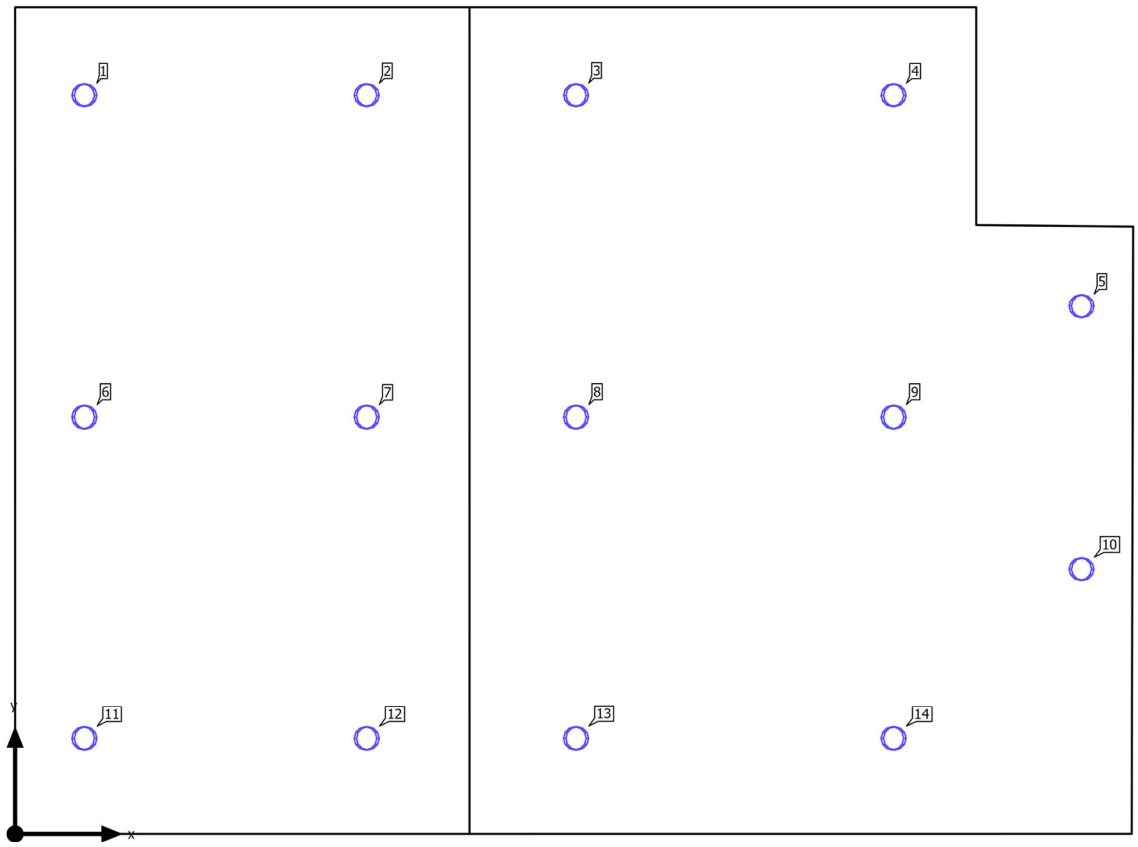
Building 1 · Storey 1 · Mezzanine

Luminaire layout plan



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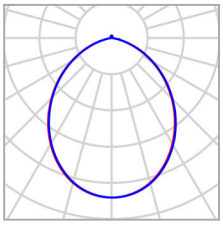
Building 1 · Storey 1 · Mezzanine

Luminaire layout plan



Manufacturer	FHAL	P	20.5 W
Article No.	Fixed Downlights	$\Phi_{Luminaire}$	2147 lm
Article name	FHALR-767 W34 WH 4K Ra90 21W		
Fitting	1x		

Individual luminaires

X	Y	Mounting height	Luminaire
0.563 m	6.117 m	2.250 m	1
2.898 m	6.117 m	2.850 m	2
4.649 m	6.117 m	2.840 m	3
7.276 m	6.117 m	2.180 m	4
8.830 m	4.375 m	1.780 m	5
0.563 m	3.453 m	2.250 m	6
2.898 m	3.453 m	2.850 m	7
4.649 m	3.453 m	2.840 m	8
7.276 m	3.453 m	2.180 m	9
8.830 m	2.191 m	1.780 m	10
0.563 m	0.790 m	2.250 m	11
2.898 m	0.790 m	2.850 m	12
4.649 m	0.790 m	2.840 m	13

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Building 1 · Storey 1 · Mezzanine

Luminaire layout plan

X	Y	Mounting height	Luminaire
7.276 m	0.790 m	2.180 m	14

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

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5 & 7 Eagle Ray Road

Project Specification

5 & 7 Eagle Ray Road, Mangawhai, New Zealand
Project Ref: 2435

Printed: 01 July 2025

masterspec

Specification built using Masterspec software
Project ID: 325749 - 404694

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1013 DOCUMENT CONTROL

1 DOCUMENT CONTROL

Document Control

1.1 PREPARED BY

Company:	Strata Studio
Postal Address:	478
Street Address:	Karangahape Road
City:	Auckland
Telephone:	~
Email:	olivia@strata-architects.nz

1.2 DOCUMENT DETAILS

Project Name:	5 & 7 Eagle Ray
Project Number:	2435
File Reference:	~
Client:	Marotere & St Lambert
Client Contact:	~
Version:	~

1.3 REVISION CONTROL

Issue:	Building Consent
Revision:	~
Amendment Details:	~
Issued to:	~
Date of Issue:	~
Reviewed by:	~
Approved by:	~

1.4 AUDIT CONTROL

Date:	~
Author:	~
Approved by:	~

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1220 PROJECT

1 GENERAL

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This general section describes the project including:

- A description of the work
- Design construction safety
- Principal's Health & Safety matters
- Site description, features and restrictions
- Design parameters for design by contractor
- Archaeological discovery

1.1 READ ALL SECTIONS TOGETHER

Read all general sections together with all other sections.

1.2 DESCRIPTION OF THE WORK

~

1.3 RESTRICTED BUILDING WORK

This project includes Restricted Building Work.

Design Construction Safety

1.4 DESIGN CONSTRUCTION SAFETY

The project designers are unaware of unusual or atypical features, which a reasonably experienced contractor may not be aware of, that may present a hazard or risk during a typical construction process. The Contractor is still required to undertake its own assessment, to determine if they consider there are any further safety matters and provide for these in carrying out the construction of the work.

Principal's Health & Safety Matters

1.5 PRINCIPAL'S KNOWN SITE HAZARDS

Site hazards known to the principal are:
~

1.6 PRINCIPAL'S SITE HEALTH AND SAFETY PLAN

Obtain a copy of the principal's site health and safety plan.

Site

1.7 SITE

The site consists of: ~
As shown on drawing: ~

1.8 LEGAL DESCRIPTION

The site of the works, the street address and the legal description are shown on the drawings.

1.9 EXISTING SERVICES

The following are the network utility services:
Electrical: ~
Communications: ~
Water: ~
Gas: ~
Stormwater: ~
Foul water: ~

The services are also shown on the drawings.

1.10 SITE FEATURES

~

Site environment - Durability

1.11 EXPOSURE ZONE

The exposure zone is to NZS 3604, Section 4 Durability, 4.2 Exposure zones and NZBC E2/AS1.
The site zone is: ~

Site environment - Wind

1.12 WIND DESIGN PARAMETERS - NON SPECIFIC DESIGN

The design wind pressures are to NZS 3604, Table 5.4 Determination of wind zone, up to and including Extra High Wind Zone.
Building wind zone ~ (refer to NZS 3604, table 5.4)

Site environment - Seismic

1.13 EARTHQUAKE ZONE - NON SPECIFIC DESIGN

The zone is to NZS 3604, Section 5 Bracing design, 5.3 Earthquake bracing demand.
The earthquake zone ~
is:

Archaeological discovery

1.14 REPORT FINDING ANY ANTIQUITIES AND ITEMS OF VALUE

Report the finding of any fossils, antiquities and other items of value, to the Contract Administrator. All to remain undisturbed until approval is given for removal.

Pre-1900, items or evidence of human activity on the site, come under the Heritage New Zealand Pouhere Taonga Act 2014. If such items or evidence is discovered work must stop immediately and the Contract Administrator must be notified immediately. The site may be classified as an Archaeological Site under the Act, and the Contract Administrator or Owner must contact the Heritage New Zealand for authority to proceed.

Post-1900 items remain the property of the owner, pre-1900 items may remain the property of the owner or the Crown subject to what is found.
Known archaeological information relating to this site includes the following: -
~

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1232 INTERPRETATION & DEFINITIONS

1 GENERAL

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This general section relates to definitions and interpretation that are used in this specification.

Definitions

1.1 DEFINITIONS

Hold point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may not proceed on that particular part until the contract administrator and any other nominated person has advised that work can continue. A notice period of 2 Working Days is required unless stated otherwise.
Notification point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may continue and the contract administrator and any other nominated person may choose whether or not they wish to witness the particular work being carried out. A notice period of 2 Working Days is required unless stated otherwise.
Product:	A thing or substance produced by natural process or manufacture.
Proprietary:	Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
Provide and fix:	"Provide" or "fix" or "supply" or "fix" if used separately mean provide and fix unless explicitly stated otherwise.
Required:	Required by the documents, the New Zealand Building Code or by a statutory authority.
Review:	Review by the contract administrator and other consultants is for general compliance only. Review does not remove the need for the contractor to comply with the stated requirements, details and specifications of the manufacturers and suppliers of individual components, materials and finishes. Neither can the review be construed as authorising departures from the contract documents.
Working day:	Working day means a calendar day other than any Saturday, Sunday, public holiday or any day falling within the period from 24 December to 5 January, both days inclusive, irrespective of the days on which work is actually carried out.
Workplace:	Workplace means the place where work is being carried out, or is customarily carried out, for a business or undertaking including any place where a worker goes, or is likely to be, while at work (under Health and Safety at Work Act 2015).

1.2 PERSONNEL

Principal:	The person defined as "Principal" in the conditions of contract.
Contractor:	The person contracted by the principal to carry out the contract.
Contract administrator:	The person appointed by the principal to administer the contract on the principal's behalf. Where no person has been appointed by the principal, it means the principal or the principal's representative.

1.3 ABBREVIATIONS

The following abbreviations are used throughout the specification:

AAMA	American Architectural Manufacturers Association
AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
ASTM	American Society for Testing and Materials
AWCINZ	Association of Wall and Ceiling Industries of New Zealand Inc.
BCA	Building Consent Authority
BPIR	Building Product Information Requirements
BRANZ	Building Research Association of New Zealand

BS	British Standard
COP	Code of practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
HERA	Heavy Engineering Research Association
LBP	Licensed Building Practitioner
MBIE	Ministry of Business, Innovation and Employment
MPNZA	Master Painters New Zealand Association Inc
NZBC	New Zealand Building Code
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NZTA	New Zealand Transport Agency
NUO	Network Utility Operator
OSH	Occupational Safety and Health
PCBU	Person Conducting a Business or Undertaking (under Health and Safety at Work Act 2015)
RBW	Restricted Building Work
SARNZ	Scaffolding and Rigging New Zealand Inc
SED	Specific Engineering Design
TA	Territorial Authority
TNZ	Transit New Zealand (Transit New Zealand is now New Zealand Transport Agency NZTA - some specifications are still prefixed TNZ)

1.4 DEFINED WORDS

Words defined in the conditions of contract, New Zealand Standards, or other reference documents, to have the same interpretation and meaning when used in their lower case, title case or upper case form in the specification text.

1.5 WORDS IMPORTING PLURAL AND SINGULAR

Where the context requires, words importing singular only, also include plural and vice versa.

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1232S1 EXPLANATION OF SCHEDULE SECTIONS

1 GENERAL

This general section provides an explanation of schedule sections and their relationship to general sections and work sections. Specific schedule sections contained within this specification are also identified.

1.1 EXPLANATION OF SCHEDULE SECTIONS

A schedule section identifies work sections that contain common requirements, as identified in the title of the schedule section. For example 1235S1 SCHEDULE OF SHOP DRAWINGS identifies work sections that have requirements for shop drawings. Details of the requirements are contained in the identified work sections with additional requirements contained in the general section 1235 SHOP DRAWINGS.

Some schedule sections are identified by the 4 digit CBI (Co-ordinated Building Information) number of the general section that they relate to, followed by the letter "S" followed by a numeral (1-9). The numeral allows for multiple schedule sections to be associated with the same general section.

Other schedule sections that do not share a common CBI number with a general section, have their own unique 4 digit CBI number, followed by the letter "S" followed by a numeral. These schedule sections contain additional subject content relating to the schedules and the identified work sections.

1.2 SCHEDULE SECTIONS

The following Schedule sections are contained within the specification:

1278SR Schedule Of Slip Resistance Testing

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1234 DOCUMENTATION

1 GENERAL

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This general section relates to documentation required by the Territorial Authority / Building Consent Authority for compliance with the New Zealand Building Code. It also includes documentation relating to:

- Substitutions
- Manufacturers' documents
- Branded work sections
- Care of construction documents
- Confidentiality of documents
- Receipt of construction documents

Building Consent Authority documentation

1.1 BUILDING CONSENT

Obtain the original building consent forms and documents from the owner and keep them on site, preserve the condition of consent forms and documents. Liaise with the building consent authority for all notices to be given and all inspections required during construction to ensure compliance. Return the consent form and documents to the owner on completion.

1.2 BUILDING CONSENT COMPLIANCE

It is an offence under the Building Act 2004

- to carry out any work not in accordance with the building consent.
- to carry out Restricted Building Work by anyone other than a Licensed Building Practitioner licensed for that type of work.

The resolution of matters concerning building code compliance to be referred to the contract administrator for a direction and then if required to the BCA for consent.

Where any alteration is requested by the territorial authority or any other authority, do not undertake such alteration until the matter has been referred to the contract administrator for direction.

1.3 PROJECT PERSONNEL

Provide names and contact details of the contractor's key personnel and tradespersons who are involved with the project. Review the list once a month and reissue it if changes have been made.

Licensed Building Practitioner documentation

1.4 LICENSED BUILDING PRACTITIONERS

Provide LBP details. Provide names, LBP numbers, areas of practice and contact information. Provide this information to the BCA before commencing work on the Restricted Building Work in the form required by the BCA. Advise the BCA of any change to an LBP previously advised.

Include the following as applicable

- Site LBP
- Carpenter
- Foundations 1 Concrete foundation walls and concrete slab-on-ground constructor
- Foundations 2 Concrete or timber pile foundations constructor
- Bricklaying and block laying 1 Brick / masonry veneer
- Bricklaying and block laying 2 Structural masonry - Bricklayer / Blocklayer
- Roofing 1 Concrete / clay tile roofer
- Roofing 2 Profiled metal roofer and/or wall cladding installer
- Roofing 3 Metal tile roofer
- Roofing 4 Membrane roofer
- Roofing 5 Torch on membrane roofer
- Roofing 6 Liquid membrane roofer
- Roofing 7 Shingle / slate roofer
- External plastering 1 Solid plasterer
- External plastering 2 Proprietary Plaster Cladding Systems (PPCS) plasterer

Also provide names and contact details of the following

- Registered drainlayer

- Registered plumber
- Registered gasfitter
- Registered electrician

1.5 RECORD OF WORK

Where Restricted Building Work is carried out by a LBP, on completion provide a Record of Work. Provide copies to both the BCA and the Contract Administrator.

Compliance information

1.6 DOCUMENTATION REQUIRED FOR CODE COMPLIANCE

Information may be required either as a condition of the contract documents or as a condition of the building consent. It may include the following:

- Applicators approval certificate from the manufacturer / supplier
- Manufacturer's / supplier's warranty
- Installer / applicator's warranty
- Producer Statement (PS1) - Design
- Producer Statement (PS3) - Construction from the applicator / installer
- Producer Statement (PS4) - Construction review from an acceptable suitably qualified person

Refer to the general sections for the requirements for compliance information to be provided by the contractor.

Refer to the building consent for the requirements for compliance information to be provided by the contractor.

Obtain required documents from the relevant parties for delivery to the contract administrator after the final inspection has been carried out by the BCA.

1.7 PRODUCER STATEMENTS

When producer statements verifying construction are required, provide copies to both the Building Consent Authority and the Contract Administrator. Provide producer statements in the form required by the BCA.

Residential building contract

1.8 CHECKLIST

If requested provide evidence of the prescribed checklist given to the residential client.

1.9 DISCLOSURE STATEMENT

If requested provide evidence of the disclosure statement given to the residential client.

1.10 BUILDING CONTRACT

If requested provide evidence of the written building contract that the residential customer has signed.

1.11 DOCUMENTATION REQUIRED ON COMPLETION

As soon as practicable after completion of the building work, provide in writing the following information and documentation to the client and the relevant territorial authority.

Information and documentation relating to:

- The identity of the building contractor and the subcontractors who carried out the work.
- Maintenance requirements for any products incorporated in the building.

If applicable also provide any guarantee or insurance obtained by the building contractor in relation to the building work.

Substitutions

1.12 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

1.13 NO SUBSTITUTIONS

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Substitutions are not permitted to any of the specified products and systems listed in a section unless specified otherwise. If a product is not available then immediately contact the contract administrator for direction.

1.14 PROPOSED SUBSTITUTIONS

Substitution of products or systems contained within branded work sections is not allowed. The contractor may propose substitutions to products within non branded work sections, when the contractor has determined that the proposed substitution is an alternative to the specified product. The Contract administrator is not bound to accept any substitutions. Submit a draft proposal detailing the substitution to the contract administrator before proceeding with full notification.

1.15 NOTIFICATION OF SUBSTITUTIONS

Notify the contract administrator of proposed substitution of specified products. Notification to include but not be limited to:

- Product identification
- Manufacturer's name, address, telephone number, website and email address
- Detailed comparison between the properties and characteristics of the specified product and the proposed substitution
- Statement of NZBC compliance including durability
- Details of manufacturer warranties

Plus an assessment of:

- Any changes required to the programme including any extension of time required
- Any consequential effects of the proposed substitution
- Any effect the substitution may have on Health & Safety requirements
- Allowance for time and cost for re-design and documentation (if applicable)
- Allowance for time and cost for obtaining an amendment to the Building Consent (if applicable)
- Any change in cost associated with the proposed substitution

and if requested:

- All current manufacturer's literature on the product
- Accreditations and appraisals available
- Reference standards
- Product limitations
- Samples
- List of existing installations in the vicinity of the project

1.16 ACCEPTANCE OF SUBSTITUTIONS

Acceptance of any proposed substitutions will be given in writing by the contract administrator.

Amendments to issued Building Consent

1.17 CONTRACTOR AMENDMENTS TO BUILDING CONSENT

Where the contractor has sought acceptance of a substitution or a variation which is for the contractor's own convenience and the substitution or variation requires an amendment to the Building Consent, the contractor must apply for and obtain the required amendment.

The contractor must:

- Obtain approval for substitutions from the contract administrator.
- Prepare and provide to the BCA all documentation required for the amendment.
- Pay all fees and other costs associated with this amendment.
- Where the amendment affects other approved plans, also amend those plans.

1.18 PRINCIPAL AMENDMENTS TO BUILDING CONSENT

Where the principal is proposing a substitution or a variation which requires an amendment to the Building Consent, the contractor must provide to the principal information that the contractor has that is required for the amendment.

The principal will:

- Prepare and provide to the BCA all documentation required for the amendment.
- Pay all fees and other costs associated with this amendment.
- Where the amendment affects other approved plans, also amend those plans.

Manufacturer's documents

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1.19 MANUFACTURER'S AND SUPPLIER'S INSTALLATION REQUIREMENTS

Manufacturer's and supplier's requirements, instructions, specifications or details mean those issued by them for their particular product, material or component and are the latest edition.

1.20 CONTRACTOR TO OBTAIN CURRENT DOCUMENTATION

Where manufacturer’s installation, application and execution requirements are referred to in this specification, the Contractor must ensure they are fully aware of this documentation. Whenever necessary obtain and keep on site the relevant latest version of such documentation and make it available to workers carrying out that part of the work.

1.21 DOCUMENTATION PROVIDED FOR BUILDING CONSENT

Documentation including manufacturer’s installation instructions, specification data sheets, producer statements, BRANZ and similar appraisals may be included in the issued Building Consent. These documents have been provided only to demonstrate compliance with the NZBC.

Branded work sections

1.22 BRANDED PRODUCTS / SYSTEMS

Where branded products and systems are specified, all products and components of the system must be as per the specification.

1.23 CROSS REFERENCED WORK SECTIONS

If any related work is cross referenced to a generic work section, but only the equivalent branded section is included in the specification, use that branded section. Confirm with the contract administrator if there is any doubt.

Care of construction documents

1.24 CONSTRUCTION ISSUE

Take receipt of the plans, specifications and other documents issued “for construction”. Keep at least one copy on site available for use by all on site workers. Keep a record of copies provided to others including subcontractors. Protect the documents as appropriate. Obtain replacement copies for documents that have become damaged.

1.25 REVISIONS TO CONSTRUCTION ISSUE

Where revised plans and other documents are issued ensure that superseded documents are deleted from the working sets. Ensure that subcontractors are provided with amended documents. Delete superseded documents by either:

- removing them from the working copy of the construction issue; or
- marking them as superseded

1.26 RETURN DOCUMENTS ISSUED FOR CONSTRUCTION

On completion of the contract works:

- Keep such copies of the plans, specification and other documents as reasonably required for contractor’s record purposes.
- Retrieve all other copies no longer required by parties.
- Agree method of disposal of such documents with the Contract Administrator.

The Contract Administrator will advise whether such documents shall be:

- delivered to the Contract Administrator/Owner; or
- disposed of by normal waste disposal methods; or
- disposed of by secure document disposal methods.

Confidentiality of documents

1.27 CONFIDENTIALITY OF DOCUMENTS

Documents shall not be given or copied to others who do not require them for carrying out services required for the construction of the works. Documents are only to be used for the contract. Maintain confidentiality of documents.

2 SELECTIONS

Receipt of construction documents

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2.1 INITIAL ISSUE & REVISIONS - HARD COPIES

Initial issue: ~
Revisions: ~

2.2 DOCUMENT RECEIPT - HARD COPIES

Hard copies of plans, specifications and other documents issued for construction shall be ~

2.3 DOCUMENT RECEIPT - ELECTRONIC DOCUMENTS

Electronic documents issued for construction shall be ~

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1240 ESTABLISHMENT

1 GENERAL

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This general section relates to site establishment including:

- Notices and approvals
- Inspections
- Site preparation
- Temporary construction

Notices and approvals

1.1 STATUTORY OBLIGATIONS

Comply with all statutory obligations and regulations of regulatory bodies controlling the execution of the works.

1.2 BUILDING CONSENT AUTHORITY AND NETWORK UTILITY APPROVALS

Attend on building consent authority officers, statutory and network utility inspectors, as necessary to obtain approvals, including those required for the completion of the works.

1.3 NOTIFY NETWORK UTILITY OPERATORS

Notify all network utility operators of proposed works before commencing site operations. Ascertain location of services or confirm that none exist in the vicinity of the works. Take all necessary precautions to avoid damage to existing services.

Inspections

1.4 CARRY OUT INSPECTIONS

~

Site preparation

1.5 SITE ACCESS

Access to the site is limited to: ~

1.6 WORKING AREA

Limited to the following designated working areas on the site:
~

1.7 SITE AND SOIL SURVEYS

Carry out all investigations necessary and peruse all information available to determine ground conditions and likely ground performance both on the site and adjacent to it. Also refer to the territorial authority project information memorandum (PIM).

1.8 GROUND CONDITIONS

Refer to the geotechnical / soils report included with this specification.

Temporary construction

1.9 TEMPORARY BUILDINGS

Provide as necessary temporary sheds, offices, lunch rooms, sanitary accommodation and other temporary buildings required for storage, management of the works, for the use of workers while on site and as required by Acts and Regulations.

1.10 TEMPORARY SITE FENCING

Provide and maintain a temporary site fence, 2 metres high from ground level on the side accessible to the public. Construct to comply with NZBC F5/AS1 Construction and demolition hazards.

1.11 SITE - SAFETY SIGNAGE

Provide hazard board and other safety signage as required.

1.12 SITE - PROJECT SIGN

Obtain approval to, provide and erect a timber framed sign board ~mm x ~mm. Sign to be, fully painted with vinyl lettering or fully printed, and displaying:

- Title of contract
- Principal's name
- Contractor's name
- Consultants as listed in general section 1222 PROJECT PERSONNEL
- If the contractor wishes, names of subcontractors.

First aid

1 13 FIRST AID EQUIPMENT

Provide first aid equipment.

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1247 TRAFFIC CONTROL

1 GENERAL

This general section relates to temporary on and off site traffic control including:

- Access and egress
- Traffic control and signage
- Deliveries
- Parking
- Vehicle wash down

Access and egress

1.1 TRAFFIC MANAGEMENT PLAN

Refer to the building and resource consents for territorial authority requirements relating to the provision of a traffic management plan. Submit the plan to the contract administrator.

1.2 TRAFFIC SAFETY

The management of traffic safety on-site and related traffic off-site, to WorkSafe Managing Work Site Traffic - Good Practice Guidelines. Movement on and off-site also to territorial authority and/or NZTA requirements.

1.3 PROTECT NEW VEHICLE CROSSING

Provide protection to the new vehicle crossing for use by construction traffic for the duration of the contract. Comply with territorial authority requirements for the construction of temporary protection to the crossing. Ensure the protection is capable of supporting the heaviest loads to be delivered to the site. Maintain to an acceptable standard until it is no longer required for construction traffic. Replace the crossing if the temporary protection has not properly protected the existing crossing.

Traffic control and signage

1.4 TRAFFIC CONTROL - WORK IN THE ROADWAY

Where temporary works are required to be carried out in the roadway, obtain all required consents and comply with the road network authorities traffic management requirements.

1.5 CONES AND BARRIERS

Provide marker cones and barriers to demark restricted and dangerous areas and for other site safety reasons as required.

Deliveries

1.6 GOODS DELIVERY AREA

Refer to SELECTIONS for goods delivery area. Delivery vehicles that are not able to use the designated delivery area must queue in the designated off site waiting area.

Parking

1.7 PARKING

Refer to SELECTIONS for on site parking areas and parking restrictions.

Completion

1.8 REMOVE TEMPORARY PROTECTION

When no longer required remove temporary protection. Clean and leave in the condition prior to the contract works commencing. Replace surfaces where the protection has not provided the required protection.

2 SELECTIONS

2.1 SITE ACCESS

Access to the site is limited.
Refer drawing: ~

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2.2 SITE EGRESS

Egress from the site is limited.
Refer drawing: ~

2.3 TIME FOR ACCESS AND EGRESS

Site access and egress is allowed between the following times.
Times: ~ to ~

2.4 LIMITATION ON ACCESS AND EGRESS

Site access and egress is not allowed between the following times.
Times: ~ to ~

2.5 GOODS DELIVERY AREA

Designated delivery area: ~
Off site waiting area: ~

2.6 PARKING

On site parking is limited to the following areas.
Location: ~

2.7 PARKING RESTRICTIONS

Parking is not allowed in the following areas.
Location: ~

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1278SR SCHEDULE OF SLIP RESISTANCE TESTING

1 GENERAL

This section relates to the testing of surfaces for slip resistance. It includes:

- test methods and minimum test values required for slip resistance testing.
- general reporting requirements.

This section includes schedules identifying work sections with:

- slip resistant surfaces exempt from testing and slip resistant surfaces that have been tested and comply with NZBC D1/AS1 requirements for testing.
- surfaces that require slip resistance testing.

1.1 ASSOCIATED SECTIONS

Read in conjunction with:

- 1232S1 EXPLANATION OF SCHEDULE SECTIONS
- Work sections identified in the schedule(s)

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

BPN	British Pendulum Number
COF	Coefficient of friction
SDV	Slope design value
SRV	Slip resistance value

Documents

1.3 DOCUMENTS

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

NZBC D1/AS1	Access routes
AS 4586	Slip resistance classification of new pedestrian surface materials

Slip resistance - surfaces not requiring testing

1.4 SLIP RESISTANCE - SURFACES EXEMPT FROM TESTING

Walking surfaces on access routes that do not require testing for slip resistance include surfaces identified in NZBC D1/AS1, Table 2 as acceptable. These surfaces are covered in the following Work sections:

6141MF	Megafloor Polished Concrete
6221A	ARDEX Tiling Solutions
6413	Rubber Surfacing

1.5 SLIP RESISTANCE - PREVIOUSLY TESTED SURFACE

Walking surfaces on access routes that have previously been tested for slip resistance and found to comply with NZBC D1/AS1 requirements are covered in the following Work sections:

6221M	Mapei Tiling Solutions

Slip resistance - surfaces requiring testing

1.6 SLIP RESISTANCE - SURFACES REQUIRING TESTING

There are no work section requirements.

1.7 TEST METHODS & MINIMUM TEST VALUES

Refer to tables below for test methods and minimum test values required for the stated test condition.

Test condition:	Minimum test value required:	Test method:
Level access wet	39 SRV	Wet pendulum test method of AS 4586, Appendix A using the Slider 96 rubber.

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Sloping access wet	Refer to sloping access wet table below, select BPN value for stated slope.	Wet pendulum test method of AS 4586, Appendix A
Stairs wet - with slip resistant nosings	39 SRV	Wet pendulum test method of AS 4586, Appendix A using the Slider 96 rubber.
Stairs wet - without slip resistant nosings	50 BPN	Wet pendulum test method of AS 4586, Appendix A
Wet areas primarily used barefoot	“B” Classification	Obtain classification from the ramp method of AS 4586, Appendix C
Level access dry	0.4 COF	Obtain slip resistance value from the dry floor friction test method of AS 4586, Appendix B
Sloping access dry	Refer to sloping access dry table below, select COF value for stated slope.	Obtain slip resistance value from the dry floor friction test method of AS 4586, Appendix B
Stairs dry - with slip resistant nosings	0.4 COF	Obtain slip resistance value from the dry floor friction test method of AS 4586, Appendix B
Stairs dry - without slip resistant nosings	0.525 COF	Obtain slip resistance value from the dry floor friction test method of AS 4586, Appendix B
Contaminated walking surfaces	R~	Obtain classification from the oil-wet inclining platform test method of AS 4586, Appendix D

Sloping access wet - minimum test values required for a given slope

Minimum test value required (SDV)	Maximum gradient	Maximum slope in degrees
42 BPN	1 in 39	1.5°
43 BPN	1 in 29	2.0°
44 BPN	1 in 23	2.5°
45 BPN	1 in 20	3.0°
45 BPN	1 in 17	3.5°
46 BPN	1 in 15	4.0°
47 BPN	1 in 13	4.5°
48 BPN	1 in 12	5.0°
49 BPN	1 in 11	5.5°
50 BPN	1 in 10	6.0°

Sloping access dry - minimum test values required for a given slope

Minimum test value required (COF)	Maximum gradient	Maximum slope in degrees
0.433	1 in 39	1.5°
0.444	1 in 29	2.0°
0.455	1 in 23	2.5°
0.466	1 in 20	3.0°
0.477	1 in 17	3.5°
0.488	1 in 15	4.0°
0.499	1 in 13	4.5°
0.504	1 in 12	4.76°
0.521	1 in 11	5.5°
0.525	1 in 10	5.7°
0.543	1 in 9	6.5°
0.557	1 in 8	7.125°

1.8 GENERAL REPORTING REQUIREMENTS

Provide slip resistance test results to the contract administrator, including a statement that the tested surface meets or exceeds the nominated minimum test value. Refer to individual work sections for additional requirements. If no time is nominated for the submission of test results in the work section, then provide test results prior to practical completion.

If testing identifies a failure to meet performance requirements, notify the contract administrator and manufacturer/supplier. Consult with the manufacturer/supplier to identify the cause, then correct the failure and repeat the test.

Slip resistance - additional items

19 SLIP RESISTANCE - ADDITIONAL ITEMS

Refer to separate documentation for slip resistance requirements not contained within this specification.

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2361 STRIP FOOTINGS

1 GENERAL

This section relates to the supply and installation of concrete strip footings of non-specific design to NZS 3604 and NZS 4229, including;

- formwork, reinforcement, concrete mixes and the placing of concrete

1.1 RELATED WORK

Refer to ~ for ~

Documents

1.2 DOCUMENTS

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

NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3121	Water and aggregate for concrete
NZS 3604	Timber-framed buildings
NZS 4229	Concrete masonry buildings not requiring specific engineering design
NZS 4431	Code of practice for earth fill for residential development
AS/NZS 4671	Steel reinforcing materials
NZCMM	NZ Concrete Masonry Manual section 6.1 Masonry Retaining Walls

Requirements

1.3 QUALIFICATIONS

Concrete workers to be experienced, competent and familiar in the fabrication and erection of formwork and with the materials and the techniques specified.
All work to be installed or supervised by a Registered Mason or licensed building practitioner (LBP): Licensed for Bricklaying and Blocklaying 2: Structural Masonry. RBW must be supervised by an LBP.

1.4 QUALITY RECORDS

Do not place concrete/grout until all excavations, formwork/blockwork and reinforcing have been inspected and passed by the Building Consent Authority.

2 PRODUCTS

2.1 NORMAL CONCRETE

Normal concrete 17.5, 20 or 25 MPa grade (refer to SELECTIONS), maximum aggregate size 19mm ready-mixed to NZS 3104. Retain delivery dockets listing mix and despatch details.
Mass concrete 10 MPa grade.

2.2 REINFORCEMENT

To AS/NZS 4671 Grade 300E deformed mild steel except for ties in plain round mild steel and as detailed.

2.3 TYING WIRE

Mild drawn steel wire not less than 1.2mm diameter.

2.4 WATER

To NZS 3121. Water from a territorial authority/NUO water supply is acceptable.

2.5 SPACERS AND CHAIRS

Precast concrete or purpose made moulded PVC.

3 EXECUTION

3.1 STORAGE

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Handle and store reinforcing steel and accessories without damage or contamination. Store on timber fillets on hard ground in a secure area clear of any building operation. Lay steel fabric flat.

Ensure reinforcement is clean and remains clean so that at the time of placing concrete it is free of all loose mill scale, loose rust and any other contamination that may reduce bonding capacity.

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3.2 SOIL BEARING

To NZS 3604 or NZS 4229, Section 3, **Site Requirements**.
All soil bearing surfaces of footings shall be horizontal and may be stepped to accommodate variations in cleared ground level. Bearing shall be upon solid bottom in undisturbed good ground to NZS 3604 or NZS 4229, or firm fill with a "Statement Of Suitability...." to NZS 4431.

3.3 DEPTH OF FOOTINGS

As shown on drawings with minimum depth of footings below cleared ground level, to NZS 3604 or NZS 4229, clause 3.4.2.

- 200mm.

3.4 STEPPED FOOTINGS

Footings can be stepped for uneven sites with the following requirements:

- minimum vertical step in footings 600mm
- stepped walls overlapped minimum 450mm vertically and horizontally

3.5 MASS CONCRETE SUB FOOTING

Where good ground is greater than 600mm deep, 10 MPa mass unreinforced concrete can be used to fill up from the good ground to the required depth of the footing, to NZS 3604 or NZS 4229, clause 3.4.1. Refer to SELECTIONS for minimum dimensions.

3.6 BLINDING CONCRETE SUB FOOTING FOR MASONRY FOUNDATION

For footings made of reinforced concrete masonry lay the blocks on a level blinding of 17.5 MPa unreinforced concrete with a minimum thickness of 60mm and a minimum width of the masonry unit plus 110mm (centred).

3.7 WIDTH OF FOOTINGS

Footing to be centred on foundation wall above. Refer to drawings or SELECTIONS for minimum dimensions.

3.8 FORMWORK

Use formwork of sufficient strength to retain and support the wet concrete to the required profiles and tolerances. Select formwork finish to produce the specified finished quality. Water blast to clean formwork. Keep formwork wet before concrete is placed.

3.9 REINFORCEMENT

Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3109. Do not rebend bars. Where rebending is approved, use a purpose built tool, proper preparation and preheating.
Longitudinal reinforcing and ties, refer to SELECTIONS for size and quantity.
Stepped footings to NZS 4229, at least 50% of the lower footing reinforcement shall be turned up the step to a minimum of 450mm beyond the rebar intersection, and at least 50% of the upper footing reinforcement shall be carry on into the lower foundation wall to a minimum of 450mm (350 with hook) beyond the rebar intersection.

3.10 REINFORCING LAPS

To NZS 3604, 6.11.7, **Foundation wall reinforcement.** Horizontal reinforcing bars lapped 500mm minimum.
To NZS 4229, 6.6.3, 40 diameter laps for deformed bars.
Tie all lapping bars to each other.

3.11 STARTER BARS

Vertical starter reinforcement to NZS 4229, to match vertical wall reinforcement in size, type, location and spacing. Starters to penetrate foundation wall by 600mm minimum, and in the footing to be bent through 90° and tied to longitudinal reinforcing.

3.12 COVER

Minimum cover 75mm.

3.13 OPENINGS

Footings to be continuous under openings unless shown otherwise.

3.14 PUMPING CONCRETE

Set up and supervise pump operation, placing and compaction of the mix to, NZS 3109: **7.4 Handling and placing** and **7.6 Compaction,** advise the ready-mix supplier of the type of pump and the slump required, in addition to the concrete grade, strength and quantity.

3.15 STRIKE FORMWORK

Strike formwork without damaging or overloading structure to NZS 3109. Do not remove formwork before the following minimum periods under average temperature conditions:

12 hours: Sides of beams, walls and columns

Completion

3.16 PROGRESSIVE CLEANING

Clean off concrete spills as they occur, making good any damage at the same time.

3.17 FINAL CLEANING

Clean down exposed walls and remove waste material from adjoining surfaces at completion.

3.18 REMOVE

Remove from the site materials not used.

4 SELECTIONS

4.1 CONCRETE

Normal concrete: 17.5 MPa

4.2 MASS CONCRETE SUB FOOTING

Concrete strength: 10 MPa
Minimum width: ~mm
Minimum height: ~mm

4.3 BLINDING CONCRETE SUB FOOTING FOR MASONRY FOUNDATION

Concrete strength: 17 MPa
Minimum width: Masonry unit foundation width plus 110mm
Minimum height: 60mm

4.4 FOOTING SIZE AND REINFORCING

The following are minimum requirements.
Location: ~
Footing width: ~mm
Footing height/depth: ~mm
Longitudinal steel: ~ / D~
Stirrups: R6 ties @ 600mm centres minimum (to NZS 4229 table 6.2)

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3102 CONCRETE WORK - STANDARD

1 GENERAL

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This section relates to formwork, reinforcement, concrete mixes and the placing of concrete.

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

DPM	Damp proof membrane
MPa	Megapascal
CCANZ	Concrete NZ (Legacy Documents)

The following definitions apply specifically to this section:

ACRS	Australasian Certification Authority for Reinforcing and Structural Steels - An independent certification scheme for reinforcing steel and structural steel. Certifies compliance with Australia/New Zealand Standards. Web site - www.steelcertification.com
CNZ PAS:	Concrete New Zealand Plant Audit Scheme - an independent audit scheme for the production of concrete which certifies compliance with NZS 3104 Specification of Concrete Production. Web site: http://rmcplantaudit.org.nz

Documents

1.3 DOCUMENTS

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

NZBC B1/AS1	Structure
NZBC E2/AS3	External moisture
AS 1366.3	Rigid cellular plastics for thermal insulation - Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 1478	Chemical admixtures for concrete, mortar and grout - Admixtures for concrete.
AS/NZS 2269.0	Plywood - Structural - Specifications
AS/NZS 3000	Electrical installations
NZS 3101.1	Concrete structures standard
NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3114	Specification for concrete surface finishes
NZS 3121	Water and aggregate for concrete
NZS 3122	Specification for Portland and blended cements (General and special purpose)
NZS 3125	Specification for Portland-limestone filler cement
NZS 3604	Timber-framed buildings
NZS 3631	New Zealand timber grading rules
NZS 4229	Concrete masonry buildings not requiring specific engineering design
AS/NZS 4671	Steel reinforcing materials
AS/NZS 4672.1	Steel prestressing materials - General requirements
Concrete NZ TR3	Alkali silica reaction

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:

~

Manufacturer/supplier contact details

Company: ~
Web: ~
Email: ~
Telephone: ~

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Requirements

1.5 QUALIFICATIONS

Refer to 1270 CONSTRUCTION for requirements relating to qualifications

1.6 RECORDS

Retain the following records and make available to the contract administrator upon request:

- Mixing records
- Concrete delivery docket
- Reinforcing steel batch certificate
- Time, date, location and weather condition of each pour.

Performance

1.7 CONCRETE PRODUCTION COMPLIANCE

Concrete production and testing to comply with NZS 3104. Concrete to be supplied from a concrete batching plant holding a current quality Certificate of Audit provided by CNZ PAS Concrete NZ Plant Audit Scheme or an Auditing Engineer with credentials nominated in NZS 3104.

1.8 STEEL REINFORCING COMPLIANCE

Steel reinforcing and steel prestressing materials for concrete to AS/NZS 4671 or AS/NZS 4672.1, respectively. Steel reinforcing to be manufactured in New Zealand, or by an overseas manufacturer holding a current valid NZ S Mark or ACRS certificate for that type of steel.

If requested, the supplier to provide certification upon delivery that reinforcing steel complies with the grades specified on the drawings.

Steel that fails to meet these requirements is not to be used (or ordered) without the contract administrators written approval, further proof and/or testing may be required.

Quality control and assurance

1.9 CONCRETE ASSESSMENT - ON SITE

Where the quality of concrete supplied in in doubt, carry out concrete assessment during construction to NZS 3109: section 9 Concrete Assessment.
Make all test records available, if requested.

1.10 INSPECTIONS

Reviewer:	Stage:	Hold/Notification Point:
Construction Reviewer:	~	~

1.11 QUALITY ASSURANCE

Carry out the whole of this work to the requirements of NZS 3109.

Quality assurance procedures to include all aspects of concrete construction including;

- Formwork construction
- Reinforcing steel placing
- Cast in items
- Concrete supply
- Concrete placing and compaction
- Concrete finishes
- Construction tolerances

2 PRODUCTS

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Materials

2.1 CEMENT

General purpose Portland cement (Type GP) and general purpose blended cement (Type GB) to NZS 3122.

2.2 CEMENT, FILLER

Portland limestone filler cement to NZS 3125.

2.3 SAND

To NZS 3121 and NZS 3104 clause 2.5.4. The provisions of Concrete NZ TR3 apply when the sand is potentially reactive.

2.4 COARSE AGGREGATE, NORMAL CONCRETE

To NZS 3121, except as modified by NZS 3104: clause 2.5.3, Coarse aggregate. The provisions of Concrete NZ TR3 apply when the aggregate is potentially reactive.

2.5 WATER

To NZS 3121.

2.6 ADMIXTURES, SITE OR PLANT

To AS 1478.
For concrete defined as Normal Concrete(N) to NZS 3104, admixtures may be added at the Plant Engineers discretion as required by concrete producers mix design, subject to the following requirements:

- The quantity of admixture used and the method of mixing to be in accordance with manufacturers recommendations.
- Admixtures containing calcium chloride will not be permitted.
- Concrete must comply with the entrained air requirements of NZS 3101 when the surface is subject to freeze-thaw cycles.
- Additional admixtures may be added to concrete at the Contractor's request to control the set, in response to weather or environmental factors, subject to approval by Engineer.
- Admixtures containing calcium chloride will not be permitted where steel reinforcing is present.

Concrete

2.7 NORMAL CONCRETE

Normal concrete 17.5, 20, 25 MPA up to 50 MPa grade, maximum aggregate size 37.5mm, ready-mixed to NZS 3104 section 2 Provisions for Ready-Mixed Concrete. Refer to SELECTIONS.

Reinforcement

2.8 GRADE 300E STEEL

To AS/NZS 4671. Round bars are shown by symbol "R" and deformed bars by symbol "D", followed by the diameter in millimetres.

2.9 GRADE 500E STEEL

To AS/NZS 4671. Round bars shown by symbol "HR" and deformed bars by symbol "HD" followed by diameter in millimetres.

2.10 WELDED WIRE FABRIC

Hard drawn steel wire spot welded with correct gauge to AS/NZS 4671 Class E, smooth or deformed and to the spacings and dimensions either specified or shown on the drawings.

2.11 MESH FOR SLABS TO NZS 3604 OR NZS 4229

For concrete slab-on-ground designed to NZS 3604 or NZS 4229, mesh to be in accordance to NZBC B1/AS1, welded reinforcing mesh to AS/NZS 4671, Class E, minimum - Grade 500E, 2.27kg/m2 (1.14kg/m2 in each direction).

2.12 TYING WIRE

Mild drawn steel wire not less than 1.2mm diameter.

2.13 SPACERS AND CHAIRS

Precast concrete or purpose made moulded PVC to approval. Where concrete spacer blocks are used in exposed concrete work use blocks similar to surrounding concrete.

Formwork

2.14 TIMBER BOARDS

Dressing or merchantable grade radiata pine to NZS 3631 for shutter face, to obtain the concrete finish specified.

2.15 PROPRIETARY STEEL

An approved proprietary steel formwork and shutter system.

2.16 STRUCTURAL PLYWOOD

To AS/NZS 2269.0 for shutter face with plywood grade as necessary to obtain the concrete finish specified.

2.17 TIMBER FALSEWORK

No. 2 framing radiata pine or as required to construct the required formwork.

2.18 RELEASE AGENT

A release agent that will not stain or adhere to the concrete, contaminate reinforcing steel or construction joints, or have a detrimental effect on any finished surface or applied finishes.

Damp proof membrane

2.19 DAMP-PROOF MEMBRANE

0.25mm minimum polyethylene to NZS 3604, 7.5.4, **Damp-proof membrane**.

Accessories

2.20 CEMENT GROUTS

Cement mixed with the minimum quantity of water to obtain a suitable consistency. Grout cement to NZS 3122. Use grout within 30 minutes of preparation.

2.21 CELLULAR POLYSTYRENE INSULATION

Proprietary polystyrene foam board to AS 1366.3. Refer to SELECTIONS.

3 EXECUTION

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Installation/application

3.4 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

Unless stated otherwise on the drawings permissible deviations from established lines, grades, dimensions and cambers to remain within the tolerances laid down in NZS 3109: table 5.1, Tolerances for precast components and table 5.2,Tolerances for in situ construction.

3.5 TOLERANCES OF CONCRETE SURFACE FINISHES

Unless stated otherwise on the drawings, permissible abrupt, offset and gradual deviations for the specified surface finish to remain within the tolerances laid down in NZS 3114: table 3, Tolerances for abrupt deviations or offsets and gradual deviations.

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Fix formwork

3.6 LOADINGS

Design and construct formwork and falsework in accordance with in accordance with NZS 3109 Section 5 and sound engineering principles to withstand the worst combination of:

- dead loads of formwork, reinforcement, concrete and precast elements such as floor planks
- construction loads including dynamic effects of placing, compacting and construction traffic
- wind and snow loads

3.7 PROVIDE ALL FORMWORK

Provide formwork and falsework to NZS 3109 Section 5 and to achieve the required off-the-form surface finishes to NZS 3114. Fabricate in a manner permitting its easy removal without damage to the concrete.
Provide a 20mm x 20mm chamfer to all corners unless detailed otherwise. Protect corners from damage during and after stripping.
Keep absorbent formwork wet before concrete is placed. Clean formwork by waterblasting.

3.8 FALSEWORK

Carry strutting down to a construction sufficiently strong and stable to afford the required support without permissible stress or deflections being exceeded. Prop through to other floors if the construction load on a particular suspended floor exceeds the design load.

3.9 EXPOSED CONCRETE

Formwork linings and surface finishes as nominated for both fair face and concealed or exposed surfaces. Unless detailed, obtain written confirmation of the type and pattern of all joints.

3.10 JOINTS IN FORMS

Construct joints to prevent loss of grout between joints in form linings, as well as between forms and completed work. Column forms to have full height linings so that no horizontal joints occur on exposed faces.

3.11 CAMBERS

Cambers shown on the drawings or specified, relate to the concrete immediately before formwork is struck.

3.12 STRIKING FORMWORK

Ensure the safe removal of all or any part of the formwork. Remove without shock, vibration or damage to the concrete and in such a manner as to take the imposed stresses gradually to NZS 3109.5.4. Stripping times to NZS 3109 table 5.3.

Install damp proofing

3.13 INSTALL DAMP-PROOF MEMBRANE

Install to NZS 3604.7.5.6 Polyethylene (polythene) sheet damp proof membranes. Bring granular hardfill to a suitable surface to receive the DPM using maximum 25mm sand blinding.
Lay the DPM on prepared basecourse with 150mm laps between sheets. Seal laps and penetrations with 50mm wide pressure sensitive plastic tape.
Refer to drawings for perimeter details.

Install insulation

3.14 INSTALL UNDERSLAB POLYSTYRENE INSULATION

Install polystyrene insulation system to manufacturer's requirements.

Install reinforcing / cast-in items

3.15 INSTALL REINFORCEMENT TO NZS 3101 & NZS 3109

Install reinforcing in accordance to NZS 3101as modified by NZBC B1/VM1 and NZS 3109. Reinforcement spacing as dimensioned on drawings, or if not shown, to the clear distance minimums in NZS 3109, 3.6, Spacing of reinforcement and requirements of NZS 3101.1 8.3 Spacing of reinforcement.

3.16 CUT AND BEND

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Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3101.1, 8 and NZS 3109: 3.3 Hooks and bends. Minimum radii of reinforcement bends to NZS 3101.1, 8 and NZS 3109: table 3.1, Minimum radii of reinforcement bends. Do not rebend grade 500E bars. Where rebending is necessary for grade 300E bars, use a purpose built tool, proper preparation and preheating.

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3.17 ADJUSTMENTS

Use a purpose built tool for on site bending and to deal with minor adjustments to steel reinforcement.

3.18 TOLERANCES

Tolerances for reinforcement bending, bar spacing & position and concrete cover to NZS 3109, 3.9, Tolerances for reinforcement, unless tighter tolerances specified.

3.19 SECURE REINFORCEMENT

Secure reinforcement adequately with tying wire and place, support and secure against displacement when concreting. Bend tying wire back well clear of the formwork. Spacing as dimensioned, or if not shown, to the clear distance minimums in NZS 3109, 3.6, Spacing of reinforcement.

3.20 LAPPED SPLICES

Length of laps where not dimensioned on the drawings in accordance with the SELECTIONS. Provide laps only where indicated on the drawings. Tie all lapping bars to each other. Plain bars lapped splices must be hooked
Wire mesh laps to NZS 3101.1, lap one mesh square plus 50mm minimum (do not count bar extension beyond the outermost wire).

3.21 MESH LAPS FOR SLABS TO NZS 3604 OR NZS 4229

For slabs on ground the welded reinforcing mesh to be lapped such that the outermost wires overlap by the greater of:

- the spacing of the cross wires plus 50mm
- 150mm or
- manufacturer's requirements

Do not count bar extensions beyond the outermost cross wire

3.22 REINFORCING BAR LAPS TO NZS 3604

For foundation walls horizontal reinforcing bars to be lapped with a lap length of not less than 500mm. Corners and intersection laps shall be determined by NZS 3604 figure 6.15a

3.23 REINFORCEMENT COVER TO NZS 3101.1

Minimum cover to all reinforcing bars, stirrups, ties and spirals, as shown on drawings. Where cover is not shown on drawings provide minimum cover to NZS 3101.1, table 3.6, Minimum required cover for a specified intended life of 50 years. Sub-soil cover to NZS 3101.1, to suit soil and groundwater conditions. Fix chairs for top reinforcement in slabs at 1.0 metre centres or to ensure adequate support. Cover tolerances to NZS 3109, 3.9, Tolerances for reinforcement.

3.24 REINFORCEMENT COVER TO NZS 3604 OR NZS 4229

For in-situ concrete, foundations and interior slabs on ground, to NZS 3604 or NZS 4229, the reinforcement and welded mesh cover to be:

Location, cover to	**NZS 3604**	**NZS 4229**
Footing, to earth	75mm	75mm
Footing, to DPM	75mm	50mm
Foundation, to edge	75mm	75mm
Slab, to slab top	30mm	30mm
Slab, to slab edge	50mm to 75mm	50mm to 75mm

3.25 CASTING IN

Build in all grounds, bolts and fixings for wall plates and bracing elements, holding down bolts, pipes, sleeves and fixings as required by all trades and as shown on the drawings, prior to pouring the concrete.

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Do not use grounds exceeding 100mm in length. Location and form of conduits to be approved in writing by the Contract Administrator. Minimum cover 40mm. Do not encase aluminium items in concrete. Do not paint steel embedded items more than 25mm into the concrete encasement. Cut back form ties to specified cover and fill the cavities with mortar.

Form all pockets, chases and flashing grooves as required by all trades and as shown on the drawings.

Wrap all pipes embedded in concrete with tape to break the bond and to accommodate expansion. Do not embed pipes for conveying liquids exceeding a temperature of 50°C in concrete.

3.26 EQUIPOTENTIAL BONDING REINFORCING

If required by AS/NZS 3000 clause 5.6, ensure that reinforcing is electrically equipotential bonded (or at least conductor cable attached) before the concrete is poured. For bonded reinforcing ensure all reinforcing is interconnected with good contact at joints and tight conductive ties.

Place concrete

3.27 CONSTRUCTION JOINTS

Locate and construct as shown on the drawings or in accordance with NZS 3109, 5.6, Type B.

3.28 PRE-PLACEMENT INSPECTION

Do not place concrete until all excavations, boxing and reinforcing have been inspected and passed by the Building Consent Authority.

3.29 UNFAVOURABLE CONDITIONS

Do not place concrete in high winds or other unfavourable conditions in accordance with NZS 3109: 7.2 Unfavourable conditions

3.30 PROTECT CONCRETE WORK

Protect formwork, reinforcement, "build in" items and fresh concrete from damage, as the pour is placed, making good any damage if it occurs.

3.31 PREPARATORY WORK

Ensure at the time of placing, that surfaces to receive the concrete are clean, free of debris and with no free water present. Ensure reinforcement, cast-in items and hardened concrete against which fresh concrete is laid are free from any release agent or other deleterious surface deposit.

3.32 TRANSPORT CONCRETE

Transport concrete from agitator to final placement as quickly as possible using means that avoid segregation.

3.33 PUMPING CONCRETE

Set up and supervise pump operation, placing and compaction of the mix to NZS 3109, 7.4, Handling and placing and NZS 3109, 7.6, Compaction Advise the ready-mix supplier of the type of pump and the slump required, in addition to the concrete grade, strength and quantity.

3.34 PLACE CONCRETE

Place concrete to NZS 3109: clause 7.4, Handling and placing. Place in layers not more than 500mm deep, compacted and vibrated. Do not place fresh concrete against the preceding layer after more than 45 minutes, or such lesser time as required by the circumstances, to NZS 3109: clause 7.4, Handling and placing.

3.35 COMPACT CONCRETE

To NZS 3109: clause 7.6, Compaction. Compact by vibration of the concrete to expel entrapped air and until settlement of the concrete is visibly evident over all areas of the surface. Maintain vibration until settlement ceases and coarse aggregate at the surface is embedded. Do not continue vibration beyond reaching this condition.

Note: compaction by vibration is not required when using Self Compacting Concrete (SCC).

3.36 VIBRATORS

Use sufficient immersion vibrators, with one spare for emergency, to ensure that vibration is achieved throughout the entire volume of each layer of concrete, and until complete compaction is reached, to NZS 3109: clause 7.6, Compaction.

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Finishing

3.37 SCREED THE SURFACE

Screed the concrete surface by straight edge or vibrating screed immediately after compaction and to tolerances in NZS 3109: table 5.2, Tolerances for in situ construction.

3.38 SURFACE FINISHES

To NZS 3114, Part 1 Off-the-form surface finishes, Part 2 Exposed aggregate surface and Part 3 Floors, exterior pavements, and inverts, for slabs and pavements. Refer SELECTIONS.

3.39 SAW CUTS TO NZS 3604 OR NZS 4229

Provide saw cuts in accordance to NZS 3604 clause 7.5.8.6 Shrinkage Control Joints and NZS 4229 clause 7.8.5 Shrinkage Control Joints. Cut slabs where indicated on the drawings as required to control shrinkage cracking. Form by saw cutting the slab (blade width approximately 5 mm) to a quarter of the depth of the slab (saw cutting shall take place no later than 24 hours after initial set for average ambient temperatures above 20 ºC, and 48 hours for average ambient temperatures below 20 ºC).

3.40 SAW CUTS

Cut slabs where indicated and as required to control shrinkage cracking. Carry out cutting as soon as possible, without causing tear-out of aggregate and before shrinkage cracking has occurred, generally within 24 hours of pouring.

3.41 CLEAN OUT SAWCUTS

Clean out saw cuts. Fill with cement grout where the floor will be covered with carpet or vinyl.

Curing

3.42 CURING PERIOD

Cure all concrete for a minimum of 7 days. Keep time between placing of concrete and the start of curing to an absolute minimum. Ensure curing is continuous.

3.43 CURING METHOD

Notify the curing method to be used for this work. Select from the following methods;

- Ponding
- Sprinkling
- Wet coverings - Do not use at times of freezing weather
- Plastic sheet
- Curing compound

3.44 KEEP ABSORBENT FORMWORK MOIST

Keep formwork left in place continuously moist by sprinkling with water over the curing period. Continue sprinkling the exposed surface if the formwork is removed before the end of the curing period.

3.45 SECURE COVERINGS

When covering with sheet materials, ensure that edges are well secured throughout the specified curing period, to prevent draughts passing over the surfaces of the concrete.

Defects

3.46 DEFECTS

Reject concrete with structural defects. Immediately after stripping formwork, identify all defects and obtain direction. Do not carry out any repair work until directed and then only in accordance with the direction. Repair defects by cutting out, making good and replacing, or otherwise as directed.

3.47 SURFACE DEFECTS

Make good surface defects immediately after forms are stripped. Make good hollows or bony areas with 1:2 mortar or plaster, finished to the same tolerances as the parent concrete. Fill any tie rod holes with 1:2 mortar.

Completion

3.48 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

4.1 FORMWORK

Location: ~
Type: ~
Finish: ~

4.2 DAMP-PROOF MEMBRANE

Location: ~
Brand/type: ~
Thickness: ~

4.3 CELLULAR POLYSTYRENE INSULATION

Location: ~
Brand: ~
Type/grade: ~
Thickness: ~mm
R-value: ~

4.4 SAW CUTS

Location: ~
Spacing: ~

4.5 LOCATION OF CONSTRUCTION JOINTS

Location: ~
Spacing: ~

4.6 REINFORCEMENT LAPS

Where reinforcement laps are not shown on the drawings, lap as follows:

Bar Diameter	Grade 300E deformed	Grade 500E deformed
10mm	400mm	650mm
12mm	500mm	750mm
16mm	650mm	1000mm
20mm	800mm	1250mm
25mm	1000mm	1600mm
32mm	1200mm	2000mm

4.7 WELDED WIRE FABRIC

Location: ~
Type: ~
Wire diameter: ~mm
Pitch: ~mm

4.8 NORMAL CONCRETE (N)

Location: ~
28 day strength: ~ MPa
Aggregate size: ~mm maximum
Pigments: ~

4.9 SURFACE FINISHES

Location:	**Surface finish to NZS 3114:**
~	~
~	~
~	~

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3410 STRUCTURAL STEEL

1 GENERAL

This section relates to the fabrication, erection and specialist coating of structural steelwork of a general nature, for Construction Category CC1 or CC2 (to AS/NZS 5131).

Refer to SELECTIONS for project Construction Category.

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

AESS	Architecturally Exposed Structural Steelwork
CC	Construction Category
NDE	Non-Destructive Examination

1.3 DOCUMENTS

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

NZBC F5/AS1	Construction and demolition hazards
AS 1111.1	ISO metric hexagon bolts and screws - Product grade C - Bolts
AS 1111.2	ISO metric hexagon bolts and screws - Product grade C - Screws
AS 1112.1	ISO metric hexagon nuts - Style 1 - Product grades A and B
AS/NZS 1163	Cold-formed structural steel hollow sections
AS/NZS 1214	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS/NZS 1252.1	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Technical requirements
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 1554.1	Structural steel welding - Welding of steel structures
AS 1554.2	Structural steel welding - Stud welding (steel studs to steel)
AS/NZS 1554.3	Structural steel welding - Welding of reinforcing steel
AS/NZS 1554.4	Structural steel welding - Welding of high strength quenched and tempered steels
AS/NZS 1554.5	Structural steel welding - Welding of steel structures subject to high levels of fatigue loading
AS/NZS 1594	Hot-rolled steel flat products
AS 1627.4	Metal finishing - Preparation and pretreatment of surfaces - Abrasive blast cleaning
AS 1627.9	Metal finishing - Preparation and pretreatment of surfaces - Pictorial surface preparation standards for painting steel surfaces
AS/NZS 2312:2002	Guide to the protection of iron and steel against atmospheric corrosion by the use of protective coatings
NZS 3404.1	Steel Structures Standard
AS 3597	Structural and pressure vessel steel - Quenched and tempered plate
AS/NZS 3678	Structural steel - Hot-rolled plates, floorplates and slabs
AS/NZS 3679.1	Structural steel - Hot-rolled bars and sections
AS/NZS 3679.2	Structural steel - Welded I sections
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 5131	Structural steelwork - Fabrication and erection
AS/NZS ISO 13918	Welding - studs and ceramic ferules for arc stud welding
GANZ	Galvanizing Association of New Zealand - After-Fabrication Hot Dip Galvanizing. A practical reference for designers, specifiers, engineers, consultants, manufacturers and users

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1.4 MANUFACTURER DOCUMENTS

Manufacturer and supplier documents relating to work in this section are:
~

Copies of the above literature are available from ~
Web: ~
Email: ~
Telephone: ~
Facsimile: ~

Requirements

1.5 QUALIFICATIONS

Welding operators (and supervisors) to be experienced, competent workers, qualified to AS/NZS 5131, Table 7.4, to suit relevant Construction Category and weld category.

1.6 TOLERANCES

To AS/NZS 5131 Section 12 and Appendix F, Tolerance Class 1.

1.7 SHOP DRAWINGS

Generally to AS/NZS 5131, 4.4.
Refer to the general section 1235 SHOP DRAWINGS for the requirements for submission and review and the provision of final shop drawings.

Provide shop drawings to show, but not be limited to:

- Design calculations
- Fully dimensioned elevations of all elements (minimum scale 1:20)
- Complete details of construction, connections and all support systems (minimum scale 1:10)
- Jointing details and method of fixing between individual elements and between this installation and adjacent work
- Co-ordination requirements with other work
- A full schedule of materials and finishes.

Submit shop drawings for review to ~.

- ~ working days (at least) before fabrication is planned to commence, provide shop drawings for review.
- Complete shop drawing review before commencing fabrication.

1.8 VERIFY DETAILS AND DIMENSIONS

Refer to drawings to ensure all required details and fixings are provided for in the structural steelwork. Verify dimensions against site measurements prior to fabrication.

1.9 TESTS

To AS/NZS 5131, Section 13, Inspection, Testing And Correction and AS/NZS 5131 Appendix I, Inspection of Welding and Bolting (New Zealand Only), as follows:

- Welds: Non-destructive examinations (NDE)

1.10 HOT WORK - FIRE SAFETY

Refer to section 1270 CONSTRUCTION

2 PRODUCTS

2.1 STRUCTURAL STEEL

Comply with New Zealand, Australian, British or Japanese Standards for steel as required by NZS 3404.1, section 2, including, type, category, and suppression of brittle fracture. Also to AS/NZS 5131, Section 5.

Steel members and sections steel grade table

Component	Conforming to	Grade
Hot rolled steel sections	AS/NZS 3679.1	300; 350; 300L0; 300S0; 350L0, 300L15; 350L15

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Plates and flats	AS/NZS 3678; AS/NZS 1594;	250; 300; 350; 400; 450; WR350; 250L0, 300L0; 350L0; 300L15; 350L15
Plates and flats	AS/NZS 1594; TS 102	HA250; HA300; HA350; HA400; HW350
Circular hollow sections	AS/NZS 1163; TS 102	C250L0; C350L0; C450L0
Square hollow sections	AS/NZS 1163; TS 102	C350L0; C450L0
Rectangular hollow sections	AS/NZS 1163; TS 102	C350L0; C450L0
Welded beams and columns	AS/NZS 3679.2; TS 102	300; 400
Quench & tempered plate	AS 3597	500; 600; 700; 900; 1000
Purlins and girts	AS 1397	G250; G300; G350; G450; G500; G550, Z350, Z450

2.2 WELDING CONSUMABLES

To comply with and be selected for grade of steel being welded as required by AS/NZS 1554 series of standards.

2.3 FLUX

Welding flux to be dry and from sealed containers.

2.4 BOLTS, NUTS AND WASHERS

Grade 4.6, screws AS 1111.2 and bolts to AS 1111.1. Grade 4.6 nuts to comply with AS 1112.1. Property Class 8.8 bolts and equivalent nuts and washers (high strength structural quality only) to comply with AS/NZS 1252.1. Hot-dip galvanize to AS/NZS 4680 (and AS/NZS 1214), bolts, nuts and washers forming a permanent part of a structure subject to a protective coating.

Bolt Categories and tensioning

Bolting category	Bolt standard	Property Class	Tension method	Tensioned joint type
4.6/S	AS 1111.1	4.6	Snug tight	
8.8/S	AS/NZS 1252.1	8.8	Snug tight	
8.8/TB	AS/NZS 1252.1	8.8	Full tension	Bearing
8.8/TF	AS/NZS 1252.1	8.8	Full tension	Friction

In bearing type connections where the thread position relative to the shear plane is to be controlled.
N - threads included in shear plane
X - threads excluded from shear plane
F - friction type joints - prepare faying surfaces

2.5 GROUT

To AS/NZS 5131, 5.8.

3 EXECUTION

Preparation, assembly and Fabrication

3.1 GENERALLY

To AS/NZS 5131, Section 6.

3.2 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.3 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements. Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.4 SURFACE FINISH

Grind off all burrs and sharp arrises.

3.5 CUTTING

To AS/NZS 5131, Section 6.5.

3.6 HOLING

To AS/NZS 5131, Section 6.7
Do not use slotted holes for connections, other than those documented.

Welding

3.7 WELDING GENERALLY

To AS/NZS 5131, Section 7 and AS/NZS 1554.1. Equipment to comply with AS/NZS 1554.1, clause 1.8.2.
Site weld only when correct alignment and preset or camber have been achieved.
Weld types as documented elsewhere or on drawings
Weld categories not documented elsewhere or on drawings to be Category GP.

3.8 NON-DESTRUCTIVE WELD EXAMINATION

Non-destructive weld examination (NDE) to AS/NZS 5131, clause 13.6.2 and AS/NZS 5131 Appendix I, Inspection of Welding and Bolting (New Zealand Only).
If non-visual NDE is required, use a third party testing authority.
Repair any welds revealed as faulty by NDE and repeat the examination.

Mechanical fastening

3.9 MECHANICAL FASTENING GENERALLY

To AS/NZS 5131.
Connection contact surfaces to AS/NZS5131, 8.4.1.
Category 8.8/TF bolting to be clean, as rolled and free from applied finishes.
For washers, place one washer under the part rotated during tightening process (nut or bolt head).
Permanent bolt only when correct alignment and preset or camber have been achieved.

3.10 TENSIONING BOLTS

For tensioning of bolting categories 8.8/TB and 8.8/TF, use part-turn method or a direct tension indicator device. Ensure clear thread run out beneath the nut after tensioning is to New Zealand requirement of AS/NZS 5131, 8.2.2.

3.11 THREADS EXCLUDED FROM SHEAR PLANE

Select length of bolts such that the threaded portion does not occur within the shear plane between joined parts.

Erection of structural steel

3.12 ERECTION GENERALLY

To AS/NZS 5131, Section 11.
Make sure every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure.
Comply with NZBC F5/AS1: Construction and demolition hazards, and the WorkSafe publication: Guidelines for the provision of facilities and general safety in the construction industry.

3.13 BOLTS AND ANCHORAGES

For each group of anchor bolts, provide a template with set-out lines clearly marked for positioning the bolts when casting in.
Start erection only when the holding down bolts and anchorages have been cast-in-place long enough to achieve sufficient strength.

3.14 TEMPORARY WORK

Provide temporary bracing, propping and restraint as required to make structure safe. Fix any temporary members so as not to weaken or deface permanent steelwork. Leave temporary bracing and restraint in place until the erection is sufficiently advanced to allow safe removal of temporary bracing.

3.15 SITE WORK

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Other than work shown on the shop detail documentation as site work, do not fabricate, modify or weld structural steel on-site.

3.16 GROUTING SUPPORTS

Before grouting steelwork supported by concrete or masonry, set steelwork on packing or wedges as follows:

- Permanent packing or wedges - Form with solid steel or grout of similar strength to the permanent grout.
- Temporary packing or wedges - Remove before completion of grouting.

Grout at supports before constructing supported floors, walls and roofing.
Do not grout if the base plate or the footing surface temperature are outside the range 3°C to 35°C or to manufacturer's requirements.
Fill the space beneath the base plate with grout, if necessary hammered in tight to ensure complete filling of space.

3.17 DRIFTING

Use drifting only to bring members into position, without enlarging holes or distorting components.

3.18 EARTHING STRUCTURAL STEEL

If it is a project electrical requirement, ensure that any electrically at-risk, steel frames or isolated members, are earthed (or at least conductor cable attached) before the steel has any in-situ finishes applied or is enclosed.

3.19 TEMPORARY CONNECTIONS

Remove temporary elements on completion and restore the surface.

Completion & Commissioning

3.20 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

4.1 CONSTRUCTION CATEGORY

Construction category (to AS/NZS 5131)	Location
CC ~	~
CC ~	~

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3412DH DHS PURLINS & GIRTS

1 GENERAL

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This section relates to the fabrication, erection and finishing of the **Dimond** Hi-Span (DHS) cold formed, galvanized steel purlin and girt system; incorporating **Dimond** fastBRACE lock-in bracing.

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

NZBC F5/AS1	Construction and demolition hazards
AS/NZS 1252.1	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Technical requirements
NZS 3404.1	Steel Structures Standard
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 5131	Structural steelwork - Fabrication and erection
AS/NZS ISO 9001	Quality management systems - requirements
AS 1111.1	ISO metric hexagon bolts and screws - Product grade C - Bolts
AS 1112.1	ISO metric hexagon nuts - Style 1 - Product grades A and B
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1897	Electroplated coatings on threaded components (metric coarse series)
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER DOCUMENTS

Dimond Structural Systems Manual (web based Manual with dated update pages)
Dimond Installation Guide - Purlin Systems

Copies of the above literature are available from:

Web:	www.dimond.co.nz
Freephone:	0800 346 663.

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.5 SHOP DRAWINGS

Provide shop drawings.

Refer to the GENERAL sections for the requirements for submission and review and the provision of final shop drawings.

1.6 CO-ORDINATION

Refer to architectural, electrical and services drawings to ensure details and fixings required are provided for in the structural steel work.

1.7 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication.

Performance

1.8 PROJECT STRUCTURAL STEELWORK REQUIREMENTS

Refer to the appropriate Structural Steelwork section for project steel requirements, Categories and Classes to AS/NZS 5131.

1.9 QUALITY ASSURANCE

Maintain quality assurance programmes to AS/NZS ISO 9001 for both fabrication and erection as necessary to ensure that work is performed in accordance with this specification and the qualifying requirements of the contract documents.

1.10 INSPECTION

Inspect stages of fabrication and construction of the structure to AS/NZS 5131.

2 PRODUCTS

Materials

2.1 PURLINS AND GIRTS

Dimond Hi-Span (DHS) roll formed purlins and girts, pre-punched for installation of bracing channels and for connection to the purlin cleats. Manufactured from G450-500, Z275 galvanized steel to AS 1397. Size and thickness for the various locations as scheduled/as detailed on the drawings.

2.2 DIMOND FASTBRACE BRACING SYSTEM

Dimond fastBRACE roll formed channels complete with end cleats and locking tabs. Manufacture from G250, Z450 galvanized steel to AS 1397. Channel length for the various locations as scheduled/as detailed on the drawings.

2.3 BOLTED CHANNEL BRACING

Dimond DB 89/12 roll formed channels, complete with end cleats pre-punched for bolting. Manufacture from G250, Z450 galvanized steel to AS 1397. Channel length for the various locations as detailed on the drawings. Fully bolt between all DHS purlins up the rafter length.

2.4 TIE RODS

Engineering round bar as scheduled/as detailed on the drawings.

Components

2.5 BOLTS, NUTS AND WASHERS

Grade 4.6 bolts to comply with AS 1111.1. Grade 4.6 nuts to comply with AS 1112.1. Property Class 8.8 bolts, and equivalent nuts and washers (high strength structural quality only) to comply with AS/NZS 1252.1. Hot-dip galvanized to AS/NZS 4680, bolts, nuts and washers forming a permanent part of a structure subject to a protective coating. Alternatively electrogalvanize to AS 1897.

3 EXECUTION

Conditions

3.1 GENERALLY

Construct to AS/NZS 5131, section 6, Preparation, Assembly and Fabrication and AS/NZS 5131, section 11, Erection. Identify steel to NZS 3404.1 and AS/NZS 5131.

3.2 DEFECTS

Discard material showing visual defects affecting its structural integrity and/or appearance.

3.3 DELIVERY, STORAGE AND HANDLING

Keep components dry in transit. Store on a level firm base, clear of the ground, protected from weather, contamination and damage and away from current work areas. Prevent water and condensation from being trapped between adjacent surfaces.

Do not drag components across each other and other materials. Protect edges and surfaces from damage and ensure that section shape is not damaged during handling, storage or installation.

3.4 ERECTION GENERALLY

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Carry out the erection of DHS purlins, girts or associated bracing to the requirements of AS/NZS 5131. Comply with NZBC F5 1: Construction and demolition hazards, and the WorkSafe publication: Guidelines for the provision of facilities and general safety in the construction industry.

3.5 NO GAS CUTTING OR WELDING

Gas cutting of holes or welding of DHS purlins and girts is not permitted.

3.6 NO PREMATURE LOADING

Correctly position and complete bracing and connections to primary structure before any loads are applied.

Do not rely on bracing to perform structurally during craneage or pre-assembly. Provide additional temporary bracing as required.

Application

3.7 BOLTING

Bolting to AS/NZS 5131.

3.8 INSTALLATION OF DHS PURLINS

Install and bolt into position as detailed on the drawings.

3.9 INSTALLATION OF DHS GIRTS

Install and bolt into position as detailed on the drawings.

3.10 INSTALLATION OF DIMOND FASTBRACE SYSTEM

Install tie rods to ridge purlins as detailed.
Starting from the ridge, place the fastbrace with the bolted end nearest the ridge and bolt up. Pass the other end through the bracing holes typically at mid span and lock into position with the next brace. Repeat and work down the roof slope.

3.11 INSTALLATION OF BOLTED CHANNEL BRACING

Install bracing channels and bolt between alternate purlins, as shown on the drawings.
Install lock-in Dimond fastBRACE channels progressively from ridge to eaves in locations shown on the drawings.

3.12 EARTHING STRUCTURAL STEEL

If it is a project electrical requirement, ensure that any electrically at-risk, steel frames or isolated members, are earthed (or at least conductor cable attached) before the steel has any in-situ finishes applied or is enclosed.

4 SELECTIONS

For further details on selections go to www.dimond.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

4.1 DIMOND DHS PURLINS

Size:	DHS ~
Coating:	Z275

4.2 DIMOND DHS GIRTS

Size:	DHS ~
Coating:	Z275

4.3 DIMOND BRACING

Type:	~
Coating:	Z450

4.4 TIE RODS

Diameter:	~mm
Finish:	~

4.5 BOLTS, NUTS AND WASHERS

Grade:	~

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Coating: Galvanized
Size: ~mm

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3821 TIMBER FRAMING

1 GENERAL

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This section relates to the supply and erection of timber framing, as a framed structure, or as part of a partitioning system.

1.1 RELATED WORK

Refer to ~ for ~.
Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.
The following abbreviations apply specifically to this section:

FSC®	Forest Stewardship Council®
COC	Chain of Custody
PEFC	Programme for the Endorsement of Forest Certification

The following definitions apply specifically to this section:
SG Structural grade to NZS 3604, 1.3 Definitions

Documents

1.3 DOCUMENTS

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

NZBC B2/AS1	Durability
AS/NZS 2904	Damp-proof courses and flashings
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber-framed buildings
NZS 3622	Verification of timber properties
NZS 3631	New Zealand timber grading rules
NZS 3640	Chemical preservation of round and sawn timber
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry.
BRANZ BU 673	Cavity battens

***A copy of NZS 3604 Timber-framed building, must be held on site.**

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

1.5 DIMENSIONS

All timber sizes except for roof battens are actual minimum dried sizes.

Requirements

1.6 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

2 PRODUCTS

Materials

2.1 TIMBER FRAMING, TREATED

Species, grade and in service moisture content to NZS 3602, NZBC B2/AS1 and treatment to NZS 3640, NZBC B2/AS1. Structural grade (SG) to NZS 3604, NZS 3622 with properties to NZS 3603.

2.2 APPEARANCE TIMBERS

Graded to NZS 3631, treated where required by NZBC B2/AS1, NZS 3602, table 1, and treatment to NZS 3640.

2.3 STRAPPING

Treated to NZBC B2/AS1, NZS 3602, table 1 and to NZS 3640, clause 6.3.1.

Species:	Radiata pine
Grade:	SG6
Size:	70mm x 45mm, 45mm x 45mm or 45mm x 19mm

2.4 EXTERIOR CAVITY WALL BATTENS - TIMBER - NON-STRUCTURAL

To NZBC E2/AS1. H3.1 Radiata pine battens, 20mm thick, 45mm minimum width, and height to match timber framing studs. To NZS 3602, table 1, reference 1D.10, Requirements for wood-based building components to achieve a 50-year durability performance.

2.5 DPC

Refer to 4161 UNDERLAYS, FOIL AND DPC section

Components

2.6 NAILS

Type to NZS 3604, section 4, **Durability**, and of the size and number for each particular types of joint as laid down in the nailing schedules of NZS 3604, sections 6 - 10.

2.7 SCREWS

Wood screws to the requirements of NZS 3604, 2.4 Fastenings and Fabrication, and section 4, Durability, and of the type, number and form required for each screw application to NZS 3604, sections 6 - 10.

2.8 BOLTS AND COACH SCREWS

Bolts and coach screws complete with washers, to the requirements of NZS 3604, clause 2.4.5 Bolts and Coach Screws, and section 4, Durability, and of the type, number and form required for each particular junction to NZS 3604, sections 6 - 10.

2.9 THREADED RODS

Use stainless steel threaded rods of the required length, with washers and nuts at both ends, when stainless steel bolts of the required length are not available.

2.10 TIMBER CONNECTORS AND FIXINGS

Supply for each particular joint the connectors and fixings as noted on the drawings. Comply with the requirements of the manufacturer, NZS 3604, section 4, Durability, and of the number and form required for each particular junction to NZS 3604, sections 6-10.

2.11 BRACING STRAPS

Nail-on type to the requirements of NZS 3604, section 4, Durability, and of the number and form required for each particular application to NZS 3604, sections 6-10.

2.12 POWDER ACTUATED FASTENERS

To type, size and charge required by the powder actuated tool manufacturer for each particular member and the substrate.

2.13 CORROSION RISKS

For interior timber, treated with copper-based timber preservatives (H3.2 or higher), use a minimum of hot-dipped galvanized steel fixings and fasteners.

For exterior timber, timber in damp areas and timber subject to occasional wetting, use only stainless steel (or equivalent) fixings and connectors, when the timber is treated with; Copper Azole (CuAz, Preservative code 58), Alkaline Copper Quaternary (ACQ, Preservative code 90), Micronise Copper Azole (code 88) or Micronised Copper Quaternary (code 89).

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3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings, for framing to which linings are attached.

Moisture content:	
At erection	24% EMC maximum
At enclosure	20% EMC maximum
At lining	16% EMC maximum

3.4 PROTECT TIMBER

Protect all timber against damage and from inclement weather. Ensure that any variation in moisture content is kept to a minimum, before and after erection and before enclosure.

Installation/application

3.5 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

Timber framing tolerances shall be in accordance with NZS 3604 Table 2.1 Timber framing tolerances.

3.6 SEPARATION

Separate all timber framing timbers from concrete, masonry and brick by: -

- a full length polyethylene damp-proof course overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space

3.7 EXECUTION

Execution to comply with NZS 3604, except as varied in this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

3.8 SET-OUT

Set-out framing generally in accordance with the requirements of NZS 3604, to carry superimposed loads, and as required to support sheet linings and claddings. When necessary provide framing to suit required cladding/lining control joints and sheet joints.

3.9 SET TIMBERS

Set timbers true to required lines and levels with mitres, butt joints, laps and housings cut accurately to provide full and even contact over the whole of the bearing surface.

3.10 TIMBER CUTTING

Select and cut spanning members to minimise allowable defects and avoiding knots and short grain on edges in the middle third, and shakes, splits and checks at mid-span and close to ends.

3.11 STRAIGHTENING STUDS

Cutting for straightening to comply with NZS 3604, 8.5.3, Straightening studs.

3.12 TIMBER PLATES AND FURRING

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Fix to steelwork with bolts and washers or approved proprietary fastenings at 1 metre maximum spacing and not less than 2 fixings to each member, or to engineering specific design.

3.13 HOLES AND NOTCHES

Limit holes and notches, checks and half-housing for the structure to those allowable in NZS 3604. Neatly form holes and notches for services without lessening the structural integrity of the member.

3.14 EXPOSED TIMBER CONNECTORS AND FIXINGS

Do not use steel timber connectors and fixings on any structural framing exposed to view unless detailed on the drawings.

3.15 POWDER-ACTUATED FASTENING TOOLS

Comply with the requirements of WorkSafe and the Health and Safety at Work Act 2015. Powder-actuated fastening tool operators to have the appropriate current Certificate and/or Licence and tools to have the appropriate certificate of fitness if necessary.

3.16 ADDITIONAL FRAMING

Position and fix all necessary members for the fixing of all services, fittings, fixtures, edges of linings or claddings, and to provide lateral support to load carrying framing.

3.17 FORM NAILED JOINTS

Fully drive nails in all structural joints with the number and location for each particular joint, to the requirements of the nailing schedules of NZS 3604. Where splitting could occur, pre-drill to 80% of nail diameter.

3.18 FORM BOLTED JOINTS

Drill for and set bolts to ensure full bearing and development of the joint strength, with tension to just set the washers into timber or to engineering specific design.

3.19 FIT CONNECTORS AND FIXINGS

Fit connectors and fixings to obtain full bearing over all contact surfaces and full development of the required loading capacity for that particular joint and in accordance with the manufacturer's requirements or to engineering specific design.

3.20 FIT CAVITY BATTENS

Fit and fix 20mm cavity battens over wall underlay or rigid air barrier. Temporary fix battens before being permanently fixed into the framing with the cladding fixings, to the requirements of the manufacturer or to NZBC E2/AS1 and BRANZ BU 673. Make allowances for cladding control joints where required. Fit and fix related flashings. Fit and fix cavity closers to base of walls, open horizontal (or raking) junctions and over openings (windows, meters etc). Use cavity spacers set to 5° fall where fixing is required between cavity battens.

3.21 FIT BRACING

Fit and fix subfloor, wall and roof bracing elements to the requirements of the manufacturer or to NZS 3604, to develop the full number of bracing units required.

3.22 DPC TO LOSP TREATED TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section

3.23 DPC TO TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section

Completion

3.24 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

4.1 CERTIFIED SUSTAINABLE TIMBER

Product:	~
Certification type:	~
Timber species:	~
Origin:	~

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Claim: ~

4.2 SUB-FLOOR FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Bearers:	Radiata pine	SG8	H1.2
Ground floor joists:	Radiata pine	SG8	H1.2

4.3 SUB-FLOOR FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Bearers:	Douglas fir	Structural	H1.2
Ground floor joists:	Douglas fir	Structural	H1.2

4.4 FLOOR FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Mid floor joists:	Radiata pine	SG8	H1.2
Boundary joists:	Radiata pine	SG8	H1.2

4.5 FLOOR FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Mid floor joists:	Douglas fir	Structural	H1.2
Boundary joists:	Douglas fir	Structural	H1.2

4.6 EXTERIOR WALL FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Exterior walls:	Radiata pine	SG8	H1.2
Parapets:	Radiata pine	SG8	H1.2
Enclosed decks and balconies:	Radiata pine	SG8	H1.2
Cantilevered joists enclosed decks and balconies:	Radiata pine	SG8	H3.2
Nogs	Radiata pine	SG8	H1.2
Wall battens (not cavity):	Radiata pine	Merch	H1.2
Jamb battens	Radiata pine	Merch	H3.1

4.7 EXTERIOR WALL FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Exterior walls:	Douglas fir	SG8	H1.2
Parapets:	Douglas fir	SG8	H1.2
Enclosed decks and balconies:	Douglas fir	SG8	H1.2
Cantilevered joists enclosed decks and balconies:	Douglas fir	SG8	H3.2
Nogs	Douglas fir	SG8	H1.2
Wall battens (not cavity):	Douglas fir	Merch	H1.2
Jamb battens	Douglas fir	Merch	H3.1

4.8 ROOF FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Rafters:	Radiata pine	SG8	H1.2
Trusses:	Radiata pine	SG8	H1.2
Purlins:	Radiata pine	SG8	H1.2
Valley boards:	Radiata pine	Merch	H1.2
Sarking:	Radiata pine	Merch	H1.2
Skillion roof framing:	Radiata pine	SG8	H1.2
Enclosed flat roof framing:	Radiata pine	SG8	H1.2

4.9 ROOF FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Rafters:	Douglas fir	SG8	H1.2
Trusses:	Douglas fir	SG8	H1.2

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Purlins:	Douglas fir	SG8	H1.2
Valley boards:	Douglas fir	Merch	H1.2
Sarking:	Douglas fir	Merch	H1.2
Skillion roof framing:	Douglas fir	SG8	H1.2
Enclosed flat roof framing:	Douglas fir	SG8	H1.2

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4.10 INTERIOR WALL FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Non structural walls:	Radiata pine	SG8	H1.2
Structural and braced walls:	Radiata pine	SG8	H1.2

4.11 INTERIOR WALL FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Non structural walls:	Douglas fir	SG8	H1.2
Structural and braced walls:	Douglas fir	SG8	H1.2

4.12 CEILING FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Ceiling joists:	Radiata pine	SG8	H1.2
Timber ceiling battens:	Radiata pine	SG8	H1.2
Proprietary ceiling battens:	Manufacturer ~	Type ~	Reference ~

4.13 CEILING FRAMING - DOUGLAS FIR

Member	Species	Grade	Treatment
Ceiling joists:	Douglas fir	SG8	H1.2
Timber ceiling battens:	Douglas fir	SG8	H1.2
Proprietary ceiling battens:	Manufacturer ~	Type ~	Reference ~

4.14 EXTERIOR EXPOSED TIMBER

Member	Species	Grade	Treatment
Posts:	Radiata pine	SG8	H3.2 CCA
Joists:	Radiata pine	SG8	H3.2 CCA
Exterior stairs and steps:	Radiata pine	SG8	H3.2 CCA
Pergola:	Radiata pine	SG8	H3.2 CCA
Ground contact members	Radiata pine	SG8	H5 CCA

Note: All CCA preservative code 01 or 02

4.15 CAVITY BATTENS

Cavity battens	Species	Grade	Treatment
Timber - Structural	Radiata pine	Merch	H3.2
Timber - Non Structural	Radiata pine	Merch	H3.1
Proprietary - non structural:	Manufacturer ~	Type ~	Reference ~
Cavity closer:	Manufacturer ~	Type ~	Reference ~

4.16 SPECIAL FRAMING ELEMENTS

Member	Species	Grade	Treatment
~	~	~	~

4.17 DPC

Refer to 4161 UNDERLAYS, FOIL AND DPC section

4.18 NAILS

Location	Type	Material	Finish
~			

4.19 SCREWS

Location	Type	Material	Finish
~			

4.20 BOLTS AND COACH SCREWS

Location	Type	Material	Finish
~			

4.21 NAIL PLATES

Location	Type	Material	Finish
~			

4.22 CONNECTORS

Location	Type	Material	Finish
~			

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4161 UNDERLAYS, FOIL AND DPC

1 GENERAL

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This section relates to the application of:

- DPC/DPM
- wall underlays includes Kraft based and synthetic wall underlays
- roofing underlays includes kraft based and synthetic roof underlays
- foils
- vapour barriers
- accessories

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

NZMRM	New Zealand Metal Roofing Manufacturers Inc.
W2	Wall underlay Kraft/bituminous based Heavy grade
W3	Wall underlay Synthetic based non-absorbent
W4	Wall underlay Synthetic based absorbent
R1	Roof underlay Kraft/bituminous based Heavy grade
R2	Roof underlay Kraft/bituminous based Self-supporting
R3	Roof underlay Synthetic based Heavy grade
R4	Roof underlay Synthetic based Self-supporting

The following definitions apply specifically to this section:

Wall underlay	the same meaning as defined in NZBC E2/AS1, covering kraft based and synthetic wall underlays, sometimes called, wall wraps, building wraps or building papers.

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZS/AS 1530.2	Methods for fire tests on building materials, components and structures - Test for flammability of materials
NZS 2295	Pliable, permeable building underlays
AS/NZS 2904	Damp-proof courses and flashings
NZS 3604	Timber-framed buildings
AS/NZS 4200.1	Pliable building membranes and underlays
AS/NZS 4347.0	Damp-proof courses and flashings - Methods of test - General introduction, list of methods and test specimen requirements
AS/NZS 4389	Roof safety mesh
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents related to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
E-mail:	~
Telephone:	~

Requirements

1.5 INSTALLATION SKILL LEVELS

Installers to be familiar with the manufacturer's technical literature and the NZMRM CoP NZ Metal Roof and Wall Cladding Code of Practice.

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2 PRODUCTS

Materials

DPC

2.1 POLYETHYLENE DPC

Polyethylene film to AS/NZS 2904 and to the appropriate test methods set out in AS/NZS 4347.0. Thickness 500 microns minimum, manufactured for use as a damp-proof course and concealed flashings to doors and windows.

DPM

2.2 DAMP PROOF MEMBRANE - CONCRETE FLOOR

Polyethylene sheet with minimum thickness of 0.25mm to NZS 3604, 7.5.6, **Polyethelene (polythene) sheet damp-proof membranes**.

Wall Underlays

2.3 BITUMINOUS HEAVY WEIGHT WALL UNDERLAY (W2)

Wall underlay tested to NZS 2295.

2.4 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE - FIRE (W4)

Absorbent, breathable, fire retardant, non-woven, white soft spun-bonded polypropylene membrane. Designed for use as fire retardant membrane, with Flammability Index of 1, when tested to NZS/AS 1530.2.

2.5 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYOLEFIN - FIRE (W4)

Absorbent, breathable, fire retardant polyolefin (polyethylene) woven into sheet form with micro sized pores that allow the membrane to breathe with a fire retardant flammability index of 1, tested to NZS/AS 1530.2.

2.6 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE (W4)

Absorbent, breathable spun bonded polypropylene type building membrane, coated with a breathable water resistant film.

2.7 NON-ABSORBENT SYNTHETIC WALL UNDERLAY - POLYOLEFIN (W3)

Non-absorbent, breathable very fine high density white polyolefin fibres bonded with heat and pressure to form a wide sheet.

Accessories

2.8 WINDOW DOOR SEALING SYSTEM

Proprietary window and door flashing tape and accessories to E2/AS1, paragraph 4.3.11, **Flexible flashing tape**, paragraph 9.1.5, **Wall underlays to wall openings**.

2.9 STUD STRAPS

19mm wide polyethylene straps, for cavity construction with framing centres greater than 450mm.

2.10 GUTTER AND UNDER FLASHINGS

Bituminous breather type underlay cut to width by manufacturer for use under valley, apron flashing and internal gutters. Soffit liner cut to width from bituminous breather type underlay.

2.11 ADHESIVE TAPE

Adhesive tapes to compliment the underlay. Pressure sensitive tapes for joining foil insulation and vapour barriers.

3 EXECUTION

Conditions

3.1 GENERAL REQUIREMENTS

To NZBC E2/AS1 Table 23 Properties of Roof Underlays and Wall Underlays; and manufacturers technical literature.
Note: Care should be taken not to expose the underlay to continuous wet and windy conditions.

3.2 STORAGE

Store wall and roofing underlays and accessory materials, under conditions that ensure no deterioration or damage. Store rolls in an upright position on a smooth floor and protected from sunlight, UV radiation and moisture.

3.3 INSPECTION

Before starting work, check that the framing will allow work of the required standard. Carry out remedial work identified before laying underlay.

Application - DPC

3.4 POLYETHYLENE DPC TO TIMBER

Lay polyethylene DPC under treated and untreated timber, including LOSP treated timber, of all timber framed walls on concrete and concrete masonry, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

3.5 DPC TO MASONRY AND BRICK VENEER

Lay DPC along base of cavity and fix top edge to studs with galvanized clouts. Turn DPC out over concrete rebate under bottom course of veneer.

3.6 DPC BETWEEN DISSIMILAR MATERIALS

Lay DPC between dissimilar materials where required.

Application - DPM

3.7 DPM TO CONCRETE FLOOR

Lay DPM under concrete floor substrate over sand binding, in a single layer with 150mm overlaps at joints to provide a waterproof barrier.

Application - Wall Underlay

3.8 WALL UNDERLAY

Fix horizontally to outside face of substrate in true alignment, with succeeding sheets overlapping 150mm to NZBC E2/AS1, clause 9.1.7, **Wall underlay** and refer to manufacturer for requirement for fastenings. Fix to manufacturers requirements. Scribe neatly around penetrations and openings to leave no gaps. Tape all penetrations. Keep clean, undamaged and without visible weather deterioration until closed in.

3.9 INSTALL STUD STRAPS

Over underlay, install 19mm wide polyethylene straps horizontally at 300mm centres, draw taut and fix to studs with stainless steel staples.

3.10 METAL CLADDING ON TIMBER CAVITY BATTENS

Fix strip of underlay to face of batten before fixing the metal cladding.

Completion

3.11 CLEAN UP

Clean up as the work proceeds.

3.12 LEAVE

Leave work to the standard required by following procedures.

3.13 REMOVE

Remove debris, unused materials and elements from the site.

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4 SELECTIONS

4.1 DPC

Location: ~
Brand / type: ~ / ~

4.2 DPM - CONCRETE FLOOR

Location: ~
Brand / type: ~ / polyethylene DPM
Thickness: ~
Jointing tape: ~

4.3 WALL UNDERLAY

Location: ~
Brand / type: ~ / ~
Jointing tape: ~

Accessories

4.4 WINDOW/DOOR SEALING SYSTEM

Brand / type: ~ / flashing tape

4.5 AIR SEAL BACKING ROD

Location: ~
Brand / type: ~ / ~
Size: ~ mm

4.6 STUD STRAPS

Location: ~
Brand / type: ~ / 19mm wide polyethylene strap

4.7 GUTTER AND UNDER FLASHINGS

Location: ~
Brand / type: ~ / ~

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4161T KINGSPAN THERMAKRAFT UNDERLAYS, FOILS, DPC, DPM, & TAPES

1 GENERAL

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This section relates to the supply and installation of Kingspan's Thermakraft product range including DPC, DPM, Wall & Roof Underlays, Foils, Flashing Tapes, and accessories.

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

DPC	Damp proof course
DPM	Damp proof membrane
EPDM	Ethylene propylene diene monomer

The following definitions apply specifically to this section:

Wall underlay	The same meaning as defined in NZBC E2/AS1, covering kraft based and synthetic wall underlays, sometimes called wall wraps, building wraps or building papers.

Documents

1.3 DOCUMENTS

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

AS 1530.2	Methods for fire tests on building materials, components and structures - Test for flammability of materials
NZS 2295	Pliable, permeable building underlays
AS/NZS 2904	Damp-proof courses and flashings
NZS 3604	Timber-framed buildings
NZS 4229	Concrete masonry buildings not requiring specific engineering design
AS/NZS 4347	Damp-proof courses and flashings - Methods of test
AS/NZS 4389	Roof safety mesh
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire

CodeMark BRANZ-CM-1002 (Rev 2) - Watergate Plus Wall Underlay
CodeMark CMNZ 30028 (Rev I) - Thermakraft Covertek 407 Roof and Wall Underlay
CodeMark CMNZ 30030 (Rev I) - Thermakraft Covertek 405 Roof and Wall Underlay
CodeMark CMNZ 30069 (Rev H) - Thermakraft Covertek 403 Roof and Wall Underlay

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:
Thermakraft's Product Data Sheets
Thermakraft's Installation Guides
BRANZ Appraisal 329 (2022) - Supercourse 500 Damp-Proof Course and Concealed Flashing - Amendment 29.08.2023
BRANZ Appraisal 651 (2019) - Thermakraft Covertek 407 Roof and Wall Underlay - Amendment 14.05.2024
BRANZ Appraisal 695 (2023) - Watergate Plus Wall Underlay - Amendment 14.05.2024
BRANZ Appraisal 743 (2019) - Thermakraft Covertek 405 Roof and Wall Underlay - Amendment 24.05.2024
BRANZ Appraisal 878 (2025) - Thermakraft Aluband Window Flashing Tape
BRANZ Appraisal 912 (2021) - Thermakraft 220 Synthetic Wall Underlay - Amendment 17.01.2025
BRANZ Appraisal 917 (2020) - Thermakraft Covertek 403 Roof and Wall Underlay - Amendment 14.05.2024
BRANZ Appraisal 942 (2022) - OneSeal Multi-fit Pipe and Cable Penetration Seals - Amendment 04.06.2024

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BRANZ Appraisal 943 (2021) - Thermakraft Covertek 401 Roof and Wall Underlay - Amendment 25.11.2023
BRANZ Appraisal 1000 (2023) - Thermakraft Thermabar 397 Light Diffusing Reflective Underlay
BRANZ Appraisal 1029 (2023) - Thermakraft Ausnet Hexagonal Wire Mesh
BRANZ Appraisal 1104 (2020) - Thermathene Orange Concrete Underlay - Amendment 06.09.2024
BRANZ Appraisal 1122 (2020) - Thermaflash Flashing Tape - Amendment 02.09.2024
BRANZ Appraisal 1229 (2023) - Thermakraft Covertek 215 Roof Underlay
BRANZ Appraisal 1277 (2025) - Thermakraft RainArmor Self Adhesive Roof Underlay and Wall Underlay

Manufacturer/supplier contact details

Company:	Kingspan Insulation NZ Ltd
Web:	www.thermakraft.co.nz
Email:	technical@kingspaninsulation.co.nz
Telephone:	0800 806 595

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years	For Kingspan Thermakraft product range.

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Compliance information - CodeMark certified

1.8 CODEMARK CERTIFICATE - THERMAKRAFT WATERGATE PLUS

Thermakraft Watergate Plus wall underlay meets the requirements of the NZBC when used within the conditions and limitations of its CodeMark Certificate of Conformity BRANZ-CM-1002 (Rev 2).

1.9 CODEMARK CERTIFICATE - THERMAKRAFT COVERTEK 403

Thermakraft Covertek 403 roof and wall underlay meets the requirements of the NZBC when used within the conditions and limitations of its CodeMark Certificate of Conformity CMNZ 30069 (Rev H).

Compliance information - BRANZ appraised

1.10 BRANZ APPRAISED - THERMAKRAFT SUPERCOURSE 500

Thermakraft Supercourse 500 DPC has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 329

1.11 BRANZ APPRAISED - THERMAKRAFT WATERGATE PLUS

Thermakraft Watergate Plus wall underlay has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 695

1.12 BRANZ APPRAISED - THERMAKRAFT ALUBAND

Thermakraft Aluband flashing tape has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 878

1.13 BRANZ APPRAISED - THERMAKRAFT COVERTEK 403

Thermakraft Covertek 403 roof and wall underlay has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 917

1.14 BRANZ APPRAISED - THERMAKRAFT ONESEAL

Thermakraft OneSeal multi-fit pipe and cable penetration seal has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 942

1.15 BRANZ APPRAISED - THERMAKRAFT AUSNET

Thermakraft Ausnet wire netting has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 1029

1.16 BRANZ APPRAISED - THERMAKRAFT THERMATHENE ORANGE

Thermathene Orange DPM has been appraised as meeting provisions of the NZBC when used within the Conditions and Limitations of its BRANZ Appraisal 1104

2 PRODUCTS

DPC

2.1 THERMAKRAFT SUPERCOURSE 500

BRANZ appraised, 0.5mm thick embossed black film DPC composed of recycled alloyed polyethylene. Tested to AS/NZS 4347 in accordance with AS/NZS 2904. Available in various width. Refer to SELECTIONS.

DPM

2.2 THERMAKRAFT THERMATHENE ORANGE

BRANZ appraised, 0.3mm thick x 4000mm wide orange DPM composed of recycled alloyed polythene. Membrane has a vapour flow resistance of at least 90MNs/g to NZS 3604 and NZS 4229 Damp-Proof Membranes. Refer to SELECTIONS.

Synthetic underlays - fire retardant

2.3 THERMAKRAFT WATERGATE PLUS

CodeMark certified and BRANZ appraised synthetic wall underlay, white with blue logo print, composed of a water resistant vapour permeable film laminated to a non-woven polyolefin sheet. Fire retardant, tested to AS 1530.2 and assigned a Flammability Index of ≤5. Available in 685mm, 1370mm and 2740mm width. Refer to SELECTIONS.

2.4 THERMAKRAFT COVERTEK 403

CodeMark certified and BRANZ appraised synthetic roof and wall underlay, white with green logo print, composed of a water resistant vapour permeable film laminated to two layers of non-woven, spun bonded polyolefin sheet. Fire retardant, tested to AS 1530.2 and assigned a Flammability Index of ≤5. Available in 1350mm width. Refer to SELECTIONS.

Components - sealing

2.5 THERMAKRAFT WHITE GENERAL PURPOSE TAPE

60mm wide, white polypropylene general purpose tape with acrylic adhesive. Refer to SELECTIONS.

2.6 THERMAKRAFT PREMIUM JOINING TAPE

75mm wide, black self-adhering multi-layer synthetic construction tape. Refer to SELECTIONS.

2.7 THERMAKRAFT ONESEAL

BRANZ appraised black multi-fit pipe and cable penetration seal composed of adhesive coated, 1.2mm thick flexible synthetic rubber material (EPDM) with pre-notched ring markings. Refer to SELECTIONS.

2.8 THERMAKRAFT CORNER MOULDS

Orange, flexible inert polythene moulded window corner flashing. Refer to SELECTIONS.

2.9 THERMAKRAFT ALUBAND

BRANZ appraised, black, self-adhering polymeric faced bituminous flashing tape. Available in 75mm, 150mm and 200mm width. Refer to SELECTIONS.

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Components - secure strapping/netting

2.10 THERMAKRAFT THERMASTRAP

19mm wide, rigid embossed polypropylene strap, colour blue. Refer to SELECTIONS.

2.11 THERMAKRAFT STUD STRAP

25mm wide, flexible woven and coated polythene strap, colour black. Refer to SELECTIONS.

2.12 THERMAKRAFT AUSNET

BRANZ appraised 1mmØ x 2000mm wide galvanized steel hexagonal wire netting to AS/NZS 4534. Available in 50mm and 75mm mesh size. Refer to SELECTIONS.

2.13 THERMAKRAFT AUSMESH

2mmØ galvanized steel safety mesh to AS/NZS 4389, 150mm x 300mm mesh size. Available in 1800mm and 2400mm width. 1800mm wide mesh can be white or black PVC coated. Refer to SELECTIONS.

Fixings

2.14 FIXINGS - TO TIMBER

Little grippers, staples, clouts or screws to suit application. Refer to SELECTIONS.

2.15 FIXINGS - TO STEEL

Construction grade double sided tape, adhesive or galvanized flat head screws to suit application. Refer to SELECTIONS.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Installation/application - generally

3.4 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

Installation - DPC

3.5 INSTALL DPC

Ensure substrate's surface is smooth, flat and free from sharp ridges/projections that may puncture membrane. Install as a single layer with minimum 50mm overlap at joints to the Installation Guide.

Installation - DPM

3.6 INSTALL DPM - CONCRETE FLOOR

Install DPM over sand blinding below concrete floors, install in a neat fashion with a smooth surface as a single layer with minimum 150mm overlap at joints to the Installation Guide.

3.7 APPLY TAPE TO LAPPED DPM JOINTS

Ensure DPM is free of dust and contaminates, where required clean with a dry cloth. Apply tape to the Installation Guide centred over joint laps by firmly pressing down without stretching or pulling tape.

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Installation - wall underlay

3.8 INSTALL WALL UNDERLAY

Install wall underlay to the Installation Guide horizontally and in true alignment over exterior face of wall framing including openings. Start by placing first sheet overlapping bearer or bottom plate by 35mm, draw taut and fix at maximum 300mm centres to wall framing members. Install additional sheets in row repeating the process for the first sheet with sheet end laps to be of at least 150mm and occurring over wall framing. Install sheets up to the top of the top plate repeating the installation process for the first row and overlapping higher over lower sheets by at least 150mm.

3.9 INSTALL WALL PENETRATION SEALS

Ensure wall underlay is free of dust and contaminates, where required clean with a dry cloth. Install penetration seal to the Installation Guide over pipe/conduit with a tight fit. Slide seal over pipe/conduit and place on underlay in a diamond shape. Remove backing release film and push firmly down to fix in place.

Installation - secure netting/strapping

3.10 INSTALL SECURE STRAPPING

Place straps on underlay, draw taut and fix to framing to the Installation Guide.

3.11 INSTALL WIRE NETTING

Install wire netting to the Installation Guide in the same direction as the underlay. Where required to facilitate water drainage install netting with a sag, otherwise draw taut. Tie edges of netting together with galvanized wire clips and fix in place.

3.12 INSTALL SAFETY MESH

Install safety mesh to the Installation Guide and AS/NZS 4389.

Installation - roof underlay

3.13 INSTALL ROOF UNDERLAY - HORIZONTAL

Install underlay to the Installation Guide horizontally and in true alignment over exterior face of roof framing. Place first sheet overlapping guttering (max. 20mm) or if eaves flashing is used terminate on the upper side of the flashing, draw sheet taut and fix at maximum 300mm centres to roof framing members. Install additional sheets in row repeating the process for the first sheet with sheet end laps to be of at least 150mm. Install sheets up to and over the ridge repeating the installation process for the first row and overlapping higher over lower sheets by at least 150mm.

3.14 INSTALL ROOF UNDERLAY - VERTICAL

Install underlay to the Installation Guide vertically and in true alignment over exterior face of roof framing. Place first sheet up the slope to the ridge overlapping guttering (max. 20mm) or if eaves flashing is used terminate on the upper side of the flashing, draw sheet taut and fix at maximum 300mm centres to roof framing members. Install additional sheets repeating the process for the first sheet lapping joints by at least 150mm.

Preparation of wall underlay for window/door placement

3.15 INSTALL CORNER MOULDS

Install corner moulds with tight fit to sill/jamb corners to the Installation Guide.

3.16 APPLY FLASHING TAPE ACROSS SILL/JAMB CORNERS

Cut 75mm wide tape to 100mm length. Apply to exterior wall surface across sill/jamb corners at 45°, overlap corners by 3mm.

Completion

3.17 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.thermakraft.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

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DPC

4.1 DPC - THERMAKRAFT SUPERCOURSE 500

Location:	~
Manufacturer:	Thermakraft
Brand:	Supercourse 500
Type:	Damp proof course
Width:	~

DPM

4.2 DPM - THERMAKRAFT THERMATHENE ORANGE

Location:	~
Manufacturer:	Thermakraft
Brand:	Thermathene Orange
Type:	Damp proof membrane
Width:	4000mm
Joint tape:	~

Synthetic underlays - fire retardant

4.3 WALL UNDERLAY - THERMAKRAFT WATERGATE PLUS

Location:	~
Manufacturer:	Thermakraft
Brand:	Watergate Plus
Type:	Synthetic wall underlay
Width:	~
Fixings:	~

4.4 ROOF & WALL UNDERLAY - THERMAKRAFT COVERTEK 403

Location:	~
Manufacturer:	Thermakraft
Brand:	Covertek 403
Type:	Synthetic roof and wall underlay
Width:	1350mm
Fixings:	~

Components for sealing wall underlay penetrations

4.5 PENETRATION SEAL - THERMAKRAFT ONESEAL

Location:	~
Manufacturer:	Thermakraft
Brand:	OneSeal
Type:	Pipe and service penetration seal
Size:	~

4.6 WINDOW CORNER FLASHING - THERMAKRAFT CORNER MOULDS

Location:	~
Manufacturer:	Thermakraft
Brand:	Corner Moulds
Type:	Window corner flashing
Fixings:	~

Components for securing underlays

4.7 SECURE STRAPPING - THERMAKRAFT THERMASTRAP

Location:	~
Manufacturer:	Thermakraft
Brand:	Thermastrap
Type:	Secure strapping

Width:	19mm
Fixings:	~

4.8 SECURE STRAPPING - THERMAKRAFT STUD STRAP

Location:	~
Manufacturer:	Thermakraft
Brand:	Stud Strap
Type:	Secure strapping
Width:	25mm
Fixings:	~

4.9 SUPPORT NETTING - THERMAKRAFT AUSNET

Location:	~
Manufacturer:	Thermakraft
Brand:	Ausnet
Type:	Support netting
Width:	2000mm
Mesh size:	~
Fixings:	~

4.10 SAFETY MESH - THERMAKRAFT AUSMESH

Location:	~
Manufacturer:	Thermakraft
Brand:	Ausnet
Type:	Safety mesh
Width:	~
Mesh size:	150mm x 300mm
Finish:	~
Fixings:	To AS/NZS 4389

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4231HA JAMES HARDIE AXON™ PANEL CLADDING

1 GENERAL

This section relates to the supply and fixing of James Hardie Axon™ Panel cladding.

1.1 RELATED WORK

Refer to ~ for ~.
Refer to painting section/s for the protective coating required to meet the NZBC durability requirements.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:
LRV: Light Reflectance Value
CLD: Ceramic Low Density

Documents

1.3 DOCUMENTS

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

NZBC C/AS1-AS2	Protection from fire
NZBC E2/AS1	External Moisture
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS/NZS 2908.2	Cellulose-cement products-Flat sheet
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber-framed buildings
AS/NZS 3837	Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter
NFPA 285:2019	Standard fire test method for evaluation of fire propagation characteristics of exterior wall assemblies containing combustible components

CodeMark Certificate CMNZ30165 - Axon™ Panel Cladding by James Hardie

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

James Hardie® documents relating to this part of the work:
Axon™ Panel Timber Cavity Batten Technical Specification March 2024
Axon™ Panel Fixed to Hardie™ CLD™ Structural Cavity Batten Technical Specification March 202
Axon™ Panel Direct Fixed Technical Specification March 2024
Hardie™ Flex Sheet technical specification
Fire and Acoustic Design Manual by James Hardie®
BRANZ Appraisal 1211 [2022] - Axon™ Panel Cladding

Manufacturer/supplier contact details

Company:	James Hardie New Zealand Limited
Web:	www.jameshardie.co.nz
Email:	info@jameshardie.co.nz
Telephone:	Ask James Hardie™ on 0800 808 868.

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years:	For James Hardie Axon™ Panels (refer to James Hardie product warranty)

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15 year:	For accessories supplied by James Hardie (refer to James Hardie product warranty)
From:	Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.7 SAFE WORKING

To James Hardie requirements for safe working practices with James Hardie products, particularly with regards to cutting and drilling.

1.8 INFORMATION FOR OPERATION AND MAINTENANCE

Provide relevant James Hardie maintenance requirements at completion of the work.

Performance - Wind

1.9 PERFORMANCE - WIND

James Hardie Axon™ Panel is suitable for use in all wind zones up to design wind pressure of 3.2kPa ULS and building height 25m maximum.

Performance - Fire

1.10 EXTERNAL FIRE SPREAD - CLADDING EXEMPT FROM TESTING

To NZBC C/AS1, 5.3 External cladding systems or NZBC C/AS2, 5.8 External Cladding Systems, where external walls are located at a distance greater than or equal to 1.0m from a relevant boundary and a building height less than 10m.

1.11 EXTERNAL FIRE SPREAD - CLADDING SYSTEM AND MATERIALS

James Hardie Axon™ Panel cladding system is tested to NFPA 285 passing test criteria. Cladding materials achieve Type A classification to AS/NZS 3837 (peak heat release rate ≤ 100 kW/m², total heat release rate ≤ 25 MJ/m²).

2 PRODUCTS

Materials

2.1 WALL UNDERLAY

Refer to section 4161 UNDERLAYS, FOIL AND DPC.

2.2 EXTERIOR CAVITY WALL BATTENS

Radiata pine battens, minimum 45mm wide and 70mm wide x 18mm thick, H3.1 treated, height to match timber framing studs. To NZS 3602, Table 1, reference 1D.10, Requirements for wood-based building components to achieve a 50-year durability performance.

2.3 EXTERIOR CAVITY CLOSER/VERMIN-PROOFING

Perforated uPVC, with upstands.

2.4 AXON™ PANEL

James Hardie Axon™ Panel, face primed shiplap jointed panels, 9.0mm and 8.5mm thick, manufactured from cellulose fibre reinforced cement to AS/NZS 2908.2. Refer to SELECTIONS.

2.5 AXENT™ TRIM

Hardie™ Axent™ Trim, 45mm, 70mm and 89mm wide x 19mm thick, manufactured from cellulose fibre reinforced cement to AS/NZS 2908.2. Refer to SELECTIONS.

Components

2.6 FASTENER TYPE

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Fasteners to minimum durability requirements of the NZBC. Refer to NZS 3604, section 4, **Durability**, for requirements for fixing's material to be used in relation to the exposure conditions.

Refer to NZBC E2/AS1, Table 20, **Material selection** for fixing material, and NZBC E2/AS1, Table 21, **Compatibility of materials in contact**, for selection of suitable fixing materials and their compatibility with other materials.

Zone	Fixings Material
Zone D, Zone E / Microclimates (incl. Geothermal)	Grade 316 Stainless
Zone B, Zone C	Hot-dipped galvanized
Bracing - All zones	Grade 316 Stainless

Check against SED (specific engineering design) requirements for microclimate conditions.

Refer to SELECTIONS.

2.7 NAIL - AXON™ PANEL FIXING TO TIMBER CAVITY BATTEN

Over flexible wall underlay: 65mm x 2.8mm Hardie™Flex nails

Over RAB™ Board: 75mm x 3.15mm Hardie™Flex nails

Refer to SELECTIONS.

2.8 NAIL - AXON™ PANEL DIRECT FIX

40mm x 2.8mm Hardie™Flex nails.

2.9 NAIL - AXENT™ TRIM

40mm brad nails.

Accessories

2.10 FLASHING TAPES - TIMBER CAVITY BATTEN

Inseal® 3259 black compressible medium density closed cell foam tape, 1.5mm thick x 48mm wide for vertical joints, and 1.5mm thick x 80mm wide for internal corners.

2.11 FLASHING TAPES - HARDIE™ CLD™ STRUCTURAL CAVITY BATTEN

Polypropylene DPC under Hardie™ CLD™ Structural Cavity Batten internal corners. Refer to James Hardie® Axon™ Panel technical specification for selection of required width.

2.12 ALUMINIUM ACCESSORIES

Extruded aluminium etch primed. External box corners and horizontal 'h' flashing suitable for dark paints.

2.13 SEALANT

Flexible sealant. Refer to the sealant manufacturer's technical literature to confirm suitability for the application.

3 EXECUTION

Conditions

3.1 STORAGE

Take delivery of products dry and undamaged on pallets, and keep on pallet. Protect edges and corners from damage and covered to keep dry until fixed.

3.2 HANDLING

Avoid distortion and contact with potentially damaging shiplap edges and surfaces. Do not drag panels across each other, or across other materials. Protect edges, corner and surface finish from damage.

3.3 SUBSTRATE

Do not commence work until the substrate is of the standard required for the specified finish; plumb, level and in true alignment. Moisture content of timber framing must not exceed the requirements specified by NZS 3602 to minimise shrinkage and movement after panels are fixed.

Confirm that 70mm minimum framing for vertical joints for timber cavity construction has been correctly installed.

3.4 SEAL EDGES

Seal site cut sheet edges prior to installation. Seal panel edges around window and door openings, meter boxes and at other penetrations.

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Application - generally

3.5 FIX WALL UNDERLAY

Refer to 4161 UNDERLAYS, FOIL AND DPC.

3.6 TIMBER CAVITY BATTENS

Install 18mm minimum thick cavity battens to NZBC E2/AS1: 9.0 Wall claddings, where required. Fix vertical cavity battens to wall framing studs. The battens are fixed by the cladding fixings which will penetrate the wall framing studs over the wall underlay. Seal the top of the cavity and install cavity closer/vermin-proofing at base of walls, open horizontal (or raking) junctions, over openings (windows, meters etc).
Do not use continuous horizontal cavity battens at nogs or at bottom plate. Use cavity spacers where fixing is required between cavity battens.

3.7 PENETRATIONS AND FLASHINGS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- Wall underlay appropriately incorporated with penetration and junction flashings.
- Materials lapped in a way that water tracks down to the exterior face of the wall underlay.
- Wall underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- Required holes in cladding accurately formed and cut to James Hardie requirements, ensure (if required) services penetration grommets/sleeves/seals/tapes are in place prior to cladding installation.
- Claddings neatly finished off to all sides of openings
- Installation of flashings (those required to be installed prior to installation of penetrating elements).

Install Axon™ Panel cladding

3.8 PANEL LAYOUT

All panel edges must be supported by the framing. Fix Axon™ Panels vertically.

3.9 FASTENER - SIZE AND LAYOUT

Fix Axon™ Panels to framing using the fixings specified in James Hardie® Axon™ Panel technica specifications and in accordance with the following requirements:

- Nails must have a minimum clearance of 18mm from sheet edges and a minimum of 75mm vertically and 150mm horizontally from sheet corners.
- Nails must finish flush with sheet surface.

3.10 FIXING - DIRECT FIXED TO FRAME

Fix with 40mm x 2.8mm Hardie™ Flex nails. Fix sheet at 200mm centres at all sheet edges as well as all intermediate framing. Alternatively fix with ND50 brad nails at 150mm centres.

3.11 FIXING - TIMBER CAVITY CONSTRUCTION, FLEXIBLE UNDERLAY

Fix with 65mm x 2.8mm Hardie™ Flex nails when fixed over a flexible underlay. Fix sheet at 200mm centres at all studs.

3.12 GUN NAILING

Axon™ Panels can be fixed using nail guns. The gun nails used must have a full round head to provide the required holding power. The length and gauge of nails must at a minimum be as specified in the James Hardie Axon™ Panel technical specifications.

3.13 VERTICAL JOINT

Joint Axon™ Panels in accordance with James Hardie Axon™ Panel technical specifications

3.14 HORIZONTAL JOINT

Provide a horizontal joint at floor joist levels to accommodate the movement resulting from timber joist shrinkage and settlement. Install a 'z' flashing where drainage is required at floor level. For Axon™ Panels use a Hardie™ 9mm Panel aluminium 'h' mould complete with 'h' mould jointer external corner jointer or a Hardie™ 9mm aluminium angled 't' mould complete with angled 't' mould jointer, external corner jointer or a purpose made 'z' flashing to form a horizontal joint.

3.15 INTERNAL CORNER JOINT - TIMBER CAVITY BATTENS

Seal site cut Axon™ Panel edges. Position and fix Axon™ Panels and Hardie™ 9mm aluminiu internal corner mould to internal corner over cavity battens, fixing in accordance with James Hardie Axon™ Panel Technical Specification details.

3.16 EXTERNAL CORNER JOINT - TIMBER CAVITY BATTENS

Seal site cut Axon™ Panel edges. Fix Hardie™ 9mm Aluminium External Box corner or Hardie™ Alumnium Invert External Corner through cavity battens into framing. Position and fix Axon™ Panels through cavity battens into framing, fixing in accordance with James Hardie Axon™ Panel Technical Specification details.

3.17 EXTERNAL CORNER JOINT WITH H MOULD

Fit Hardie™ 9mm Panel aluminium horizontal 'h' mould over lower Axon™ Panel and lap the upstand under upper Axon™ Panel. Leave 15mm gap maximum between upper and lower Axon™ Panels at the solid timber floor joist levels.

Fit Hardie™ 9mm Panel aluminium external box corner under the aluminium 'h' mould with flanges removed locally. Mitre the 'h' mould over box corner flashing to cover it. Install "h" mould external corner jointer over. The upper box corner flashings are to be finished flush with the bottom edge of upper Axon™ Panel.

An aluminium corner flashing is required over the Hardie™ 9mm Panel aluminium horizontal flashing where the box corner is terminated under the 'h' mould. Hardie™ 9mm Panel aluminium external box corner flanges to be removed locally over the aluminium 'h' mould and corner underflashing to be lapped under the upper box corner flashing. Lap wall underlay over aluminium 'h' mould or seal to flashing with a flashing tape. Refer to Axon™ Panel technical specifications.

3.18 FIX AXENT™ TRIM

Fix Hardie™ Axent™ Trim to internal corners, external corners, vertical joints and intermediate vertical locations in accordance with James Hardie Axon™ Panel Technical Specification details.

3.19 FINISHING

Refer to painting section/s for protective coating system.

Completion

3.20 REPLACE

Replace all damaged or marked elements.

3.21 LEAVE

Leave work to the standard required for following procedures.

3.22 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

For further details on selections go to www.jameshardie.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

4.1 TIMBER CAVITY BATTENS

Timber species:	Radiata pine
Treatment:	H3.1
Size:	45mm wide x 18mm thick minimum, height to match framing studs
Batten spacing:	~
Fastener type:	40mm x 2.8mm Hardie™ Flex nails
Fastener finish:	~
Fixing centres:	800mm

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4.2 JAMES HARDIE AXON™ PANELS - SHEET CLADDING PANELS

Brand/type: ~
Thickness: ~mm
Fastener type: ~
Fastener finish: ~
External corner type: ~

4.3 JAMES HARDIE AXENT™ TRIM

Brand/type: Hardie™ Axent™ Trim
Thickness: 19mm
Width: ~mm

Finishing

4.4 PAINTING

Refer to painting section/s for details.

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4241D DIMOND PROFILED CLADDING

1 GENERAL

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This section relates to the supply and fixing of Dimond Roofing profiled cladding complete with accessories. It includes:

- Long run profiles
- Architectural Euro-Tray® profiles (angle seam, roll cap, roll seam and lite) profiles
- Euro-Panel (lock seam and hook seam) profiles

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC.
Refer to ~ for ~

1.2 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

BMT	Base metal thickness
NZMRM	New Zealand Metal Roofing Manufacturers Inc
MS	Modified Silicone
LBP	Licensed Building Practitioner

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC C/AS1-C/AS2	Protection from fire
NZBC C/VM2	Protection from fire
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS/NZS 1734	Aluminium & aluminium alloys – flat sheets, coiled sheet and plate
AS/NZS 2269.0	Plywood - Structural - Specifications
AS/NZS 2728	Prefinished / prepainted sheet metal products for interior / exterior building applications
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1566	Copper & copper alloys, rolled flat products
AS 3566	Self-drilling screws for the building and construction industries
NZS 3602	Timber and wood-based products for use in building
ISO 5660.1	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 1 Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 2 Smoke production rate (dynamic measurement)
BS EN 988	Zinc & zinc alloys, specification for rolled flat products for building
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:
Web only based: Dimond Roofing and Cladding Systems Manual

Manufacturer/supplier contact details

Company:	Fletcher Steel Ltd
Trading as:	Dimond Roofing
Web:	www.dimond.co.nz
Email:	roofspec@dimond.co.nz
Telephone:	0800 346 663 (0800 DIMOND)

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years	For failure of coating adhesion
~ years	For weatherproofing by material penetration

- Provide this warranty on theDimond Roofing standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1 6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

5 years	For workmanship

- Provide this warranty on the Metal wall cladding installers' standard form
- Commence the warranty from the date of practical completion of the contract works
- Include a copy of theDimond Roofing maintenance requirements with the warranty.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1 7 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1 8 QUALIFICATIONS - STANDARD

Installers to be Dimond Roofing Recommended Installer, or experienced, competent roofers familiar with Dimond Roofingproducts. And for Restricted Building Work, shall also be an LBP or supervised by an LBP.
Carry out work with experienced, competent installers familiar with the products being used and with appropriate qualifications such as the National Certificate in Metal Roofing and Cladding.

Carry out the cladding work with experienced, competent installers familiar with the products being used.

1 9 QUALIFICATIONS - ROOFINGSMITHS LICENSED INSTALLERS

Installers to be experienced in the installation of Dimond Roofing systems & trained and recommended by Dimond Roofing or be RoofingSmiths licensed installers. If requested provide evidence of qualification / experience prior to commencing work.

A list of recommended RoofingSmiths can be obtained from the Dimond Roofing web site, www.dimond.co.nz or telephone 0800 346 663 (0800 DIMOND).

Compliance Information

1 10 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Manufacturer's, importer's or distributors warranty
- Installer's warranty
- Producer Statement - Construction from the installer
- Other information required by the BCA in the Building Consent Approval documents

Performance - Wind

1 11 DESIGN PARAMETERS WIND - NON SPECIFIC DESIGN

Non-specific design wind pressures in accordance with Limit State / Load Span Capacity Chart for selected profile in Dimond Roofing Technical Information.
Refer to the project wind design stated in the general section 1220 PROJECT

1 12 FIXINGS, WIND

Design and use the fixings/fixing pattern appropriate for the wind design parameters. Refer to Dimond Roofing Technical Information for load span tables and fixing charts for the selected profile. Allow for specific loadings at corners and the periphery of the cladding, where localised pressure factors apply. Fixing pattern to also take into account fixing method and girt/frame spacing.

Performance - General

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1.13 PERFORMANCE

Install cladding materials in accordance with the NZMRM CoP and Dimond Roofing**,** requirements for the selected profile, to form a weather-tight performance for the completed cladding system, including all penetrations through the walls and junctions with roofs and parapets.

1.14 EXTERNAL FIRE SPREAD - CLADDING MATERIAL, NON-COMBUSTIBLE MATERIAL

Dimond metal claddings are a non-combustible substrate to NZBC C/AS1 and NZBC C/AS2, as composed of entirely steel or aluminium with a surface finish no more than 1mm in thickness.

1.15 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the walls. Ensure that all necessary members are positioned so that flashings can be fastened at both edges through the cladding to the primary structure.

2 PRODUCTS

Materials

2.1 STEEL - TYPE AM COATING (ALUMINIUM/ZINC/MAGNESIUM ALLOY), PREPAINTED

Formability steel sheet, G550 for roll forming or G300 for flashings, coated to AS 1397. Prefinished /prepainted to AS/NZS 2728.

Fixings

2.2 FASTENERS GENERALLY

Fixings and fasteners are to be compatible with all materials, the environment and meeting the requirements of the NZ Building Code. Installation is to be in accordance with NZBC E2/AS1 and/or the NZMRM CoP and Dimond Roofing requirements.
For fixing patterns refer to Dimond Roofing Fixing Charts for the selected profile.

2.3 FIXING SCREWS

To AS 3566. Screws appropriate to the cladding material and the supporting structure, as required by Dimond Roofing and with a minimum Class 4 or 5 durability and not less than the material being fixed. Screw into timber to penetrate by minimum 30mm. Screw fasteners to be head stamped identifying the manufacturer and class.

For aluminium cladding use Alutite or stainless steel fixings and for copper, stainless steel or titanium zinc cladding use stainless steel fixings. Refer to SELECTIONS.

2.4 RIVETS

Sealed aluminium, minimum diameter 4mm, for use with zinc coated, zinc/aluminium coated or aluminium cladding.

Components

2.5 FLASHINGS GENERALLY

Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the window frame materials and fixings and cladding materials and fixings.

2.6 FLASHINGS

To NZBC E2/AS1,4.0 Flashings Formable grade 0.55mm BMT for galvanized, Type AZ or AM - coated and pre-painted steel, 0.5mm BMT for Copper , 0.7mm BMT for Titanium Zinc and 0.90 for aluminium to the same standards as the profiled sheets,notched where across profile or provided with a soft edge. Ensure flashing material matches the cladding material.

2.7 WALL AND PARAPET FLASHINGS

To NZBC E2/AS1, 4.0 Flashings. Supplied by Dimond Roofing to match or to suit the cladding.

2.8 CLOSURE STRIPS

Non-bituminous compressible, profiled foam strips to fit the sheet profile.

Accessories

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2.9 WALL UNDERLAY

Refer to 4161 UNDERLAYS, FOIL AND DPC.

2.10 SEALANT

Neutral curing MS sealant or MS polymer sealant as required by Dimond Roofing and used as directed.

2.11 LAP SEALING TAPE

Closed cell self adhesive nitrile tape.

2.12 NATURAL LIGHTING

Refer to 4312D DIMOND PROFILED GRP NATURAL LIGHTING.

3 EXECUTION

Conditions

3.1 INSPECTION - STRUCTURE

Inspect the wall framing and supporting structure to ensure that it is complete and fully braced ready for cladding.

3.2 FRAMING TIMBER MOISTURE

When continuous metal cladding etc. Runs along a long continuous timber member and is directly fixed to it, the timbers equilibrium moisture content (EMC) to be 18% or less. For flashings in this situation (sometimes called transverse flashings) the framing EMC to be maximum 16%, and preferably as low as 12%. Transverse flashings can be temporarily tacked in place and final fixing done when moisture content is acceptable.

3.3 STORAGE

Take delivery of and accept packs of cladding undamaged on delivery. Reject all damaged material. Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets. If sheet packs become wet, fillet or cross stack to allow air movement between sheets.

3.4 HANDLING

Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage.

Application - Preparation

3.5 SEPARATION

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible or inert materials. Place isolators between metals and treated timber and cement based materials.

3.6 FIX UNDERLAYS

Refer to 4161 UNDERLAYS, FOIL AND DPC
To NZBC E2/AS1. 9.1.7. Fix to framing, with laps and fixing to Dimond Roofing requirements. Make good any damage before or during fixing of cladding before fixing continues.

Application - General

3.7 SET-OUT FOR VERTICAL CLADDING

Set cladding to vertical plumb lines and maintain verticality. Set all exposed fixings with horizontal string lines. Carefully set out sheets with side laps away from the main line of sight, and with the widths of end sheets the same. Check during fixing to eliminate creep or spread and to keep fastenings in line.

3.8 AVOID END LAPS

End laps should be avoided, except where specifically detailed. Where end laps are necessary, seal both ends of the lap with lap sealing tape or sealant and 4mm sealed pop rivets at maximum 50mm centres, to detail in NZMRM CoP.

3.9 MOVEMENT JOINTS

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Wall fixing and jointing to conform with Dimond Roofing requirements for thermal movement. Over timber framing, transverse flashings (those running along continuous framing members) to have expansion joints at maximum 12.0m centres. Maximum horizontal sheet lengths between vertical joints recommended to be 8m.

3.10 FIXING GENERALLY

Install and fix in accordance with NZBC E2/AS1, the NZMRM CoP, and Dimond Roofing required fixing patterns and details for each area of the building cladding. Use only screws and clips as required by Dimond Roofing. Paint colour matched fixings and accessories before installation.

3.11 PENETRATIONS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- wall underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- claddings neatly finished off to all sides of openings
- installation of flashings (those required to be installed prior to installation of penetrating elements).

3.12 MARKING AND CUTTING

Cut only by shearing tools. Do not use black lead pencils for marking Type AZ and Type AM coated steel products. Use Blue coloured Zincalume pencil supplied by New Zealand steel.

3.13 FIX SHEETS

Fix sheets in place using the fastening system required by Dimond, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

Application - Flashings

3.14 INSTALL FLASHINGS

Flash to penetrations, cap corners and edges, using sealant and rivets to detail, to Dimond Roofing requirements, NZBC E2/AS1, 4.0 Flashings. Flashings should only be installed onto timber battens with a moisture content less than 18%.

3.15 USE OF SEALANTS

Select and use sealants only as recommended by Dimond. Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces.

Do not use sealant on Copper and Titanium Zinc material, these materials are required to be soldered to complete any joint.

Completion

3.16 COMPLETE

Ensure the work is complete with all flashings, finishings and trim properly installed so the cladding system is completely weathertight.

3.17 REPLACE

Replace all damaged or marked elements.

3.18 LEAVE

Leave this work complete with all necessary flashings and cappings all properly installed as the work proceeds so the finished cladding is completely weathertight.

3.19 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

For further details on selections go to www.dimond.co.nz
Substitutions are not permitted to the following, unless stated otherwise.

Cladding - Profiles

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4.1 DIMOND BROWNBUILT 900 CLADDING

BMT/material:	~
Coating system:	~
Colour:	~
Effective cover:	900mm
Profile height:	37mm
Framing material:	~
Pan fixing:	~
Fixing pattern:	Refer to Dimond BB900 literature for details

Accessories

4.2 FLASHINGS - GENERALLY

Profile:	~
BMT/material:	~
Coating system:	To match cladding
Paint colour:	To match cladding

4.3 CLOSURE STRIPS

Brand:	~

4.4 COVERS AND TRIMS

Location:	~
Material/thickness:	~

4.5 UNDERLAYS

Refer to 4161 UNDERLAYS, FOIL AND DPC.

4241NZ COLORSTEEL® WALL CLADDING

1 GENERAL

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This section relates to **New Zealand Steel Limited** coated metal in a range of colours and grades for cladding material.

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC.
Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

BMT	Base metal thickness
NZMRM	New Zealand Metal Roofing Manufacturers Inc
MS	Modified silicone

Documents

1.3 DOCUMENTS

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

NZBC C/VM2	Protection from fire
NZBC E2/AS1	External Moisture
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - performance requirements
AS 3566	Self-drilling screws for the building and construction industries
ISO 5660.1	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 1 Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 2 Smoke production rate (dynamic measurement)
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:

- COLORSTEEL® Installers Guide
- COLORSTEEL® Design Guide
- COLORSTEEL Altimate® Installation Guide
- COLORSTEEL Altimate® Design Guide
- COLORSTEEL Dridex® Design Guide
- COLORSTEEL Dridex® Installation Guide
- COLORSTEEL® Matte Design Guide
- New Zealand Steel - Zincalume-Brochure
- COLORSTEEL® Environmental Categories & Warranty Guide
- CodeMark CM70050 (Rev 1) Colorsteel® Endura® Dridex® and Colorsteel® Maxx® Dridex®

Manufacturer/supplier contact details

Company:	New Zealand Steel Limited
Web:	www.colorsteel.co.nz
Telephone:	0800 100523
Email:	specifications@colorsteel.co.nz
Rollformer:	~

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

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~ years For COLORSTEEL® ~ for perforation
~ years For COLORSTEEL® ~ for paint
Include a copy of the cladding manufacturers' maintenance requirements with the warranty.

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
5 years For workmanship

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.8 QUALIFICATIONS WORKERS – MANUFACTURER / SUPPLIER REQUIREMENTS - DRIDEX®

Workers to be trained and accredited by New Zealand Steel Limited in the installation of COLORSTEEL Dridex® roofing materials. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.9 NO SUBSTITUTIONS

Substitutions are not permitted to any specified New Zealand Steel system, or associated components and products.

1.10 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

Performance - Fire

1.11 EXTERNAL FIRE SPREAD - NON-COMBUSTIBLE MATERIAL

Zincalume®, COLORSTEEL® Maxam™, COLORSTEEL® Maxam™ Dridex®, COLORSTEEl Altimate® and COLORSTEEL Altimate® Dridex® are manufactured from a non-combustible material with a surface finish no more than 1mm in thickness applied directly to the non-combustible substrate.

1.12 EXTERNAL FIRE SPREAD - CLADDING MATERIAL, CLASSIFICATION

COLORSTEEL® Maxam™ and COLORSTEEL® Maxam™ Dridex® have been tested to ISO 5660.1 and to specific requirements of NZBC C/AS1 or NZBC C/AS2 achieving:

Type A classification (peak heat release rate ≤ 100 kW/m², total heat release rate ≤ 25 MJ/m²).

1.13 INTERIOR SURFACE FIRE PROPERTIES - GROUP NUMBER

Zincalume®, COLORSTEEL® Maxam™, COLORSTEEL Altimate® and COLORSTEEL® Maxam™ Dridex® have been tested to ISO 5660.1 & ISO 5660.2 and have been assigned the following Group Numbers in accordance with Appendix A, NZBC C/VM2:

Zincalume®	Group Number 1-S
COLORSTEEL® Maxam™	Group Number 1-S
COLORSTEEL® Maxam™ Dridex®	Group Number 1-S
COLORSTEEL Altimate®	Group Number 1-S

2 PRODUCTS

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Materials

2.1 COLORSTEEL® MAXAM™ - STEEL, TYPE AM COATING (ALUMINIUM/ZINC/MAGNESIUM ALLOY), PREPAINTED

Formability steel sheet, G550 for roll forming or G300 for flashings, coated to AS 1397, AM150 grade. Pre-finished /pre-painted to AS/NZS 2728 to a Type 6 standard.

Fixings

2.2 FASTENERS GENERALLY

Fixings and fasteners are to be compatible with all materials and have a durability no less than the material being fastened.

2.3 FIXING SCREWS

Screws to AS 3566. Screws appropriate to the cladding material and the supporting structure, as required by cladding profile manufacturer (roll-formers) and with a minimum Class 4 durability and not less than the material being fixed. Screw lengths must be sufficient to allow 30mm penetration into structural timber or 3 threads penetration through steel structural members. Screw fasteners to be head stamped identifying the manufacturer and class. Refer to SELECTIONS.

2.4 RIVETS

Sealed aluminium, minimum diameter 4.0mm.

Components

2.5 FLASHINGS GENERALLY

Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the window frame materials and fixings and cladding materials and fixings.

2.6 FLASHINGS

To NZBC E2/AS1, 4.0, Flashings.
Formable grade 0.55mm BMT for galvanized, aluminium/zinc-coated and pre-painted steel, to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

Flashings to framed penetrations to be in accordance with project drawings or to NZMRM CoP recommendations.

2.7 WALL AND PARAPET FLASHINGS

To NZBC E2/AS1, 4.0 Flashings.
Supplied by the cladding manufacturer to match or to suit the cladding.

Accessories

2.8 UNDERLAY

Refer to 4161 UNDERLAYS, FOIL AND DPC.

2.9 SEALANT

Neutral Curing silicone or MS polymer sealant as required by the roofing manufacturer and used as directed.

2.10 LAP SEALING TAPE

Closed cell self adhesive nitrile tape.

3 EXECUTION

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.
Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

Do not use sunscreen containing Zinc Oxide or Titanium Dioxide as it may damage the paint coating in contact.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Inspect the wall framing and supporting structure to ensure that it is complete and fully braced ready for cladding and free from any misalignments or protrusions that could damage the cladding.

Ensure moisture content is:
Timber framing: 18% maximum
12-16% maximum under traverse flashings

When continuous metal roofing etc. runs along a long continuous timber member and is directly fixed to it, the timbers equilibrium moisture content (EMC) to be 18% or less. For flashings in this situation (sometimes called transverse flashings) the framing EMC to be maximum 16%, and preferably as low as 12%. Transverse flashings can be temporarily tacked in place and final fixing done when moisture content is acceptable.

3.4 SEPARATION

Isolate dissimilar materials (metals and non-metals) in close proximity as necessary by fitting separator strips of compatible inert materials. Place isolators between metals and treated timber and cement based materials.

Application

3.5 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.6 INSTALLATION GENERALLY

Install profiled metal cladding in accordance with NZMRM CoP and roofing profile supplier requirements, to form a weather-tight performance for the completed roofing system, including all junctions, flashing/cappings and penetrations through the roofing.

3.7 PENETRATIONS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- wall/cladding underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations.
- claddings neatly finished off to all sides of openings where appropriate.
- installation of flashings (those required to be installed prior to installation of penetrating elements).

3.8 SET-OUT FOR VERTICAL CLADDING

Set cladding to vertical plumb lines and maintain verticality. Set all exposed fixings with horizontal string lines. Carefully set out sheets with side laps away from the main line of sight and to achieve uniform flashing widths where possible. Check during fixing to eliminate creep or spread and to keep fastenings in line.

3.9 MARKING AND CUTTING

Use ink pen, chalk line or coloured pencil for marking roof sheets and flashings prior to cutting. Do not use black lead pencils for marking aluminium/zinc coated products. Make all cuts cleanly to a marked straight line, cut by shear only, using nibblers or hand snips. Remove all cutting and drilling debris.

3.10 FIX SHEETS

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Fix sheets in place using the fastening system required by the cladding profile manufacturer (roll-former) for specified profiles, to suit project wind loadings stated in the general section 1220 PROJECT or in accordance with specific design in accordance with project engineers requirements. Use only screws as required by manufacturer. Paint colour matched fixings and accessories before installation. Use setting tools that do not unduly damage the head of the fasteners.

3.11 THERMAL MOVEMENT

Fixing and jointing to conform with the cladding profile manufacturer's (roll-formers) requirements for thermal movement.
Over timber framing, transverse flashings (those running along continuous framing members) to have expansion joints at maximum 12m centres.

3.12 END LAPS

End laps are not permitted, except where specifically detailed.

3.13 FIXING GENERALLY

Install and fix in accordance with the NZMRM CoP recommendations and to cladding manufacturer's required fixing patterns and details for each area of the building cladding. Use only screws as required by manufacturer. Paint colour matched fixings and accessories before installation.

3.14 INSTALL FLASHINGS

Flash to penetrations, cap corners and edges, using sealant and rivets to detail Where no detail is provided flash to NZMRM CoP recommendations and the roofing manufacturer's and NZBC E2/AS1 requirements.

3.15 FLASHING PENETRATIONS

Flash all penetrations through the cladding as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.

3.16 USE OF SEALANTS

Select and use sealants only as recommended by cladding manufacturer. Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces.

Completion

3.17 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.colorsteel.co.nz and to selected cladding manufacturer's website.
Substitutions are not permitted to the following, unless stated otherwise.

Cladding

4.1 COLORSTEEL® MAXAM™ PROFILED CLADDING

Location:	~
Manufacturer:	New Zealand Steel
Material:	COLORSTEEL® Maxam™
BMT:	~mm
Colour:	~
Profile:	~
Substrate:	~
Fixing:	~

Accessories

4.2 FLASHINGS - GENERALLY

Profile:	~
BMT/material:	~

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Coating system:	To match roofing
Coating colour:	To match roofing

4.3 FLASHINGS - REQUIRING GREATER DURABILITY

Location:	~
BMT/material:	0.90 Aluminum
Coating system:	COLORSTEEL Altimate®
Coating colour:	To match cladding

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4283RM RCS FIBRE CEMENT SHEET FINISHING SYSTEMS

1 GENERAL

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This section relates to Resene Constructions Systems exterior Fibre Cement Sheet Finishing Systems.
It includes:

- Mineral Fibre Cement Sheet Finishing System with mineral or acrylic textured finish coat or
- Acrylic Fibre Cement Sheet Finishing System with acrylic textured finish coat
- All required components and accessories to complete jointing and finishing

Resene Constructions Systems products must be installed by an approved applicator.

1.1 RELATED WORK

Refer to 4256HM JAMES HARDIE® MONOLITHIC CLADDING for Hardie™ Axon™ Panel fo textured coating systems
Refer to 6700R RESENE PAINTING GENERAL for general matters related to painting
Refer to 6711R RESENE PAINTING EXTERIOR for exterior paint systems

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

LRV	Light reflectance value
MPNZA	Master Painters New Zealand Association
PPCS	Proprietary Plaster Cladding Standard

Documents

1.3 DOCUMENTS

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

NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
NZS 4210	Masonry construction: materials and workmanship
MPNZA	Health and Safety Programme
WorkSafe:	Guidelines for the provision of facilities and general safety in the construction industry

Health and Safety at Work Act 2015

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:
Resene Construction Systems - Fibre Cement Sheet Finishing System - 9mm Axon™ - Fully Meshed - Acrylic RenderSpec, May 2024
Resene Construction Systems - Fibre Cement Sheet Finishing System - 9mm Axon™ - Fully Meshed - Mineral RenderSpec, May 2024
Resene Construction Systems - Fibre Cement Sheet Finishing System - 9mm Axon™ - Fully Meshed - RMaxx RenderSpec, May 2024
Resene Constructions Systems Fibre Cement Sheet Render System Sheets
Resene Total Colour System
BRANZ Appraisal 500 [2022] - Fibre Cement Sheet Finishing System

Manufacturer/supplier contact details

Company:	Resene Construction Systems
Web:	www.reseneconstruction.co.nz
Email:	help@reseneconstruction.co.nz
Telephone:	0800 50 70 40

Company:	Resene
Web:	www.resene.co.nz
Telephone:	0800 RESENE (0800 737 363)

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Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:
15 years For materials by Resene Construction Systems

- Provide this warranty on the Resene Construction Systems standard form
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
5 years For execution / workmanship by RCS licenced plasterer

- Provide this warranty on the Resene Construction Systems standard form
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS WORKERS - MANUFACTURER / SUPPLIER REQUIREMENTS

Workers to be PPCS (Proprietary Plaster Cladding Standard) Registered Plasterers licensed to apply the Resene Construction Systems exterior render systems. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any of the Resene Construction Systems Fibre Cement Sheet Finishing System, components and associated products listed in this section.

1.9 SAMPLES

Refer to the general section 1270 CONSTRUCTION for details of how samples will be reviewed and how instructions to proceed will be given. Provide the following samples for review:

	Sample A	Sample B	Sample C
Sample description:	~	~	~
Sample type:	~	~	~
Number:	~	~	~
Location:	~	~	~
Supporting documentation:	~	~	~
Reviewer:	Contract administrator~	Contract administrator~	Contract administrator~
Time for review:	10 working days ~	10 working days ~	10 working days ~
Review criteria:	~	~	~

1.10 INFORMATION FOR OPERATION AND MAINTENANCE

Refer to the general section 1239 OPERATION & MAINTENANCE for provision of the following general operation and maintenance information as electronic PDF format documents:
Resene Construction Systems Maintenance Guide to be provided on request. Provide this information prior to practical completion.

1.11 HEALTH AND SAFETY

Refer to the requirements of the Health and Safety at Work Act 2015 updates and WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry.
If the elimination or isolation of potential hazards and risks is not possible then minimise hazards and risks in this work on site by using the proper equipment and techniques as required in the MPNZA Health and Safety Programme. Supply protective clothing and equipment. Inform employees and others on site of the hazards and risks, and put into place procedures for dealing with emergencies. Obtain from Resene Construction Systems material safety data sheets for each product. Keep sheets on site and comply with the required safety procedures.

Compliance information

1.12 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation: -

- Applicators approval certificate from the manufacturer
- Manufacturer / supplier warranty
- Installer / applicator warranty
- Producer Statement - PS3 Construction from the Registered Plasterer
- Other information required by the BCA in the Building Consent Approval documents.

1.13 DURABILITY

The work covered by this part of the specification has been designed and constructed to achieve a durability of 15 years.

Performance

1.14 PERFORMANCE

Accept responsibility for the structural and weather-tight performance of the Resene Construction Systems Fibre Cement Sheet Finishing System.

Quality control and assurance

1.15 INSPECTIONS

Allow for inspections of the whole of the work at each stage by the Contract Administrator (or nominated person).
Determine a programme for inspections including notification or hold points when each part and stage of the work is ready for inspection prior to the work commencing.

1.16 MANUFACTURER'S INSPECTION

Permit representatives of Resene Construction Systems to inspect the work in progress and to take samples of their products from site, if requested.

1.17 PROTECTION OF NEW PLASTER

Confirm the protection systems to be applied to fresh plaster coats during curing. Plastering not to begin until protection systems are confirmed.

2 PRODUCTS

Materials - Fibre Cement Sheet Finishing System Jointing / slurry coat

2.1 ROCKCOTE MULTISTOP BEDDING COMPOUND

Rockcote Multistop Bedding compound is a polymer modified, cement based dry plaster mix used in conjunction with jointing mesh to joints in backing boards and for mixing slurry coat. Supplied in 15kg bags.

Materials - Fibre Cement Sheet Finishing System

2.2 ACRYLIC RMAXX RENDER

A high yielding cement free dispersion based plaster.

2.3 ACRYLIC TEXTURE

Ready mixed, tintable, mineral-filled, polymer based elastomeric high-build coating.

2.4 RESENE X-200

Resene X-200 waterproof membrane colour selection from Resene Total Colour System.

Accessories

2.5 ACRYLBOND

Cemix Acrylbond is an acrylic water resistant modifier and bonding agent. Used in conjunction with Multistop to form a slurry coat.

2.6 MULTISTOP BEDDING COMPOUND uPVC PRIMER

uPVC primer when mixed with diluted Acrylbond resin or water.

2.7 SEALANT

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Soudal Gorilla MS Sealant, UV resistant, solvent-free, flexible and paintable sealant.

2.8 REINFORCING MESH - FOR JOINTING

RCS Sticky Mesh, alkali-resistant fibreglass woven mesh 75mm wide, 160gsm. Supplied in 50 metre rolls.

2.9 REINFORCING MESH - FOR RENDER BASE COAT

Resene Construction Systems alkali-resistant fibreglass woven mesh 6mm x 5mm weave, 1200mm wide and RCS sticky mesh, alkali-resistant fibreglass woven mesh 150mm wide. Both supplied in 50 metre rolls.

2.10 uPVC COMPONENTS

uPVC extrusions.

2.11 WATERPROOF MEMBRANE TAPE

Tape covered by a valid BRANZ Appraisal for use as a waterproof membrane over the top of plastered parapets, balustrades and fixing blocks.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

Keep plaster products dry in transit. Take delivery of plaster products dry and undamaged, in original unopened packaging with labels intact. Provide dry storage on site, stack carefully, protect from mechanical damage. Keep bagged render off concrete surfaces.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Do not commence work until openings and apertures have been cut, pipes, fixtures, fixing pads and plugs have been fixed and flashings and other preparations are complete. All defects in substrate must be rectified by the trades applicable prior to application of plaster coatings. Ensure that backgrounds and adjoining surfaces are, after the preparation called for in this section, is of the standard required by Resene Construction Systems.

3.4 CHECK FLASHINGS AND ACCESSORIES

Check and ensure all required flashings have been installed to NZBC E2/AS1, 4.0 **Flashings**. Make sure that all window sills are left open between joinery and plaster. All window sills are to have an appropriate sill flashing/membrane that has been installed by the main contractor. Notify Contract Administrator if flashings are not installed to required standard.

3.5 PROTECT

Before application of plaster, apply masking film and tape to all joinery, pipes, roofs and all areas likely to be marked by the plaster. Use drop cloths and ground covers to keep the working areas clean. Clean off droppings onto finished work immediately.

3.6 PLASTERING CONDITIONS

Carry out plastering to Resene Construction Systems specification under conditions which will not adversely affect the finished work. Generally, apply plaster systems in dry conditions when temperature is between 5°C and 30°C and will be in that range for the 24 hours period following application.

3.7 CURING

Confirm the curing and protection systems to be applied to fresh plaster coats. Plaster systems should be protected from hot drying winds and direct sunlight for the first 16 hours and protected from rain and water run off for the first 24 hours.

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Application - general / surface preparation

3.8 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.
Comply with the tolerances laid down in NZS 4210 Table 2.2. To have no deviation more than 3mm from a straight edge 1200mm long.

3.9 PREPARE SUBSTRATE

Before plastering is commenced, ensure backing board surface is clean, sound, dry and free from dust, dirt, grease, & other surface contaminants. Make good any defects in the background which may adversely affect the quality of the plaster coating.

3.10 MOVEMENT CONTROL JOINTS

Provide movement control joints in the plaster to coincide with movement joints in the backing board and / or where shown on the drawings and to Resene Construction Systems requirements. Reinforcing mesh is not continuous across control joints. Exposed control joints to be reflected through final coatings from substrate.

3.11 APPLY JOINT BEDDING PLASTER AND JOINT MESH

Mix Rockcote MultiStop Bedding Compound in accordance with manufacturer's requirements and apply to all rebated board joints with a steel trowel or broad-knife at approximately 2mm thick. Lay in mesh and trowel well to embed mesh into Multistop Bedding Compound. Apply levelling coat of Multistop Bedding Compound to ensure the joint is level with surrounding sheet plan. Leave to dry overnight.

3.12 APPLY SLURRY COAT

For bare substrates, mix a slurry from 50:50 mix of Acrylbond/Water and Multistop Bedding Compound, in accordance with manufacturer's requirements and apply to backing board using a roller.
For painted substrates, mix a slurry from Acrylbond and Multistop Bedding Compound, in accordance with manufacturer's requirements and apply to backing board using a roller.

Application - acrylic render with acrylic texture

3.13 ACRYLIC RMAXX RENDER BASE AND MESH COAT

Mix RCS RMaxx in accordance with manufacturer's requirements and apply base plaster coat 2-3mm thickness maximum. Embed fibreglass mesh into the wet plaster in accordance with RCS RenderSpec requirements starting at the top of the wall and overlapping each successive length by 100mm minimum. Ensure there are no wrinkles or trapped bubbles in the mesh and that it is fully embedded just below the surface of the render.

Ensure the fibreglass mesh covers all exposed areas of the substrate, including any recesses around the exterior joinery and internal corners. Fibreglass Mesh must be bought to the outside edge of all flashings. Apply sticky mesh around all external corners and into all opening reveals. Apply 450 x 150 mm strips of fibreglass mesh `butterflies' diagonally at every corner of at all corners of windows, doors and other exterior openings. After the render mix has cured, trim off excess length accurately against the flashing edge.

3.14 ACRYLIC LEVELLING COAT

Mix RCS RMaxx in accordance with manufacturer's requirements and apply by trowel a second coat of 1-2mm thickness. Trowel flat and leave to touch dry before floating off with a large plastic float, to remove any imperfections and leave a level surface.

3.15 ACRYLIC TEXTURED FINISH COAT

Apply selected acrylic texture coat 0.5mm-2mm thickness to achieve the specified finish and colour (optional) to Resene Construction Systems requirements. Refer to SELECTIONS for acrylic texture finish and colour.

Application - finishing

3.16 SEALANT

Apply selected sealant in accordance with manufacturer's requirements to all construction joints and to all internal corners of system prior to painting.

3.17 PROTECTIVE FINISH COAT - RESENE X-200

Apply two coats of Resene X-200 reinforced waterproof membrane in accordance with manufacturer's requirements to achieve a protective acrylic based finish.

3.18 FINISHING

Refer to SELECTIONS for finishes and colours.

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Completion & Commissioning

3.19 FINAL INSPECTION

A final inspection by Resene Construction Systems applicator and Contract Administrator (or nominated person) of the entire finished cladding to take place immediately after completion of the wall cladding work and any defects or subsequent damage made good immediately.

3.20 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.reseneconstruction.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Materials

4.1 RCS FIBRE CEMENT SHEET ACRYLIC RENDER & ACRYLIC TEXTURE

Location:	~
Manufacturer:	Resene Construction Systems
Substrate:	9mm Hardie™ Axon™ Panel for textured coating system
Jointing System:	Rockcote Multistop bedding compound with 75mm wide mesh
Slurry Coat:	Rockcote Multistop bedding compound - mixed with 50/50 mix of Acrylbond/Water
Render Basecoat:	RCS RMAXX Render with fibreglass mesh
Render 2nd coat:	RCS RMAXX Render
Texture coat:	Rockcote Classico
Texture finish:	~
Texture colour:	~
Paint coat:	2 coats of Resene X-200, LRV of texture coat (recommended) >25%
Paint colour:	~

4311D DIMOND PROFILED METAL ROOFING

1 GENERAL

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This section relates to the supply and fixing of Dimond Roofing profiled roofing and includes:

- Metal roofing
- Duraclad roofing
- and associated accessories and components

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC.
Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

BMT	Base metal thickness
LBP	Licenced Building Practitioner
NZMRM	New Zealand Metal Roofing Manufacturers Inc
MS	Modified silicone

Documents

1.3 DOCUMENTS

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

NZBC C/VM2	Protection from fire
NZBC E2/AS1	External Moisture
NZBC G12/AS1	Water Supplies
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS/NZS 2728	Prefinished / prepainted sheet metal products for interior / exterior building applications
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 3566	Self-drilling screws for the building and construction industries
ISO 5660.1	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 1 Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 2 Smoke production rate (dynamic measurement)
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:
Dimond Roofing and Cladding Systems Manual (January 2021)
Dimond Roofing Profile BPIR

Manufacturer/supplier contact details:

Company:	Fletcher Steel Ltd
Trading as:	Dimond Roofing
Web:	www.dimond.co.nz
Email:	roofspec@dimond.co.nz
Telephone:	0800 346 663 (0800 DIMOND)

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:.

~ years:	for failure of coating adhesion
~ years:	for weatherproofing by material penetration

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
5 years for installation

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS WORKERS – LICENSED UNDER STATUTE

Workers to be a Roofing Licenced Building Practitioner (LBP) or supervised by a Roofing LBP. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, components and associated products listed in this section.

Compliance information

1.9 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Manufacturer's, importer's or distributors warranty
- Installer's warranty
- Producer Statement - Construction from the installer/applicator
- Other information required by the BCA in the Building Consent Approval documents

Performance - Wind

1.10 DESIGN PARAMETERS WIND - NON SPECIFIC DESIGN

The design wind pressures are to NZS 3604, table 5.4. Refer to general section 1220 PROJECT for details.

1.11 FIXINGS, WIND

Design and use the fixings/fixing pattern appropriate for the wind design parameters. Refer to Dimond Roofing Technical Information for load span tables and fixing charts for the selected profile. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply. Fixing pattern to also take into account fixing method and purlin spacings.

Performance - General

1.12 DRINKING WATER

Roofing for collecting potable water to NZBC G12/AS1.

2 PRODUCTS

Materials

Fixings

2.1 FASTENERS GENERALLY

Fixings and fasteners are to be compatible with all materials, the environment and meeting the requirements of the NZ Building Code. Installation is to be in accordance with NZBC E2/AS1 and/or the NZMRM CoP and Dimond Roofing requirements.
For fixing patterns refer to Dimond Roofing Fixing Charts for the selected profile.

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2.2 FIXING SCREWS

To AS 3566. Screws appropriate to the roofing material and the supporting structure, as required by Dimond Roofing and with a minimum Class 4 or 5 durability and not less than the material being fixed. Screw into timber to penetrate by minimum 30mm. Screw fasteners to be head stamped identifying the manufacturer and class.

For aluminium roofing use Alutite or stainless steel fixings and for copper or stainless steel roofing use stainless steel fixings. Refer to SELECTIONS

Components

2.3 FLASHINGS GENERALLY

To NZBC E2/AS1, 4.0 Flashings.
Formable grade 0.55 BMT for galvanized, Type AZ or AM - coated and pre-painted steel, 0.5mm BMT for Copper 0.7mm and 0.90 for aluminium (or 0.7mm for small aluminium flashings) to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

2.4 FLASHINGS TO VERGE, RIDGE AND HIP

Supplied by the roofing manufacturer to match or to suit the roofing in the same material as the roof.

2.5 BOOT FLASHINGS

Generally to NZBC E2/AS1, 8.4.17 **Roof penetrations** (note; NZBC E2/AS1, Figure 54 **Soaker flashing for pipe penetration**, has an error, use as guide only)
EPDM proprietary pipe flashing laid on 45° bias to roofing, with over-flashing (soaker flashing) if required.
A boot flashing should be positioned so that it dams a roofing pan no more than 50%, if this cannot be avoided use an over-flashing back to the ridge and fix the boot flashing to that.

Accessories

2.6 WIRE NETTING AND SAFETY MESH

Refer to 4161 UNDERLAYS, FOIL AND DPC.

2.7 UNDERLAY AND REFLECTIVE FOIL

Refer to 4161 UNDERLAYS, FOIL AND DPC

2.8 SEALANT

Neutral curing MS sealant or polymer sealant as required by the roofing manufacturer and used as directed.

2.9 CLOSURE STRIPS

Non-bituminous compressible, profiled foam strips to fit the sheet profile.

2.10 LAP SEALING TAPE

Closed cell self adhesive nitrile tape.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.
Moisture content: 18% maximum

Installation/application

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3.4 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.5 SEPARATION

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible or inert materials. Place isolators such as flashing tapes or drainage mat between metals and CCA treated timber, cement based materials, and mixing aluminium sheet and steel mesh.

3.6 SET-OUT

Carefully set out with consideration of the position of side laps to take account of the prevailing wind and line of sight. Ensure all sheets are square and oversailing the gutter true to line. Check during fixing to eliminate creep or spread and string lines along purlin centres to keep fastenings in line.

3.7 END LAPS

End laps should be avoided, except where specifically detailed. Where end laps are necessary, seal both ends of the lap with lap sealing tape or sealant and 4mm sealed pop rivets at maximum 50mm centres, to detail in NZMRM CoP.

3.8 SEAL CUT EDGES

In very severe marine environments seal cut edges of pre-coated steel sheet with edge protection lacquer before fixing to the cladding manufacturer's requirements.

3.9 THERMAL MOVEMENT

For sheet lengths more than 18 metres, make provision for thermal expansion where required

3.10 FIXING GENERALLY

Install and fix in accordance with NZBC E2/AS1, the NZMRM CoP and the Dimond Roofing required fixing patterns and details for each area of the building roofing. Use only screws and clips as required by Dimond Roofing. Paint colour matched fixings and accessories before installation.

3.11 MARKING AND CUTTING

Use chalk line, Chinagraph pencils or coloured pencil for marking roof sheets prior to cutting. Do not use lead pencil for marking Zincalume®, Colorsteel® and Colorcote®. Cut by shear only, using nibblers or hand snips. Remove all cutting and drilling debris from the roof.

3.12 FIX SHEETS

Fix sheets in place using the fastening system required by Dimond for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

3.13 STOP ENDS AND DOWNTURNS

Form stop-ends at the upper end of sheets. Form downturns at the gutter line where the roof pitch is less than 8 degrees. Form using the required tools.

Application - Flashings

3.14 FLASHINGS

Flash roof to parapets, walls and penetrations to detail. Flashings to be installed on timber framing with moisture content of less than 18%. Where no detail is provided flash to NZMRM CoP recommendations and Dimond requirements. Cut accurately and fix using sealant and rivets to detail and to Dimond requirements to form a weatherproof cover. For highly visible flashings, plan joints/junction to take account of the aesthetic requirements.

3.15 USE OF SEALANTS

Select and use sealants only as recommended by Dimond. Remove any swarf and clean down, apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces. Do not use sealant on Copper material, these materials are required to be soldered to complete any joint.

3.16 FLASHING PENETRATIONS

Flash all penetrations through the roof. Fit pipe flashings with a proprietary collar flashing, with other penetrations flashed as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.

Completion & Commissioning

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3.17 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.dimond.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Accessories

4.1 FLASHINGS - GENERALLY

Profile:	~
BMT/material:	~
Coating system:	To match roofing
Paint colour:	To match roofing

4.2 FLASHINGS - INACCESSIBLE

Material/thickness:	~

4.3 CLOSURE STRIPS

Brand:	~

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4311NZ COLORSTEEL® ROOFING

1 GENERAL

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This section relates to **New Zealand Steel Limited** coated metal steel in a range of colours and grades for roofing material.

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC.
Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

BMT	Base metal thickness
NZMRM	New Zealand Metal Roofing Manufacturers Inc
CoP	Code of Practice for Metal Roofing
MS	Modified silicone

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External Moisture
NZBC C/VM2	Protection from fire
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 3566	Self-drilling screws for the building and construction industries
ISO 5660.1	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 1 Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction to fire tests - heat release, smoke production and mass loss rate. Part 2 Smoke production rate (dynamic measurement)
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:

- COLORSTEEL® Installers Guide
- COLORSTEEL® Design Guide
- COLORSTEEL Altimate® Installers Guide
- COLORSTEEL Altimate® Design Guide
- COLORSTEEL Dridex® Design Guide
- COLORSTEEL Dridex® Installers Guide
- COLORSTEEL® Matte Design Guide
- New Zealand steel - Zincalume® Brochure
- COLORSTEEL® - Environmental Categories & Warranty Guide
- CodeMark CM70050 (Rev 1) Colorsteel® Endura® Dridex® and Colorsteel® Maxx® Dridex®

Manufacturer/supplier contact details

Company:	New Zealand Steel Limited
Web:	www.colorsteel.co.nz
Email:	specifications@colorsteel.co.nz
Telephone:	0800 100523
Rollformer:	~

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years	For COLORSTEEL® ~ for perforation
~ years	For COLORSTEEL® ~ for paint

Include a copy of the roofing manufacturers maintenance requirements with the warranty.

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

5 years	For workmanship

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.8 QUALIFICATIONS WORKERS – MANUFACTURER / SUPPLIER REQUIREMENTS - DRIDEX®

Workers to be trained and accredited by New Zealand Steel Limited in the installation of COLORSTEEL Dridex® roofing materials. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.9 NO SUBSTITUTIONS

Substitutions are not permitted to any specified New Zealand Steel system, or associated components and products.

1.10 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

Performance - Fire

1.11 INTERIOR SURFACE FIRE PROPERTIES - GROUP NUMBER

Zincalume®, COLORSTEEL® Maxam™, COLORSTEEL Altimate® and COLORSTEEL® Maxam™ Dridex® have been tested to ISO 5660.1 & ISO 5660.2 and have been assigned the following Group Numbers in accordance with Appendix A, NZBC C/VM2:

Zincalume®	Group Number 1-S
COLORSTEEL® Maxam™	Group Number 1-S
COLORSTEEL® Maxam™ Dridex®	Group Number 1-S
COLORSTEEL Altimate®	Group Number 1-S

2 PRODUCTS

Materials

2.1 COLORSTEEL® MAXAM™ - STEEL, TYPE AM COATING (ALUMINIUM/ZINC/MAGNESIUM ALLOY), PREPAINTED

Formability steel sheet, G550 for roll forming or G300 for flashings, coated to AS 1397, AM150 grade. Pre-finished /pre-painted to AS/NZS 2728 to a Type 6 standard.

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Fixings

2.2 FASTENERS GENERALLY

Fixings and fasteners are to be compatible with all materials and have a durability no less than the material being fastened.

2.3 FIXING SCREWS

Screws to AS 3566. Screws appropriate to the roofing material and the supporting structure, as required by roofing profile manufacturer (roll-formers) fixing charts or Specific Engineered Design, and with a minimum Class 4 durability and not less than the material being fixed. Screw lengths must be sufficient to allow 30mm penetration into structural timber or 3 threads penetration through steel structural members. Screw fasteners to be head stamped identifying the manufacturer and class. Refer to SELECTIONS.

2.4 RIVETS

Sealed aluminium, minimum diameter 4.0mm.

Components

2.5 FLASHINGS GENERALLY

To E2/AS1, 4.0, Flashings.
Formable grade 0.55mm BMT for steel and 0.90mm for aluminium coated to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

2.6 BOOT FLASHINGS

EPDM proprietary boot flashing designed to weatherproof cylindrical penetrations.

Accessories

2.7 WIRE NETTING AND SAFETY MESH

Refer to 4161 UNDERLAYS, FOIL AND DPC.

2.8 UNDERLAY AND REFLECTIVE FOIL

Refer to 4161 UNDERLAYS, FOIL AND DPC.

2.9 SEALANT

Neutral Curing silicone or MS polymer sealant as required by the roofing manufacturer and used as directed.

2.10 PROFILE CLOSURES

Non-bituminous compressible, closed cell, profiled foam strips to fit the sheet profile.

2.11 LAP SEALING TAPE

Closed cell self-adhesive nitrile tape.

3 EXECUTION

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.
Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

Do not use sunscreen containing Zinc Oxide or Titanium Dioxide as it may damage the paint coating in contact.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

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Check work previously carried out and confirm it is of the required standard for this part of the work.

Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could adversely affect the roofing. Ensure that all necessary members are positioned so that flashings can be fastened at both edges through the roof profile or cladding to the primary structure.

Ensure moisture content is:
Timber framing: 18% maximum
12-16% maximum under traverse flashings

When continuous metal roofing etc. runs along a long continuous timber member and is directly fixed to it, the timbers equilibrium moisture content (EMC) to be 18% or less. For flashings in this situation (sometimes called transverse flashings) the framing EMC to be maximum 16%, and preferably as low as 12%. Transverse flashings can be temporarily tacked in place and final fixing done when moisture content is acceptable.

3.4 WORK SAFE

All installation to be conducted in accordance with WorkSafe Working at Heights recommendations and any site requirements

3.5 SEPARATION

Isolate dissimilar materials (metals and non-metals) in close proximity as necessary by fitting separator strips of compatible inert materials. Prevent wet contact between metals and treated timber and cement based materials.

Application

3.6 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.7 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof.

Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

3.8 SET-OUT

Carefully set out with consideration of the position of side laps to take account of the prevailing wind and line of sight. Ensure all sheets are square and oversailing the gutter true to line. Check during fixing to eliminate creep or spread and string lines along purlin centres to keep fastenings in line.

3.9 MARKING AND CUTTING

Use ink pen, chalk line or coloured pencil for marking roof sheets prior to cutting. Do not use black lead pencils for marking aluminium/zinc coated products. Make all cuts cleanly to a marked straight line, cut by shear only, using nibblers or hand snips. Remove all cutting and drilling debris from the roof.

3.10 FIX SHEETS

Fix sheets in place using the fastening system required by the roofing profile manufacturer (roll-former) for specified profiles, to suit project wind loadings stated in the general section 1220 PROJECT or in accordance with specific design in accordance with project engineers requirements. Use only screws as required by manufacturer. Paint colour matched fixings and accessories before installation. Use setting tools that do not unduly damage the head of the fasteners.

3.11 THERMAL MOVEMENT

Fixing and jointing to conform with the roofing manufacturer's requirements for thermal movement for selected profile.

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3.12 END LAPS

End laps in roofing sheets are not permitted, except where specifically detailed.

3.13 STOP ENDS AND DOWNTURNS

Form stop-ends at the upper end of all sheets. Form downturns at the gutter line where the roof pitch is less than 8 degrees using purpose made tools.

3.14 INSTALL FLASHINGS

Flash roof, including to parapets, walls and penetrations to detail. Transverse flashings to be installed on timber framing with a maximum moisture content of 18%. Where no detail is provided flash to NZMRM CoP recommendations and the roofing manufacturer's and NZBC E2/AS1 requirements. Cut accurately and fix using sealant and rivets to detail to form a weatherproof cover. For highly visible flashings, plan joints/junction to take account of the aesthetic requirements.

3.15 FLASHING PENETRATIONS

Flash all penetrations through the roof according to design details. Fit pipe flashings with a proprietary collar flashing to manufacturer's requirements, with other penetrations flashed as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.

3.16 INSTALL RIDGING

Install ridging by fastening to the purlins through the leading edge of the roofing to manufacturer's requirements.

3.17 FLASHING TERMINATION

Terminate all visible flashing ends to provide a tidy and weathertight finish.

3.18 USE OF SEALANTS

Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces. Secure joint with rivets at 50mm centres.

Completion

3.19 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

3.20 PROTECT

Protect the completed roof area from mechanical and chemical damage. Provide temporary protection, as required, for material storage, foot traffic and later works such as scaffolding and remove when no longer required.

4 SELECTIONS

For further details on selections go to www.colorsteel.co.nz and to selected roofing manufacturer's website.
Substitutions are not permitted to the following, unless stated otherwise.

Material - Roofing

4.1 COLORSTEEL® MAXAM™ PROFILED ROOFING

Location:	~
Manufacturer:	New Zealand Steel
Material:	COLORSTEEL® Maxam™
BMT:	~mm
Colour:	~
Profile:	~
Substrate:	~
Fixing:	~

Accessories

4.2 FLASHINGS BEHIND CLADDING

Location: ~

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Manufacturer:	New Zealand Steel
BMT/material:	0.9mm aluminium
Coating system:	COLORSTEEL Altimate®
Coating colour:	~

4.3 FLASHINGS - GENERALLY

Profile:	~
BMT/material:	~
Coating system:	To match roofing
Coating colour:	To match roofing

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4521AC APL COMMERCIAL ALUMINIUM WINDOWS & DOORS

1 GENERAL

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This section relates to the fabrication, supply and installation of APL Window Solutions commercial window and door systems manufactured by either Altherm, First or Vantage. It includes:

- APL Aluminium windows and doors
- APL Shopfront system
- APL Flushglaze
- APL Structural Glaze
- APL Roof Windows and Overhead glazing
- APL Ventient trickle ventilators
- Hardware and furniture
- Flashings and sealants

1.1 RELATED WORK

Refer to appropriate glazing sections for glass types

1.2 ABBREVIATIONS AND TERMS

SLS	Serviceability limit state
ULS	Ultimate limit state
WGANZ	Window & Glass Association NZ
PQAS	Powder Coating Quality Assurance System

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC F4/AS1	Safety from falling
NZBC G4/AS1	Ventilation
NZBC H1/AS1-AS2	Energy efficiency
NZBC H1/VM1-VM2	Energy efficiency
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1580.108.1	Methods of test for paints and related materials - Determination of dry film thickness on metallic substrates - Non destructive methods
AS/NZS 1734	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate
AS/NZS 1866	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
NZS 3604	Timber-framed buildings
NZS 4211	Specification for performance of windows
NZS 4223.3	Glazing in buildings - Human impact safety requirements
NZS 4303	Ventilation for acceptable indoor air quality
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
BS EN 673	Glass in building - Determination of thermal transmittance (U-value) - Calculation method
AAMA 2603	Voluntary specification, performance requirements, and test procedures for pigmented organic coatings on aluminium extrusions and panels (with coil coating appendix)
AAMA 2604	Voluntary specification, performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels
AAMA 2604.05	Performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels
AAMA 2605	Voluntary specification, performance requirements and test procedures for superior performing organic coatings on aluminium extrusions and panels

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BS 3900	Methods of tests for paints, Part C5: Determination of film thickness
ISO 10077-1	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - General
ISO 10077-2	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Numerical method for frames
ISO 12631	Thermal performance of curtain walling - Calculation of thermal transmittance
BRANZ BU 636	Protecting Glass From Damage

Window & Glass Association NZ (WGANZ) documents:

Window Installation Guide	Guide to Window Installation as described in E2/AS1
PQAS	Powder Coating Quality Assurance System
SFA 3503-03	Anodic Oxide coatings on wrought aluminium for external architectural application (2005)

US Federal Specification:

TT-S-001543A	Sealing compound, silicone rubber base (for caulking, sealing and glazing in buildings and other structures)
TT-S-00230C	Sealing compound, elastomeric type, single component (for caulking, sealing and glazing in buildings and other structures)

CodeMark CMNZ10033 (V1)	APL Metro Series ThermalHEART® with Centrafix™ Windows and Doors.

1.4 MANUFACTURER / SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
Altherm Specifier's Guide
First Specifier's Guide
Vantage Specifier's Guide
APL Specifier Guide to Fluoroset FP - Selling, Fabricating, Handling, Care and Maintenance
APL Window Energy Efficiency Rating System (WEERS) Report Series
APL Metro Series ThermalHEART® with Centrafix™ System Guide V1, April 2023
BRANZ Appraisal 1188 [2023] - APL Metro Series ThermalHEART® with Centrafix™ Windows and Doors
BRANZ Appraisal 1259 [2024] - APL ThermalHEART+® Window and Door Systems

Manufacturer/supplier contact details

Company:	APL Window Solutions
Web:	www.altherm.co.nz www.firstwindows.co.nz www.vantage.co.nz www.aplnz.co.nz
Email:	specifiersguide@aplnz.co.nz
Telephone:	07 849 2113

Warranties

1.5 WARRANTY - MANUFACTURER / SUPPLIER

Provide a material manufacturer/supplier warranty:

5 years:	For fabrication
2 years:	For hardware

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements

1.6 WARRANTY - INSTALLER / APPLICATOR

Provide an installer/applicator warranty:

5 years:	For installation

- Provide this warranty in the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any specified APL aluminium system, or associated components and products.

1.8 QUALIFICATIONS

Work to be carried out by trades people experienced, competent and familiar with the materials and techniques specified.

Compliance Information

1.9 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Manufacturer / supplier warranty
- Installer / applicator warranty
- Other information required by the BCA in the Building Consent Approval documents.

1.10 CERTIFICATION

Provide evidence of a certificate by a laboratory accredited by International Accreditation of New Zealand that the windows and doors offered comply with the requirements of NZS 4211.

Performance

1.11 PERFORMANCE - WINDOWS AND DOORS

To NZS 4211, including:

- deflection, opening sashes, air infiltration, water penetration, ultimate strength, torsional strength of sashes, marking.

Refer to SELECTIONS.

1.12 STRUCTURAL / WEATHER-TIGHTNESS

The structural and weather-tight performance of the completed joinery, the glazing and infill panels is the responsibility of the window fabricator.

1.13 PERFORMANCE - THERMAL

Thermal performance of windows & doors to NZBC H1/AS1-AS2 & NZBC H1/VM1-VM2. The construction R-value of windows & doors determined in accordance with Appendix E, E1 Vertical windows and doors:

- Determine the thermal transmittance of window & doors in accordance with ISO 10077-1.
- Determine the thermal transmittance of framing in accordance with ISO 10077-2.
- Determine the thermal transmittance of glazing using BS EN 673.

Refer to SELECTIONS for construction R-values.

Performance - Wind

1.14 DESIGN PARAMETERS - NON SPECIFIC DESIGN

Design the installation to the wind zone parameters of NZS 3604, table 5.1.
Refer to SELECTIONS for wind zone.

Finishes

1.15 CERTIFY COATINGS - POWDER COATING

Certify on request, compliance with this specification and support with control and sampling records. Test for film thickness to BS 3900, part C5, method No. 4, using method (b) or to AS/NZ 1580.108.1 for certifying thickness and method (a) where any dispute arises as to the thickness provided.
The coating should be applied by an applicator who can certify that the coating has been applied in accordance with the specification.

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2 PRODUCTS

Materials

2.1 ALUMINIUM EXTRUSIONS

Alloy designation to comply with AS/NZS 1866. Branded and extruded for anodising or powder coating.

2.2 ALUMINIUM SHEET AND STRIP

Complying with AS/NZS 1734 of suitable thickness. Rolled for anodising or powder coating.
Alloy designation: 5251 - H16 or 5005 - H16

2.3 STAINLESS STEEL SHEET AND STRIP

Type: 316 austenitic steel
Finish grade: 2B (satin lustre)

2.4 GLASS

Refer to the glazing section for glass types and installation.

Accessories

2.5 FLASHINGS GENERALLY

To NZBC E2/AS1, 9.1.10 Windows and Doors. Material, grade and colour of head flashings to match the window frames. Ensure that materials used for head, jamb and sill flashings are compatible with the window frame materials and fixings and cladding materials.

Components

2.6 GLAZING GASKETS

Thermoplastic rubber. Do not stretch glazing gaskets during installation. Measure and cut gaskets 5-10% over length before installation.

2.7 HARDWARE AND FURNITURE

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Refer to SELECTIONS for type and finish. Key alike all lockable window hardware able to be keyed alike.

2.8 FIXING BRACKETS

Designed by manufacturer to specific design.

Sealants

2.9 STRUCTURAL SEALANT

Silicone chemically curing sealant specifically formulated and tested or approved equivalent with not less than a ± 40% movement factor complying with US Federal Specification TT-S-001543A.

2.10 WEATHERING/INSTALLATION SEALANT

Building sealant used in accordance with manufacturer's instructions for weather sealing aluminium frames to the cladding, complying with US Federal Specification TT-S-001543A, or a one-part polyurethane moisture curing, elastic joint sealant of medium modulus (± 25% movement) to US Federal Specification TT-S-00230C.

Finishes

2.11 DURATEC POWDER COATED ALUMINIUM

High-performance polyester powder coating in accordance with WGANZ PQAS and AAMA 2604.

3 EXECUTION

Conditions - generally

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

3.4 PROTECTIVE COVERINGS

Retain protective coverings and coatings to BRANZ BU 636 and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades. Remove protection on completion.

3.5 ADDITIONAL PROTECTION

Supply and fix additional protection as necessary to prevent marking of surfaces which will be visible on completed work.

Assembly

3.6 FABRICATION

Fabricate frames as detailed on shop drawings. Install fixing brackets, glazing, hinges, stays and running gear as scheduled. Provide temporary bracing and protection. Temporarily secure all opening elements for transportation.

3.7 HARDWARE GENERALLY

Factory fit all required and scheduled hardware. Account for all keys and deliver separately to the site manager.

3.8 SUPPLY OF FIXINGS

Use only fixings and fastenings recommended by the manufacturer of the component being fixed and to comply with the ULS wind pressure stated in SELECTIONS.

3.9 EXPOSED FIXINGS AND FASTENINGS

Fixings and fastenings exposed to the weather to be aluminium, or Type 304 stainless steel.

3.10 PROTECTED FIXINGS AND FASTENINGS

Fixings and fastenings not exposed to the weather may be hot-dip galvanized steel with a coating weight of 610 g/m² complying with AS/NZS 4680.

3.11 CORROSION PROTECTION

Before fixing, apply suitable barriers of bituminous coatings, stops or underlays between dissimilar metals in contact, or between aluminium in contact with concrete.

3.12 CONFIRM PREPARATION OF EXTERIOR WALL OPENINGS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames. Do not proceed with the window and door installation until required preparatory work has been completed.

Required preparatory work includes the following:

- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames to NZBC E2/AS1:9.1.5 Wall underlays to wall openings.
- Full height 20mm jamb battens to NZBC E2/AS1 figure 72A (direct fix only)
- claddings neatly finished off to all sides of openings
- installation of flashings (those which are required to be installed prior to frames).
- application of waterproof sealer to all door and window sills in concrete floor or concrete sill situations. To door sills only, apply a suitable membrane over the sealer.
- all in accordance with the shop drawings, where applicable.

3.13 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

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3.14 INSTALLATION

Fix to comply with the reviewed shop drawings and installation details including flashings and bedding compounds, pointing sealants and weathering sealants.

3.15 INSTALL FLASHINGS

Install flashings to heads, jambs and sills of frames as supplied and required by the window manufacturer and as detailed on the drawings. Finish head flashings to match window finish.

Place all flashings so that the head flashing weathers the jamb flashings, which in turn weathers over the upstand of the sill flashing. Ensure that sill flashings drain to the outside air.

Except where window/door frames are recessed, ensure that head flashings over-sail unit by 20mm plus any jamb scriber width at each end.

3.16 COMPLETE AIR SEAL

To NZBC E2/AS1:9.1.6 Air seals. Form an air-tight seal by means of proprietary expanding foam or sealants used with PEF backing rods, applied between the window / door reveal and structural framing to a depth of 10 - 20mm, to provide a continuous air tight seal to the perimeter of the window or door.

3.17 FIX HARDWARE

Fix all sash and door hardware and furniture as scheduled.

Application - jointing and sealing

3.18 SEAL FRAMES ON SITE

Seal frames to each other and to adjoining structure and finishes, to the requirements of the window and sealant manufacturer and to make the installation weathertight. In very high and extra high or greater wind zones, seal between the window head and the head flashing. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.

3.19 PREPARE JOINTS

Ensure joints are dry. Remove loose material, dust and grease. Prepare joints in accordance with the sealant manufacturer's requirements, using required solvents and primers where necessary. Mask adjoining surfaces which would be difficult to clean if smeared with sealant.

3.20 BACK UP

When using back-up materials do not reduce depth of joint for sealant to less than the minimum required by the manufacturer of the sealant. Insert polyethylene rod or tape back-up behind joints being pointed with sealant.

3.21 SEALANT FINISH

Tool sealant to form a smooth fillet with a profile and dimensions required by the sealant manufacturer. Remove excess sealant from adjoining surfaces, using the cleaning materials nominated by the sealant manufacturer and leave clean.

3.22 PROTECTIVE COVERINGS

Retain protective coverings and coatings and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades.
Anodised finishes should be protected from cement products and requires immediate clean-up of cement splashes. Only use tapes that have passed WGANZ testing on powder coated products. Remove protection on completion.

3.23 IN-SITU TOUCH-UP TO POWDER COATED ALUMINIUM

In situ touch-up of polyester or fluoropolymer coated aluminium is only permitted to minor surface scratching. Otherwise replace all damaged material.

3.24 SAFETY

Indicate the presence of transparent glasses for the remainder of the contract period, with whiting, tape or signs compatible with the glass type. Indicators other than whiting must not be applied to the glass surface. Masking tape must not be used for this purpose.

Completion & Commissioning

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3.25 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.aplnz.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

4.1 SUPPLY AND INSTALLATION

Supply and installation of the specified APL aluminium joinery system.

Supply:	By fabricator
Installation:	By ~

Performance

4.2 THERMAL PERFORMANCE - VERTICAL WINDOWS & DOORS

Window /Door Number:	Construction R-value:
~	~
~	~

4.3 AIR INFILTRATION

For NZS 4211, table 3 Air infiltration.

Non-air conditioned zones:	~
Air conditioned zones:	~

Performance - Wind

4.4 DESIGN PARAMETERS - NON SPECIFIC DESIGN

Building wind zone	~ (refer to NZS 3604, table 5.1)

Finishes - Powder Coating

4.5 DURATEC - POWDER COATING FINISH

Type:	Polyester organic powder coating
System integrity:	~
Colour:	~
Finish:	~

Glazing

4.6 GLASS

Type/thickness:	Refer to appropriate glazing sections for type and thickness.

Hardware

4.7 HARDWARE FINISH

Finish:	Powder coat
Colour:	Black

Flashings and Sealant

4.8 FLASHINGS

Material/type:	~
Pattern:	Formed to suit details provided

4.9 WEATHERING SEALANT

Type:	1-part polyurethane moisture curing, elastic joint sealant
Colour:	~

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4611AG AGP GLAZING COMMERCIAL

1 GENERAL

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This section relates to the supply and fixing of AGP® glass products for use with APL Window Solutions external and internal joinery in commercial type buildings.

It includes:

- Window and door glazing
- Curtain wall systems
- Canopies

This AGP section is to be read in conjunction with APL Window Solutions branded sections.

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

IGU	Insulating glass unit
PA	Polyamide
PE	Polyethylene
PP	Polypropylene
PVB	Polyvinyl butyral
SLS	Serviceability limit state
ULS	Ultimate limit state
uPVC	Unplasticised polyvinyl chloride

Documents

1.3 DOCUMENTS

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

NZBC B1/AS1	Structure
NZBC B2/AS1	Durability
NZBC F2/AS1	Hazardous building materials
NZBC H1/AS1-AS2	Energy Efficiency
NZBC H1/VM1-VM2	Energy Efficiency
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS/NZS 2208	Safety glazing materials in buildings
NZS 4211	Specification for performance of windows
NZS 4223.1	Glazing in buildings - Glass selection and glazing
NZS 4223.Supp1	Glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
NZS 4223.2	Glazing in buildings - Insulating glass units
NZS 4223.3	Glazing in buildings - Human impact safety requirements
NZS 4223.4	Glazing in buildings - Wind, dead, snow and live action
AS/NZS 4667	Quality requirements for cut and processed glass

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:

- Product notes and manufacturing limitations
- Care and maintenance of your AGP glass
- Condensation guide
- AGP Glass handling, storage & transportation guide
- Guide to visual quality of residential glass and insulating glass units (IGUs)
- Insulating glass unit (IGU) warranty

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Manufacturer/supplier contact details

Company:	Architectural Glass Products Ltd
Trading as:	AGP
Web:	www.agpl.co.nz
Email:	technical@agpl.co.nz
Telephone:	07 849 8880

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

12 years	For IGU
12 years	For float glass
12 years	For toughened glass
12 years	For laminated glass

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of supply.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

1.8 SAMPLES

Refer to the general section 1270 CONSTRUCTION for details of how samples will be reviewed and how instructions to proceed will be given. Provide the following samples for review:

	Sample A	Sample B	Sample C
Sample description:	~	~	~
Sample type:	~	~	~
Number:	~	~	~
Location:	~	~	~
Supporting documentation:	~	~	~
Reviewer:	Contract administrator~	Contract administrator~	Contract administrator~
Time for review:	10 working days ~	10 working days ~	10 working days ~
Review criteria:	~	~	~

1.9 INFORMATION FOR OPERATION AND MAINTENANCE

Refer to the general section 1239 OPERATION & MAINTENANCE for provision of the following general operation and maintenance information as electronic PDF format documents:

- Care and maintenance of your AGP glass
- Condensation guide

Provide this information prior to practical completion.

Compliance information

1.10 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation: -

- Applicator approval certificate from the manufacturer / importer / distributor
- Manufacturer / supplier warranty
- Installer / applicator warranty

- Producer Statement - Construction from the applicator / installer
- Other information required by the BCA in the Building Consent Approval documents.

Performance

1.11 THERMAL STRESS ANALYSIS

For non-heat treated glass, obtain a thermal stress analysis for tinted, reflective and other solar control vision glass including IGU's for review before placing final order.

1.12 ENERGY EFFICIENCY

Provide glazing to comply with H1 Energy efficiency requirements of NZBC H1/AS1-AS2 or NZBC H1/VM1-VM2.
Refer to SELECTIONS and schedules for location and type of glazing.

Performance - Wind (design by contractor)

1.13 DESIGN PARAMETERS WIND - DESIGN BY CONTRACTOR

Design the installation to the manufacturer requirements and as appropriate for the project wind design parameters. Refer to SELECTIONS.

Quality control and assurance

1.14 INSPECTIONS

~ ~

2 PRODUCTS

Materials, windows and doors

2.1 CLEAR FLOAT GLASS

Clear ordinary transparent float glass for general window/door glazing application. Thickness to NZS 4223.1, NZS 4223.Supp1, NZS 4223.3 and NZS 4223.4.

2.2 OBSCURE GLASS

Translucent rolled glass, sand-blasted or acid etched on one surface for a decorative finish.

2.3 LAMINATED GLASS

Grade A safety glass to AS/NZS 2208 with PVB interlayer.

2.4 TOUGHENED GLASS

Grade A safety glass to NZBC F2/AS1 and AS/NZS 2208.
Heat soaked toughened glass to NZS 4223.1, Appendix E for critical areas.
Refer to SELECTIONS.

2.5 TINTED FLOAT GLASS

Body tinted float glass. Thickness to NZS 4223.1 and NZS 4223.Supp 1, NZS 4223.3 and NZS 4223.4.

2.6 REFLECTIVE AND COATED FLOAT GLASS

Coated float glass incorporating both solar and thermal insulation properties, or coated float glass with thermal insulation properties only.

2.7 INSULATING GLASS UNITS (IGU'S)

To the performance requirements of NZS 4223.2.
Marking to NZS 4223.2 as modified by NZBC B2/AS1, 3.5.
Refer to SELECTIONS for specified surfaces of the IGU.
Surface numbering order for glass panes in an IGU are #1, #2, #3, and #4 as follows:

- Surface #1 - outer face of exterior pane
- Surface #2 - cavity face of the exterior pane
- Surface #3 - cavity face of the interior pane
- Surface #4 - outer face of the interior pane

Components, aluminium and uPVC glazing

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2.8 GLAZING TAPE AND GASKETS

Single/double sided pressure sensitive self-adhesive low/medium/high density foam tapes/butyl tapes selected to suit the glazing detail to window manufacturer's requirements.

2.9 SETTING BLOCKS

APL Window and Door Systems setting blocks consisting of PE, PP or PA material selected to suit the frame and panel type.

3 EXECUTION

Conditions

3.1 GENERAL REQUIREMENTS

To NZS 4223.1, NZS 4223.2, NZS 4223.3 as modified by NZBC B1/AS1, 7.3.1, and NZS 4223.4. Interface between external glazing and other elements to be wind and watertight on completion.

3.2 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.3 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.4 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

3.5 GLASS CONDITION

All glass to have undamaged edges and surfaces in accordance with AS/NZS 4667.

3.6 GLASS THICKNESS

Whether stated in a glazing schedule or not, confirm glass thicknesses to NZS 4223.1, NZS 4223.3, NZS 4223.4. For windows tested to NZS 4211, ensure glass meets the requirements of the window testing.
Determine the final glass thickness based on whether wind loading, or human impact considerations govern.

3.7 REBATE DIMENSIONS

Provide rebates for glazing to the widths and depths necessary for each situation including minimum glass edge cover to NZS 4223.1, Section 4 Glazing.

Conditions - human impact safety requirements

3.8 SAFETY GLAZING, GENERAL REQUIREMENTS

Glazing of doors, side panels, low level and window seat glazing, bathrooms, stairwell landings and similar locations, to NZS 4223.3 as modified by NZBC B1/AS1, 7.3.1, for thickness and maximum areas of safety glass.

3.9 SAFETY GLAZING MATERIAL

Use only safety glazing materials defined in NZS 4223.3, that also comply with the relevant requirements of AS/NZS 2208. Ensure material is permanently marked and if cut by the distributor or installer mark each piece to NZS 4223.3, 2.8 Identification.

3.10 CONTAINMENT

Edge cover to comply with NZS 4223.1, Section 4 Glazing, table 5. Otherwise to NZS 4223.3, 2.3 Edge cover.

Assembly

3.11 WORKING OF GLASS

All working of glass as required in NZS 4223.1.

3.12 EDGE WORK

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Edge work other than a clean cut. Refer to SELECTIONS/drawings for type.

Installation/application

3.13 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.
Refer to AS/NZS 4667 and NZS 4223.1 for glass and glazing.

3.14 INSTALL SAFETY GLASS

To NZS 4223.3.

3.15 INSTALLING INSULATING GLASS UNITS

Refer to the APL branded window manufacturer's requirements, and before glazing, ensure that the materials forming the opening are strong enough to accept the weight, the rebates are the correct size and prepared to receive the units to the manufacturer's requirements. Fit setting and location blocks and bead glaze units using a compatible sealant.

3.16 INSTALLING REFLECTIVE AND COATED GLASS

In addition to the type of glazing specified refer to the requirements of the glass manufacturer and ensure that the rebate dimensions, clearances and edge cover are sufficient to allow for the movement created by the particular solar control glass being used. Check thermal stability for the particular location and ensure any sealant or compound is compatible with the coating.

Application aluminium

3.17 INSTALL GLASS TO ALUMINIUM FRAMES

Install glass to NZS 4223.1.

- Bead glaze to Section 4 Glazing.
- Channel glaze to Section 4 Glazing, and Section 5 for Framed, Unframed, Partly Framed Glass Assemblies.

Application uPVC

3.18 INSTALL GLASS TO UPVC FRAMES

Install glass to NZS 4223.1.

- Bead glaze to Section 4 Glazing.
- Channel glaze to Section 4 Glazing, and Section 5 for Framed, Unframed, Partly Framed Glass Assemblies.

Finishing

3.19 SAFETY

Indicate the presence of transparent glass for the remainder of the construction period, with whiting, tape or signs compatible with the glass type.

3.20 MANIFESTATIONS

To NZS 4223.3, 2.2 Manifestation (making glass visible).

Completion & Commissioning

3.21 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

3.22 COMPLETION - TESTS & CERTIFICATION

Refer to 1270 CONSTRUCTION for general test and certification requirements at completion.
~

SELECTIONS

For further details on selections go to www.agpl.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Performance - wind

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4.1 WIND ZONE - NON-SPECIFIC DESIGN

Refer to general section 1220 PROJECT for design wind pressures.

4.2 WIND - SPECIFIC DESIGN

The design wind pressures are to AS/NZS 1170.2

SLS	~ Pa
ULS	~ Pa

Glass by type

4.3 AGP CLEAR GLASS

Location:	~
Brand:	AGP
Thickness:	~mm

4.4 AGP TINTED GLASS

Location:	~
Brand:	AGP
Tint colour/thickness:	~

4.5 AGP OBSCURE GLASS

Location:	~
Brand:	AGP
Pattern/thickness:	~

4.6 AGP STOPSOL REFLECTIVE HIGH-PERFORMANCE SOLAR CONTROL GLASS

Location:	~
Brand:	AGP
Type:	Stopsol
Thickness:	6mm
Coated surface:	~
Reflective colour:	~

4.7 AGP PVB LAMINATED GLASS

Location:	~
Brand:	AGP
Type:	PVB
Colour/thickness:	~
Interlayer:	0.38mm Standard

4.8 AGP TOUGHENED GLASS

Location:	~
Brand:	AGP
Type:	~
Thickness:	~mm

4.9 AGP SOLUX-E® - LOW E THERMAL AND SOLAR CONTROL IGU

Location:	All IGUs
Brand/type:	AGP SOLUX-E®
Outer glass type:	Clear
Coated surface:	#2
Outer glass thickness:	~mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass type:	Clear
Inner glass thickness:	~mm

4.10 AGP SOLUX-E® - TINTED LOW E THERMAL AND SOLAR CONTROL IGU

Location:	All IGUs

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Brand/type:	AGP SOLUX-E® & TINT
Outer glass tint colour/thickness:	~
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass brand/type:	AGP SOLUX-E®
Coated surface:	#3
Inner glass type:	Clear
Inner glass thickness:	~mm

4 11 AGP SOLUX-E® - STOPSOL REFLECTIVE IGU

Location:	All IGUs
Brand/type:	AGP SOLUX-E® & Stopsol reflective
Outer glass reflective colour:	~
Coated surface:	#1
Outer glass thickness:	6mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass brand/type:	AGP SOLUX-E®
Coated surface:	#3
Inner glass type:	Clear
Inner glass thickness:	~mm

4 12 AGP SOLUX ULTRA™ - HIGH-PERFORMANCE LOW E THERMAL AND SOLAR CONTROL IGU

Location:	All IGUs
Brand/type:	AGP SOLUX ULTRA™
Outer glass type:	Clear
Coated surface:	#2
Outer glass thickness:	~mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass type:	Clear
Inner glass thickness:	~mm

4 13 AGP SOLUX ULTRA™ - TINTED HIGH-PERFORMANCE LOW E THERMAL AND SOLAR CONTROL IGU

Location:	All IGUs
Brand/type:	AGP SOLUX ULTRA™ & TINT
Outer glass tint colour/thickness:	~
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass brand/type:	AGP SOLUX ULTRA™
Coated surface:	#3
Inner glass type:	Clear
Inner glass thickness:	~mm

4 14 AGP SOLUX ULTRA™ - HIGH-PERFORMANCE STOPSOL REFLECTIVE IGU

Location:	All IGUs
Brand/type:	AGP SOLUX ULTRA™ & Stopsol reflective
Outer glass reflective colour:	~
Coated surface:	#1
Outer glass thickness:	6mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon

Inner glass brand/type:	AGP SOLUX ULTRA™
Coated surface:	#3
Inner glass type:	Clear
Inner glass thickness:	~mm

4.15 AGP STOPSOL REFLECTIVE IGU

Location:	All IGUs
Brand:	AGP
Outer glass type:	Stopsol reflective
Outer glass reflective colour:	~
Coated surface:	~
Outer glass thickness:	6mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass type:	Clear
Inner glass thickness:	~mm

4.16 AGP INSULATING GLASS UNIT (IGU)

Location:	~
Brand/type:	AGP Double Glazing System
Outer glass type:	~
Outer glass thickness:	~mm
Spacer width:	~mm
Spacer type:	~
Space gas:	Argon
Inner glass type:	Clear
Inner glass thickness:	~mm

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4711P PINK® BATTS® THERMAL INSULATION

1 GENERAL

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This section relates to Comfortech Building Performance Solutions™ Pink® Batts® thermal insulation materials for walls, floors, ceilings and roofs.

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for wire netting, wall underlays and roofing underlays
Refer to 4721P Pink® Batts® Acoustic Insulation for acoustic insulation.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

Documents

1.3 DOCUMENTS

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

NZBC H1/AS1-AS2	Energy efficiency
NZS/AS 1530.1	Methods for fire tests on building materials, components and structures - Combustibility test for materials
AS/NZS 3000	Electrical installations (Known as the Australian/New Zealand Wiring Rules)
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance
NZS 4246	Energy efficiency - Installing bulk thermal insulation in residential buildings

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents related to this section are:
Comfortech H1. Done - Insulation Guide
Comfortech Pink® Batts® Insulation - Safety Data Sheet.
Comfortech Pink® Batts® Thermal Solutions - Product Guide
Comfortech Pink® Superbatts® Thermal Solutions - Installation Guide
Comfortech Pink® Batts® - Product Data Sheets
Comfortech Pink® Batts® - Installation Instructions
BRANZ Appraisal 238 (2023) - Pink® Batts® Insulation - Amended 04 November 2024
BRANZ Appraisal 632 (2023) - Pink® Batts® SnugFloor® Insulation - Amended 12 August 2024
BRANZ Appraisal 767 (2023) - Pink® Batts® Skillion Roof Insulation - Amended 04 November 2024

Manufacturer/supplier contact details

Company:	Tasman Insulation NZ Ltd
Trading as:	Comfortech Building Performance Solutions™
Web:	www.pinkbatts.co.nz
Telephone:	0800 746 522

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

50 years	For Pink® Batts® thermal insulation products

- Provide this warranty on the manufacturer/ supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

~ years	For Pink® Batts® insulation products

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Compliance information

1.9 BRANZ APPRAISAL

Pink® Batts® Insulation meets the requirements of the NZBC when used in accordance with the conditions and limitations listed in the following Branz Appraisal:
BRANZ Appraisal 238 - Pink® Batts® Insulation
BRANZ Appraisal 632 - Pink® Batts® SnugFloor® Insulation
BRANZ Appraisal 767 - Pink® Batts® Skillion Roof Insulation

Performance - Fire

1.10 FIRE PROPERTIES

Pink® Batts® insulation products, with the exception of Pink® Batts® R2.6 Wall Insulation and Pink® Batts® R2.8 Wall Insulation products, are classified as non-combustible when tested to NZS/AS 1530.1 and achieve a Group Number of 1-S.

1.11 FIRE HAZARD TESTING

Pink® Batts® insulation products withstand the 30s Needle Flame test in accordance with AS/NZS 60695.11.5, that is required for insulation abutting or covering recessed downlights intended to be in contact with IC, CA 80, CA 135 luminaires.

2 PRODUCTS

Materials

2.1 PINK® BATTS® STEEL WALL INSULATION

Pink® Batts® Steel Wall Insulation 220mm x 610mm and 90mm thick bio-soluble fibrous glass wool slab manufactured from up to 80% recycled window glass and bonded with thermosetting resin. Coloured Pink for identification. Available with R-value 2.2 and R-value 2.6. Refer to SELECTIONS.

Components

2.2 FASTENERS

Insulation anchors complete with retaining washer.

2.3 PLASTIC STRAPPING TAPES

Proprietary plastic strapping tape, stapled over framing to retain insulation in unlined wall and ceiling locations.

2.4 ADHESIVE TAPE

Pressure sensitive adhesive tape.

3 EXECUTION

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Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work. Check that framing is free from moisture. Check cavities are not interconnected. Check required wire netting, roof/ underlays are in place and are dry, clean and homogeneous before installing insulation. Ensure main power is isolated and tagged prior to installation.

3.4 HANDLING

Wear protective clothing as necessary and when handling, avoid delamination or distortion of the rectangular form. Refer to Pink® Batts® Insulation - Safety Data Sheet.

Installation

3.5 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.6 INSULATION CLEARANCES

Install Pink® Batts® insulation with clearances to mechanical and electrical services and equipment, including ducts, chimneys and other heat sensitive materials in accordance with tables below based on NZS 4246, or to equipment manufacturers requirements if they require larger clearances. Installed clearances not to be more than 50mm larger than the required clearance. Smaller clearances that are required by manufacturer can be used for equipment specifically manufactured with heat shielding or similar (excludes light fittings).
The following installation clearances tables are subject to:

- Requirements of NZS 4246
- Insulation is exposed to the source of heat or equipment etc.
- Insulation has passed the needle flame test to AS/NZS 60695.11.5 and/ or is non-combustible.
- Clearances to hot surfaces may have to be increased with non-compliant insulation and plastic/ polymeric type insulation (EPS, XPS, PIR, etc), check with insulation manufacturer.
- Clearances to hot surfaces may be able to be reduced with non-combustible insulation, check with equipment manufacturer.
- "Secure insulation" if required means, glue, mechanical fix, or provide fixed barriers at gap edge of insulation to hold in place. Rigid or semi rigid insulation may only need a firm friction fit (secure loose pieces).
- Loose fill insulation require fixed barriers to NZS 4246 to maintain clearances.

(1) CLEARANCES TO LIGHT FITTINGS :

Type of fitting	Minimum insulation clearance	Comments
Recessed, marked NON-IC, or unmarked	100mm (increase if over 100W)	NON-IC fittings and new or old unmarked & unknown fittings, and/or insulation. Secure insulation.
Recessed, CA 80, CA 90 or CA 135	Abut fittings	Do NOT cover the fittings
Recessed, IC, IC-F or IC-4	Abut & cover fittings	Ensure insulation complies
Recessed, marked Do-Not-Cover	Manufacturer clearances	Do not cover the fittings

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Independent control gear	Place on top of insulation & 50mm from fitting	If not on top allow 50mm clearance to insulation, do not cover. Includes, transformers, ballasts & drivers etc.
Surface fittings not exposed to insulation	Nil	Where surface fittings are isolated from insulation by appropriate linings. Excludes high heat fittings.
Surface fittings & exposed insulation	200mm	This is exposed insulation to any part of the exposed fitting & bulb/tube (e.g. exposed light in an unlined basement). Secure insulation.

(2) CLEARANCES TO RECESSED HOT APPLIANCES:

Appliance	**Minimum insulation clearance**	**Comments**
Electrical heaters	100mm	Clearance may be able to be reduced with non-combustible insulation. Secure insulation.
Gas appliance exposed flame	200mm	Clearance may be able to be reduced with non-combustible insulation or with specific details from the appliance manufacturer. Excludes uncommon appliances, refer NZS 4246.
Gas appliance flues	75mm	Clearance may be able to be reduced with non-combustible insulation. Secure insulation. Excludes uncommon appliances refer NZS 4246.
Oil-fired appliances and flues	230mm	Clearance may be able to be reduced with non-combustible insulation or with specific details from the appliance manufacturer. Secure insulation.
Open fireplace opening	200mm	Clearance may be able to be reduced with non-combustible insulation. Secure insulation.
Brick masonry chimneys	50mm	Clearance may be able to be reduced with non-combustible insulation. Secure insulation.
Metal chimneys & flues	75mm	Clearance may be able to be reduced with non-combustible insulation or with specific details from the appliance manufacturer. Secure insulation.
Solid fuel appliance	600mm	Clearance may be able to be reduced with non-combustible insulation or with specific details from the appliance manufacturer. Secure insulation.
Solid fuel appliance flue	600mm	Clearance may be able to be reduced with non-combustible insulation or with specific details from the appliance manufacturer. Secure insulation.

(3) CLEARANCES TO EXTRACTS, VENTS, PIPES & ROOF UNDERLAY:

Application	**Minimum insulation clearance**	**Comments**
Ducted fan motors	50mm	Includes ducted rangehoods, extractors etc. Applies to the motor unit and electrical enclosures (not the ducts)
Ducted fan ducts	Abut	Excludes motor unit and electrical enclosures.
Unducted fan motors usually discharging to ceiling space	200mm	Includes unducted, rangehoods, extractors etc, discharging into roof space. To prevent debris falling into motor. Clearance may be able to be reduced, by providing a fixed barrier around the vent.
Passive vents (still in use)	200mm	To prevent debris falling through. Clearance may be able to be reduced, with more cohesive insulation, like some of the rigid plastic types or providing a fixed barrier around the vent.
Plumbing penetrations through floors	100mm	Keep gap between pipe penetration and floor insulation in case of leaks.
Roofing material/underlay	25mm	From underside of roofing or flexible roofing underlay, to prevent wicking

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3.7 RECESSED LIGHT FITTINGS - NON-RESIDENTIAL

Non-residential recessed light fittings to AS/NZS 3000, 4.5.2.3.5;

- Existing fittings or retrofit situations, fittings maybe unmarked
- New fittings can only be labelled - CA 80, CA 90, CA 135, IC, IC-F, IC-4, NON-IC or Do-not Cover

Refer to clause INSULATION CLEARANCES GENERALLY for clearances.

3.8 RECESSED LIGHT FITTINGS - RESIDENTIAL

Residential recessed light fittings to AS/NZS 3000, 4.5.2.3.5;

- Existing fittings or retrofit situations, fittings maybe unmarked
- New fittings can only be labelled - CA 80, CA 90, CA 135, IC, IC-F & IC-4

Refer to clause INSULATION CLEARANCES GENERALLY for clearances.

3.9 LAY PLASTIC STRAPPING TAPE

Lay at right angles across the framing at a minimum of 300mm centres, staple tape to each framing member with stainless steel staples.

3.10 PREPARATION

Before installation, gently agitate the insulation by gentle shaking or bouncing to assist recovery to the nominal thickness stated on the product label. Ensure the product is installed dry.

3.11 INSTALL INSULATION - GENERALLY

Install Pink® Batts® insulation in a dry protected environment. Lay, fit and fix insulation without gaps, tucks, folds and over compaction to NZBC H1/AS1-AS2 and Pink® Batts® installation requirements. For all housing and buildings up to 300m², install in accordance to NZS 4246 sections 5 Walls, 6 Ceilings & Roofs, 7 Underfloor - Suspended Framed Floors and 10 Concrete Slab-on-Ground Insulation, for residential light timber or steel framed buildings. Insulate around vents (not over them) to allow unhindered ventilation. Confirm with fireplace manufacturer for clearances; Pink® Batts® insulation is non-combustible and need not be separated except if used in conjunction with, or attached to other heat sensitive materials. Lift up electrical wires, lighting transformers/ controllers and lay the insulation underneath.

3.12 INSTALL PINK® BATTS® STEEL WALL INSULATION

Friction fit Pink® Batts® Steel Wall Insulation slabs into the C-section of the framing; friction fit insulation slabs between framing where sliding slabs into C-section is not possible. If cutting is required, cut to size allowing insulation to fit neatly into the C section. Fill gaps around windows and doors with off-cuts. Do not cover vents. Insulate around vents to allow unhindered ventilation. Fit insulation slabs behind electrical wiring and plumbing. Ensure there are no gaps, folds or undesirable compression at edges. Partially cut insulation and place around wires or pipes if necessary. Allow 50mm clearance around metal chimneys and flues.

Completion

3.13 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.pinkbatts.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Materials

4.1 PINK® BATTS® STEEL WALL INSULATION

Location:	~
Brand/ Type:	Pink® Batts® ~
R-value:	~
Nominal stabilised thickness:	90mm

4811 SEALANTS

1 GENERAL

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This is a reference section dealing with the selection of and application methods for sealants nominated in other work sections.

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

US Federal Specifications:

TT-S-00230C:	Sealing compound, elastomeric type, single component (for caulking, sealing and glazing in buildings and other structures).
TT-S-001543A:	Sealing compound, silicone rubber base (for caulking, sealing and glazing in buildings and other structures)

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~
Facsimile:	~

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

10 years	For materials

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

5 years	For installation

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 SUBMIT

Before commencing work submit the manufacturer's specifications for the specified sealant system, including the following:

- trade name
- generic type: one/multi part, non slump/self levelling, low/medium/high modulus
- chemical composition
- maximum joint movement

- tensile strength
- elastic recovery
- service temperature range
- shrinkage
- staining properties
- toxicity
- tack free time
- through cure time
- colour range
- life expectancy
- clean up solvents required
- primers required
- method of preparing surface
- method of application.

1.7 QUALIFICATIONS

Sealant work, including preparation, to be carried out by competent and experienced sealant applicators, approved by the sealant manufacturer. Provide evidence of technical competence and experience for review before commencing work.

1.8 MANUFACTURER'S TECHNICAL SERVICES

Use the research and development, and the technical information provided by the various sealant manufacturers throughout the design, development and installation stages of sealant work.

1.9 VISIT THE SITE

Arrange for the sealant manufacturer to visit the site to examine the site conditions, to inspect the surfaces and joints, and to discuss the installation procedures, before any sealing work proceeds

2 PRODUCTS

Materials

2.1 AIR SEAL AND JOINT FILLER

Bitumen impregnated sponge plastic, bitumen adhesive-fixed.

Accessories

2.2 JOINT CLEANING MATERIALS

Xylol, methyl-ethyl-ketone, toluol, as acceptable for the substrate material and/or finish and as required by the sealant manufacturer for the particular application. Test solvents to confirm suitability before using on finished work.

2.3 MASKING TAPE

Pressure sensitive, self adhesive crimped paper tape. Do not use masking-grease materials.

2.4 SURFACE PRIMER

As required by the sealant manufacturer for each surface substrate and particular applications. Primers to suit the various project conditions.

2.5 JOINT BACKING ROD

Extruded closed cell polyethylene foam rod, open cell foam polyurethane, or rod stock of butyl or Neoprene, chemically compatible with the sealant. Use backing rod diameter 25% greater than the joint width before installation. Use in long lengths.

2.6 BOND BREAKER TAPE

Pressure sensitive self adhesive polyethylene breaker tape. Masking tape or PVC insulation tape is not permitted.

3 EXECUTION

Conditions

3.1 COMPATIBILITY

Ensure sealants, joint fillers, primers, backing rods, bond breaker tape and cleaning solutions are compatible with each other.

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3.2 NON-BLEEDING SEALANTS

Use only non bleeding sealants capable of supporting their own weight (non slump), except for self-levelling sealant.

3.3 COLOURS

Refer to material selection. Where colour not specified, choose sealant colours from the manufacturer's standard/special colour ranges.

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Preparatory work

3.4 ENSURE

Ensure that joints to receive sealants are suitable for the proposed application. Ensure that surfaces are sound, dry, free from dust, dirt, scale, laitance, corrosion or other loose material, oil, grease, paint, release agents or other contaminants which may affect the bond, or the performance of the sealing material.

Ensure that joints and spaces receiving sealant are not less than 12mm deep, with width to suit the sealant being used.

3.5 TEST SUBSTRATES

Test substrates for indications of staining or poor adhesion. If poor adhesion is evident from initial tests, consult the sealant manufacturer about the application of a suitable primer. Only use combinations of sealants and substrates for which favourable adhesion and compatibility have been confirmed sufficiently for satisfactory adhesion of the selected sealant.

Do not apply sealant to concrete or concrete block until concrete and/or mortar has cured.

3.6 CLEAN JOINTS

Clean joints as required by the manufacturer to achieve acceptable joint surfaces for the application of sealant. Protect adjacent surfaces from abrasion or other damage.

3.7 CLEAN METAL SURFACES

Clean metal surfaces with solvent to remove any grease deposits.

3.8 MASK

Mask adjacent surfaces alongside joints to prevent contamination. Mask off any surfaces which would be difficult to clean if smeared with sealant, or where excess sealant could not be neatly trimmed off or removed.

3.9 VENTILATION

Ensure adequate ventilation for sealant applicators during the preparation and application of sealant work.

Application

3.10 FINAL PREPARATION

Prepare joints in accordance with the sealant manufacturer's requirements, using only recommended solvents and cleaning methods.

3.11 BACKING

Insert backing material in joints. Use only blunt instruments to install backing rods to avoid puncturing or damage. Do not twist rods when installing. When using backup material do not leave gaps and do not reduce the depth of the sealant joint to less than the minimum required by the sealant manufacturer.

3.12 PRIMING

Use manufacturer supplied/recommended primers. Allow to cure for the manufacturer recommended time (minimum and maximum). Refer to manufacturer for instructions if maximum cure time is exceeded before sealant is applied. Do not contaminate bond breakers with primer.

Allow primer to dry as recommended by the manufacturer. Do not prime more than can be completed in one day. Prevent contamination of the primed surfaces prior to applying sealant.

3.13 JOINT FILLING

Fill joint cavity with sealant in accordance with the sealant manufacturer's requirements and quality control programmes. Use a pressure gun with a nozzle cut to suit the required joint width. Ensure sealant is deposited in a uniform, continuous bead, without gaps or air pockets and with clean, neat edges.

3.14 TOOLING

Tool sealant to form a smooth, flat bead, or a smooth convex fillet, with a profile as required by the sealant manufacturer. Complete tooling before the sealant surface starts to form a skin.

3.15 FINISHING

Remove masking immediately after tooling and before sealant surface starts to skin. Remove excess sealant from adjoining surfaces before the sealant has set, using the cleaning materials and methods required by the sealant manufacturer, leaving surfaces clean and the sealant runs undamaged.

3.16 SURROUNDING WORK

Leave surrounding surfaces in a neat, clean condition with no evidence of spill overs.

Completion

3.17 CLEAN UP

Clean up as the work proceeds.

3.18 LEAVE

Leave work to the standard required by following procedures.

3.19 REMOVE

Remove masking tape, used packaging and waste products from the site.

4 SELECTIONS

4.1 AIR SEAL AND JOINT FILLER

Brand/type: ~
Location: ~

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4821 FLASHINGS

1 GENERAL

This section relates to the fabrication and installation of flashing systems not forming part of a proprietary system.

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS 3566	Self-drilling screws for the building and construction industries - General requirements and mechanical properties
NZS 3604	Timber-framed buildings
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

Requirements

1.3 QUALIFICATIONS

Work to be carried out by trades people experienced, competent and familiar with the materials and techniques specified.

1.4 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication.

Standards of performance

1.5 DURABILITY REQUIREMENTS

Design and install the flashings appropriate for the durability applications in accordance with NZBC B2/AS1. The Building Code B2, 3.2 requires that all hidden elements have at least the same durability as that of the element that covers it. Refer to NZBC B2/AS1 Table 1: Durability Requirements of Nominated Building Elements and NZBC E2/AS1 Table 20 Material selection.

1.6 COMPATIBILITY REQUIREMENTS

Each flashing material shall be selected in accordance with NZBC E2/AS1 Table 20 to minimise corrosion. Refer to either NZS 3604 Clause 4.2 or AS/NZS 2728 for the relevant exposure conditions. For compatibility of materials in contact and subject to run-off, refer to NZBC E2/AS1 table 21 and NZBC E2/AS1 table 22.

1.7 PROTOTYPES - REVIEW

Refer to the general section 1270 CONSTRUCTION for details of how prototypes will be reviewed and how instructions to proceed will be given. For flashings where there are no specific details or drawings, provide full size prototypes of the flashings to integrate components into the weathertight system. Co-ordinate with the trades affected by the installation. Provide the prototype flashings to the contract administrator for review.

2 PRODUCTS

2.1 FLASHING MATERIALS

Acceptable materials for flashings are described in NZBC E2/AS1, 4.0. Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the building and cladding materials and their fixings.

2.2 FLASHING FABRICATION

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Fabricate flashings generally to NZBC E2/AS1, 4.0, from a ductile grade of metal designed for lateral strength by folding, stiffening or ribbing on external edges, having a maximum un-stiffened width of 300mm. Provide all hooks, hems, kick outs, bird's beaks, stop ends, soft edges and turn downs etc. to NZBC E2/AS1, 4.0, or as shown on the drawings.

2.3 FIXINGS

Rivets, screws, nails and cleats to be compatible with the materials being fastened. Fasteners complying with the corrosion requirements of AS 3566 are suitable for use with ZINCALUME® steel products. Use only low carbon non-conductive sealing washers.

2.4 JOINTS - SEALANTS

Neutral Curing silicone or MS polymer sealant as required, with low resistance to compression and be-able to withstand large temperature variations. MS polymer sealant to be used where the sealant is exposed and the surrounding surfaces are to be subsequently painted or coated.

3 EXECUTION

Conditions

3.1 DELIVERY

Keep flashings dry in transit. Take delivery of flashings in an undamaged condition. Reject all damaged materials.

3.2 STORAGE

Store materials and accessories on a level, firm base, in dry conditions, well ventilated, out of direct sunlight and completely protected from weather and damage. Ensure storage areas are away from current work areas. Cover to keep dry until fixed.

3.3 HANDLING

Avoid distortion and contact with potentially damaging surfaces/substances. Do not drag flashings across each other, or across other surfaces. Protect edges, corners and surfaces from damage.

3.4 SUBSTRATE

Do not commence work until the substrate is of the standard required by the installer for the specified flashings, level and in true alignment.

3.5 PROTECT

Protect surfaces, window and door joinery, and finishes already in place, from the possibility of damage during the installation process.

3.6 CONFIRM LAYOUT

Before commencing work confirm the proposed installation of the flashings and expansion joints and other visual considerations of the finished work.

3.7 CO-ORDINATE INSTALLATION

Co-ordinate installation of flashings with associated trades.

Application

3.8 INSTALLATION

Install flashings in accordance with NZMRM CoP and in compliance with NZBC E2/AS1, 4.0 Flashings. For very high wind zones and where the pitch of the roof is below 15° the flashing joint laps shall be sealed with sealant at each end of the lap to prevent the ingress of water.

Refer to NZBC E2/AS1 Table 7 for general dimensions of flashings.

3.9 FIXINGS

Fix flashings with fasteners appropriate to the situation. For fixing flashings with proprietary brackets or clips ensure they are aligned to allow for movement and are compatible with the flashing material.

Fix screws with the shank perpendicular to the surface of the flashing with the washer fitted firmly against the flashing. Screws to be compatible with the flashing material.

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Rivets 'blind' or 'pop' are to be sealed when used. Aluminium rivets are compatible with zinc or AZ coated steel. Monel and stainless steel rivets can be used to fix galvanized steel flashings. Minimum diameter of rivet to be used is 4.0mm. Drill hole 1mm larger than the rivet size. Seal head of rivet with neutral cured silicone.

3.10 JOINTING - SEALANTS

Clean surfaces to be lapped using a solvent ensuring all traces of the solvent are removed with a clean rag. Apply sealant by gun in a continuous bead of approximately 5mm diameter. Width of sealant when compressed should not exceed 25mm. Sealant joints shall be mechanically fixed for strength. Refer to NZMRM CoP for details.

3.11 FINAL INSPECTION

A final inspection by the installer to take place after completion of the flashing work. Any defects or subsequent damage to be made good.

Completion

3.12 PROTECT

Protect new work from damage.

3.13 REPLACE

Replace all damaged or marked elements.

3.14 LEAVE

Leave work to the standard required for following procedures.

3.15 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

4.1 FLASHINGS

Type	Material and finish/colour
General flashings:	~
Window/doors:	
- Head:	~
- Sill:	~
Beam caps:	~
Cladding:	
- External corner:	~
- Internal corner:	~
Balustrade capping:	~
Garage door:	~
Meter box:	~
Chimney flue:	~
Soffit:	~
Wall/roof junctions:	~
Barge:	~
Apron:	~
Parapet capping:	~
Saddle:	~
Change of pitch:	~
Gutter apron:	~
Curved:	~
Roof penetrations:	~

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5113G GIB® PLASTERBOARD LININGS

1 GENERAL

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This section relates to the supply, fixing and jointing of GIB® plasterboard linings and accessories to timber and steel framed walls and ceilings to form:

- standard systems
- superior finish quality systems
- bracing systems
- fire rated garage boundary wall systems
- wet area systems
- GIBFix® Framing systems

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

AWCINZ	Association of Wall and Ceiling Industries New Zealand

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from fire
NZBC E2/AS1	External moisture
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
NZS 3604	Timber-framed buildings
ISO 5660.1	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 2: Smoke production rate (dynamic measurement)
BRANZ Technical Paper P21	BRANZ Technical Paper P21: A wall bracing test and evaluation procedure (2010)

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents which refer to work in this section:
GIB® Site Guide (April 2024)
GIB® Noise Control Systems (September 2017)
GIB® Fire Rated Systems (September 2024)
GIB® Wet Area Systems (February 2021)
GIB Toughline® Aqua (July 2018)
GIB Ezybrace® Systems (August 2016)
GIB Ezybrace® Bracing Design Software
GIB Ezybrace® Bracing Supplement Document (December 2016)
GIB Ezybrace® for Light Steel Frame Systems (March 2017)
GIBFix® Framing System (August 2016)
GIB Rondo® Metal Batten System (September 2024)
GIB-Cove®
GIB RocTape®
GIB® Goldline™ Platinum Tape-on Trims
GIB® UltraFlex high impact corner mould
GIB® Tough Systems (November 2014)
BRANZ Appraisal 289 (2024) GIB® Fire Rated Systems
BRANZ Appraisal 394 (2017) GIB® Noise Control Systems
BRANZ Appraisal 427 (2021) GIB® Wet Area Systems
BRANZ Appraisal 928 (2021) GIB EzyBrace® Systems

BRANZ Appraisal 940 (2022) GIB® Intertenancy Barrier Systems for Terrace Homes

Manufacturer/supplier contact details
Company: Winstone Wallboards
Web: www.gib.co.nz
Telephone: 0800 100 442

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Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® plasterboard, associated GIB® products or GIB® accessories.

1.6 QUALIFICATIONS

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 INSPECTIONS AND ACCEPTANCE

Allow for inspection of the finished plasterboard surface:
- before applying sealer and
- before applying finish coatings or decorative papers,

so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

1.8 FIRE RATING REQUIREMENTS

Provide the GIB® fire resistant rated garage boundary wall systems. Refer to SELECTIONS for system/FRR.

Performance

1.9 SURFACE FIRE PROPERTIES - UNFINISHED BOARD

All GIB® unfinished plasterboard sheet materials achieve a Group Classification of, Group 1-S to NZBC C/AS2, Table 4.3, following testing in accordance with ISO 5660.1 and ISO 5660.2.

2 PRODUCTS

Materials

2.1 GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to AS/NZS 2588. Refer to SELECTIONS for location, type, thickness and finish.
GIB® Standard plasterboard
GIB Wideline® plasterboard
GIB Ultraline® high quality surface plasterboard
GIB Fyreline® fire resistant plasterboard
GIB Braceline® & GIB® Noiseline® dual purpose wall bracing & noise control plasterboard
GIB Aqualine® wet area plasterboard
GIB Toughline®
GIB Toughline® Aqua

Components

2.2 SCREWS

GIB® Grabber® drywall type screws as follows:

Grabber® type	Used for fixing:
High Thread	GIB Ezybrace® or Standard systems to timber
Self Tapping	Standard systems to light gauge steel or timber
Dual Thread Screws	GIBFix®, GIB Ezybrace®, or Standard systems, to light gauge steel or timber
Wafer Head Needle Tip	Light gauge metal to timber not directly under plasterboard
Pancake Head Drill Tip	Light gauge metal to light gauge metal directly under plasterboard

Refer to GIB® requirements for appropriate details.

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2.3 TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims
GIB® UltraFlex® high impact corner mould
GIB® Levelline® Tape on Trim

2.4 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

2.5 CONTROL JOINTS

GIB® Rondo® P35 control joints.
GIB® Goldline™ tape-on trims
GIB® plastic W-profile control joints.

Accessories

2.6 ADHESIVE

Timber frame and/or steel frame:
GIBFix® One ultra low VOC water based wallboard adhesive
GIBFix® All-Bond solvent based wallboard adhesive

2.7 JOINTING COMPOUND

Bedding compound:	GIB Tradeset®, GIB Lite Blue®, GIB MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®
Finishing compound:	GIB ProMix® All Purpose, GIB® Trade Finish®, GIB® Trade Finish® Lite, GIB ProMix® Lite, GIB® U-Mix, GIB Plus 4®, GIB Trade Finish® Multi
Cove:	GIB-Cove® Bond

2.8 JOINTING TAPE

GIB® jointing tape.

2.9 FIRE/ACOUSTIC SEALANT

GIB Fire Soundseal® ultra low VOC, mulit use acoustic sealant that resists passage of smoke and fire.

2.10 GAP FILLER

GIB® Gap Filler ultra low VOC multi-purpose acrylic flexible filler

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 LEVELS OF PLASTERBOARD FINISH

Provide the selected plasterboard surfaces to the pre decorative levels of finish specified in AS/NZS 2589.

3.4 PRE-INSTALLATION REQUIREMENTS - STEEL FRAMING

Check work previously carried out and confirm it is of the required standard for this part of the work.

Framing substrates shall be in accordance to AS/NZS 2589, GIB® Site Guide and GIB X-Block® Radiation Shielding Systems requirement. Refer to GIB® Site Guide.

3.5 CONFIRM LEVELS OF PLASTERBOARD FINISH ACCEPTANCE

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Before commencing work, agree in writing upon the surface finish assessment procedure towards ensuring that the quality of finish expectations are reasonable and are subsequently obtained and acceptable.

Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the specified plasterboard Level of Finish has been achieved.

"Levels of plasterboard finish" is a tool for specifying the required quality of finish when installing and flush stopping GIB® plasterboard **prior** to the application of a range of decorative finishes under various lighting conditions. Refer to **AS/NZS** 2589.

3.6 PROTECTION

Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide.

Application

3.7 LINING WALLS AND CEILINGS GENERALLY

Form to GIB® Site Guide. Ensure bulk insulation thickness shall not exceed that of the wall framing.

3.8 BOARD ORIENTATION

Minimise joints by careful sheet layout using the largest sheet sizes possible, and generally fixing horizontally. Where part sheets are required for various stud heights they should be positioned so the cut sheet is as low as possible to keep joints below eye level.

3.9 FORM FIRE RATED SYSTEMS

Form to GIB® Fire Rated Systems requirements.

3.10 FORM CONTROL JOINTS

Form control joints to GIB® Site Guide requirements.

3.11 INSTALL TAPE-ON TRIMS

Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.

Finishing

3.12 FINISHING GENERALLY

To GIB® Site Guide and AS/NZS 2589.

Completion & Commissioning

3.13 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

Plasterboard

4.1 GIB® STANDARD SYSTEMS WALLS

Location	Plasterboard type / Lining requirements	Thickness	Finish Level
~	GIB® Standard plasterboard	10mm	
~	GIB® Standard plasterboard	13mm	
~	GIB Ultraline® plasterboard	10mm	
~	GIB Ultraline® plasterboard	13mm	

4.2 GIB® STANDARD SYSTEMS CEILINGS

Location	Plasterboard type / Lining requirements	Thickness	Finish Level
~	GIB® Standard plasterboard	13mm	

~	GIB Ultraline® plasterboard	13mm	

4.3 GIB® FIRE RATED SYSTEMS

Refer to GIB® Residential Garage Boundary Walls.

Location / Type	Plasterboard type / Lining requirements	FRR / System specification	Finish Level
~	~	~	~

Accessories

4.4 GIB® TAPE ON EDGE OR CORNER TRIMS

Brand/type: ~

4.5 GIB® EDGE PROFILES

Brand/type: ~

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5171G GIB® PLASTERBOARD FIRE & SOUND LININGS

1 GENERAL

This section relates to the supply, fixing and jointing of **GIB®** plasterboard linings and accessories to timber and steel framed walls and ceilings to form:

- fire rated systems including lift shafts and ducting
- sound rated systems

1.1 RELATED WORK

Refer to 5113G GIB® PLASTERBOARD LININGS for standard linings
Refer to 5174G GIB® PLASTERBOARD IMPACT RESISTING LININGS for high impact linings
Refer to 5173G GIB® PLASTERBOARD RADIATION PROTECTION LININGS for radiation resisting linings

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.
The following abbreviations apply specifically to this section:

FRR	Fire resistance rating
IIC	Impact insulation class
STC	Sound transmission class
AWCI NZ	Association of Wall and Ceiling Industries New Zealand

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from fire
NZBC E2/AS1	External moisture
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
ISO 5660.1	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 2: Smoke production rate (dynamic measurement)

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
GIB® Site Guide (April 2024)
GIB® Noise Control Systems (September 2017)
GIB® Fire Rated Systems (September 2024)
GIB® Wet Area Systems (February 2021)
GIB Toughline® Aqua (July 2018)
GIB Rondo® Metal Batten System (September 2024)
GIB-Cove®
GIB RocTape®
GIB® Goldline™ Platinum Tape-on Trims
GIB UltraFlex® high impact corner mould
GIB® Tough Systems (November 2014)
BRANZ Appraisal 289 (2024) - GIB® Fire Rated Systems
BRANZ Appraisal 394 (2017) - GIB® Noise Control Systems

Manufacturer/supplier contact details

Company:	Winstone Wallboards
Web:	www.gib.co.nz
Telephone:	0800 100 442

Requirements

1.5 NO SUBSTITUTIONS

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Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® plasterboard, associated GIB® products or GIB® accessories.

1.6 QUALIFICATIONS

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 INSPECTIONS AND ACCEPTANCE

Allow for inspection of the finished plasterboard surface:

- before applying sealer and
- before applying finish coatings or decorative papers,

so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

1.8 FIRE RATING REQUIREMENTS

Provide the GIB® fire rated systems. Refer to SELECTIONS for system/FRR.

Performance

1.9 SURFACE FIRE PROPERTIES - UNFINISHED BOARD

All GIB® unfinished plasterboard sheet materials achieve a Group Classification of, Group 1-S to NZBC C/AS2, Table 4.3, following testing in accordance with ISO 5660.1 and ISO 5660.2.

2 PRODUCTS

Materials

2.1 GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to AS/NZS 2588. Refer to SELECTIONS for location, type, thickness and finish.
GIB® Standard plasterboard
GIB Ultraline® high quality surface plasterboard
GIB Fyreline® fire resistant plasterboard
GIB Braceline® GIB Noiseline® dual purpose high density sound control plasterboard
GIB Aqualine® wet area plasterboard
GIB Toughline® plasterboard
GIB Toughline® Aqua plasterboard GIB (previously GIB Superline®)

Components

2.2 SCREWS

GIB® Grabber® High tread drywall screws.
GIB® Grabber® Self tapping drywall screws.
GIB® Grabber® Drill Point Fine Thread Screws.
GIB® Grabber® Laminator screws.

2.3 CONTROL JOINTS

GIB® Rondo® P35 control joints.
GIB® Goldline™ tape-on trims.

2.4 TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims and edges or GIB® UltraFlex® high impact corner mould or GIB® Levelline® Tape on trim.

2.5 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

Accessories

2.6 ADHESIVE

Timber frame and/or steel frame:
GIBFix® One ultra low VOC water based wallboard adhesive.
GIBFix® All-Bond solvent based wallboard adhesive.

2.7 JOINTING COMPOUND

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Bedding compound:	GIB Tradeset®, GIB Lite Blue®, GIB MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®, GIB Trade Finish® Multi
Finishing compound:	GIB ProMix® All Purpose, GIB ProMix® Lite, GIB Trade Finish®, GIB Trade Finish® Lite, GIB Trade Finish® Multi, GIB® U-Mix, GIB Plus 4®
Cove:	GIB-Cove® Bond

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2.8 JOINTING TAPE

GIB® Paper Joint Tape
GIB® RocTape®

2.9 ACOUSTIC/FIRE SEALANT

GIB SoundseaL® low VOC highly flexible acoustic sealant.
GIB Fire Soundseal™ low VOC highly flexible multi use acoustic sealant.

2.10 GAP FILLER

GIB® Gap Filler low VOC multi-purpose acrylic flexible filler.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Framing substrates shall be in accordance to AS/NZS 2589, GIB® Site Guide and GIB Fire Rated System and/or GIB Noise Control System literature.

3.4 PRE-INSTALLATION REQUIREMENTS - TIMBER FRAMING

Check work previously carried out and confirm it is of the required standard for this part of the work.

Framing substrates shall be in accordance to AS/NZS 2589, GIB® Site Guide and GIB Fire Rated System and/or GIB Noise Control System literature.

Check timber framing moisture content is in accordance with requirements of AS/NZS 2589. Refer to NZBC E2/AS1 and GIB® Site Guide.

Timber framing:	18% maximum for fixing plasterboard to timber (8-12% recommended for fixing plasterboard to timber framing if air conditioning and/or central heating are to be installed)

3.5 LEVELS OF PLASTERBOARD FINISH

Provide the selected plasterboard surfaces to the pre decorative Levels of Finish specified in AS/NZS 2589.

3.6 CONFIRM LEVELS OF PLASTERBOARD FINISH ACCEPTANCE

Before commencing work, agree in writing upon the surface finish assessment procedure towards ensuring that the quality of finish expectations are reasonable and are subsequently obtained and acceptable.

Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the specified plasterboard Level of Finish has been achieved.

"Levels of plasterboard finish" is a tool for specifying the required quality of finish when installing and flush stopping GIB® plasterboard **prior** to the application of a range of decorative finishes under various lighting conditions. Refer to AS/NZS 2589.

3.7 PROTECTION

Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide.

Application

3.8 LINING WALLS AND CEILINGS GENERALLY

Form to GIB® Site Guide and in accordance to relevant GIB Fire Rated or Noise Control System. Sheet joins are touch fitted and shall occur over framing where required by system requirements. Ensure bulk insulation thickness shall not exceed that of the wall framing.

3.9 BOARD ORIENTATION

Minimise joints by careful sheet layout using the largest sheet sizes possible. Ensure plasterboard orientation is in accordance to the relevant GIB Fire Rated or Noise Control System. Where a double layer of GIB plasterboard is required, ensure the outer sheets are offset from the inner layer in accordance with system requirements.

3.10 FORM FIRE RATED SYSTEMS

Form to GIB® Fire Rated Systems and Penetrations in GIB® Fire Rated Systems.

3.11 FORM STEEL BEAM ENCLOSURES

Form to GIB® Fire Rated Systems.

3.12 FORM CONTROL JOINTS

Form control joints to AS/NZS 2589 and GIB® Site Guide (September 2018).

3.13 INSTALL TAPE-ON TRIMS

Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex® high impact corner mould literature and/or GIB® Levelline® to GIB® Site Guide (September 2018).

Finishing

3.14 FINISHING GENERALLY

To GIB® Site Guide and AS/NZS 2589.

Completion

3.15 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.gib.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Fire rated wall systems

4.1 GIB® FIRE RATED WALL SYSTEMS, ONE-WAY - STEEL FRAMING

Location:	~
System:	~
FRR:	~
Framing:	steel
Lining:	~ one side
Finish level:	~

Fire rated floor/ceiling systems

4.2 GIB® FIRE RATED FLOOR/CEILING SYSTEMS, TIMBER JOISTS

Location:	~
System:	~
FRR:	~
Acoustics:	~ STC / ~ Rw / ~ICC

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Flooring: ~
Joists: Timber
Lining: ~
Finish level: ~

Fire rated protection of columns & beams

4.3 GIB® FIRE RATED PROTECTION COLUMNS & BEAMS - STEEL CLIP & CHANNEL

Location: ~
System: ~
FRR: ~
Strapping: Rondo 140 Perimeter channel & clip (BMCL). Also Rondo Perimeter Angle (NZ18) for beams exposed on 3-sides.
Lining: ~
Finish level: ~

Accessories

4.4 GIB® TAPE ON EDGE AND CORNER TRIMS

Brand/type: ~

4.5 GIB® EDGE PROFILES

Brand/type: ~

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5214KI KERMAC INDUSTRIES TOILET PARTITION SYSTEMS

1 GENERAL

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This section relates to the supply and installation of,

- KerMac Industries prefabricated toilet partition systems

1.1 DOCUMENTS

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

NZBC C/AS2	Protection from fire
JIS Z 2801	Antibacterial products - Test for antibacterial activity and efficacy

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents related to this section are:

- K-Standard brochure
- K-Clashed brochure
- K-Compact partition system brochure
- K-CDF Compact 13mm partition system brochure
- K-Moda brochure
- K-Primo 13mm partition system brochure
- K-Freestanding brochure
- K-Floormounted brochure
- K-Proform brochure
- K-Childcare brochure

Fire Test Report FH 5026, Group Classification 3 for KerMac LPL (Laminex New Zealand)	K-Standard K-Clashed K-Moda K-Freestanding K-Floormounted K-Childcare
Fire Test Report 7-598418-CV, Group Classification 3 for KerMac LPL (Laminex New Zealand)	K-Standard K-Clashed K-Moda K-Freestanding K-Floormounted K-Proform K-Childcare
Fire Test Report 7-598692-CV, Group Classification 3 for KerMac LPL (Laminex New Zealand)	K-Compact K-Moda K-Primo K-Freestanding K-Floormounted K-Childcare

Manufacturer/supplier contact details:

Company:	**KerMac Industries**
Web:	www.kermac.co.nz
Email:	kerry@kermac.co.nz
Telephone:	09 273 1524

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

10 years:	Compact laminate panel integrity
5 years:	MDF core boards
2 years:	Hardware

- Provide this warranty on the KerMac standard form.

- Commence the warranties from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.4 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty.

2 years: For installation when installed by a KerMac installation team

- Provide this warranty on the KerMac standard form.
- Commence the warranties from the date of completion.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified KerMac systems, components or associated products listed in this section.

1.6 QUALIFICATIONS

Installers to be experienced, competent trades people familiar with the materials and techniques specified.

1.7 SHOP DRAWINGS

Provide KerMac shop drawings and Installation Manual for the project. Refer to the general section for timing and review requirements.

Performance

1.8 SURFACE FIRE PROPERTIES

Group Number to NZBC C/AS2, Table 4.3. Refer to SELECTIONS.

2 PRODUCTS

Materials - KerMac K-Floormounted Compact partition system

2.1 PANELS - COMPACT LAMINATE

13mm compact laminate panels with black core. Edges polished finish only. Antimicrobial to JIS Z 2801 to prevent the growth of bacteria on the surface up to 99% within 24 hours.

2.2 CHANNELS, RAILS AND BRACKETS

Extruded aluminium alloy 6060 with exposed face anodic coated.

2.3 DOORS

To match rigid panels with edges machine polished. Modesty hair strip to door sides only.

Components - KerMac K-Floormounted Compact partition system

2.4 HINGES

Die cast rise and fall, hold open hinges, to match the aluminium section in size. 3 hinges per door.

2.5 PEDESTALS

200mm stainless steel blade surrounds fixed to floor.

2.6 INDICATOR BOLT AND KEEPER

Stainless steel finished turn bolt and indicator.

2.7 HAT AND COAT HOOKS

KerMac stainless steel cast coat hook with integrated door stop.

3 EXECUTION

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Conditions

3.1 DELIVERY, STORAGE AND HANDLING

Take delivery of panels and accessories and store horizontally on site and protect from damage. Protect finished surfaces, edges and corners. Move/handle goods in accordance with manufacturer requirements. Reject and replace goods that are damaged or will not provide the required finish. Panels must be pre-conditioned in the room they are to be installed in for not less than 24 hours prior to fixing.

3.2 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work. Ensure substrate plumb, level and in true alignment.

Application - Toilet Partition Systems

3.3 INSTALL SCREENS

Carry out the fixing, erection and fitting to finish rigid, plumb, true to line and face and square, to KerMac Industries requirements.

3.4 INSTALL COMPONENTS

Hang doors and fit hardware to the KerMac Industries requirements.

Completion

3.5 ROUTINE CLEANING

Carry out routine trade cleaning of this part of the work including periodic removal of all debris, unused and temporary materials and elements from the site.

3.6 DEFECTIVE OR DAMAGED WORK

Repair damaged or marked elements. Replace damaged or marked elements where repair is not possible or will not be acceptable. Leave work to the standard required by KerMac Industries.

3.7 REPLACE

Replace any damaged or marked elements.

3.8 LEAVE

Leave work with parts fully and freely working and to the standard required by KerMac Industries.

3.9 REMOVE

Ensure the cubicles have been cleaned and remove debris, unused materials from the site.

4 SELECTIONS

For further details on selections go to www.kermac.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Performance

4.1 SURFACE FIRE PROPERTIES

Group Number	Panel/Finish	Location
3	Compact Laminate	~

Toilet and cubicle partitions

KerMac K-Floormounted

4.2 KERMAC K-FLOORMOUNTED COMPACT PARTITION SYSTEM

Brand:	KerMac Industries
System type:	K-Freestanding Compact Partition System
Panel description:	13mm Compact Laminate
Panel colour:	~
Component colour/finish:	Natural silver anodised
Pedestal height/type:	200mm Stainless steel blade surrounds

Hardware: Stainless steel finish

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5313KL RONDO SYSTEMS - PLASTERBOARD & SHEET CEILINGS

1 GENERAL

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This section relates to the supply and installation of **Rondo Ceiling Systems.** It includes;

- Rondo KEY-LOCK Concealed Ceiling System
- Rondo XPRESS® Drywall Grid System
- Rondo Steel Stud Drywall Concealed Ceiling System
- Direct-fix or fully suspended applications
- Non-fire rated and fire-rated systems
- Bulkhead, curved ceilings
- Seismic and acoustic designs

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

AWCINZ	Association of Wall and Ceiling Industries of New Zealand Inc

Documents

1.3 DOCUMENTS

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

NZBC B1/VM1	Structure general
NZBC B2/AS1	Durability
NZBC C/AS1	Protection from fire
NZBC C/AS2	Protection from fire
AS/NZS 1170.0	Structural design actions - General principles
AS/NZS 1170.1	Structural design actions - Permanent, imposed and other actions
AS/NZS 1170.2: 2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2785	Suspended Ceilings - Design & Installation
NZS 4219	Seismic performance of engineering systems in buildings
NZS 4541	Automatic fire sprinkler systems
AS/NZS 4600:2005	Cold formed steel structures
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:
Rondo Professional Design Manual
Rondo KEY-LOCK® installation guide
Rondo XPRESS® Drywall Grid System Rondo brochure
Rondo Steel Stud Drywall Concealed Ceiling System in Design Guide
Certificate of Licence for New Zealand Made trademark - Licence No. 806965

Manufacturer/supplier contact details

Company:	**Rondo Building Services Pty Ltd**
Web:	www.rondo.co.nz
Email:	steve.hardy@rondo.co.nz
Telephone:	09 636 5110

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

10 years	For Rondo branded products against defects in materials under normal use. In addition, Rondo warrants that the Rondo KEY-LOCK® Suspended Ceiling Systems will remain structurally sound for a period of 15 years.

- Provide this warranty on the manufacturer/supplier standard form
- Commence the warranty from the date of purchase.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.
Provide evidence of experience, listing completed projects of similar size and complexity.

1.7 QUALIFICATIONS WORKERS – INDUSTRY QUALIFICATION REQUIREMENTS

Installation by a manufacturer accredited installer, using the manufacturer technical services. Installers are to be members of the AWCINZ. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.
Provide evidence of experience, listing completed projects of similar size and complexity.

1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

1.9 AS BUILT DOCUMENTS

Refer to the general section 1238 AS BUILT DOCUMENTATION for the requirements for submission and review of as built documents and records.

Provide the following as built documents and records:
~

- Provide draft as built information prior to practical completion.
- Provide final as built information prior to the end of the defects liability period.

Compliance information

1.10 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Manufacturer / supplier warranty.
- Internal Rondo engineered design - refer to SELECTIONS.
- Producer Statement (PS1) - Design from supplier independent engineer.
- Producer Statement (PS3) - Construction from the applicator / installer.
- Producer Statement (PS4) - Construction Review from an acceptable suitably qualified person.
- Other information required by the BCA in the Building Consent Approval documents.

Performance

1.11 LOADING CODE REQUIREMENT

To AS/NZS 2785, comply with the requirements of; AS/NZS 1170.0, AS/NZS 1170.1, AS/NZS 1170.2, NZS 1170.5, NZBC B1/VM1, as appropriate.

1.12 CERTIFICATION

Provide:

- Certificates and other evidence that the system complies with the standards of performance specified.
- Producer Statements.

1.13 FIRE RATING REQUIREMENT

Design the ceiling system so that together with the floor and ceiling lining system, it is to NZBC C/AS1 Appendix E, E3 Fire resistance and NZBC C/AS2, Appendix C, 5.1 Fire Resistance. Refer to SELECTIONS.

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1.14 ENVIRONMENTAL REQUIREMENTS

Durability to NZBC B2/AS1.

Performance - Wind (design by contractor)

1.15 DESIGN PARAMETERS WIND - DESIGN BY CONTRACTOR

Design the installation to the wind pressure parameters of AS/NZS 1170.2. Refer to general section 1220 PROJECT for general details.
Contact Rondo Building Services Pty Ltd for their internal engineering design service or to facilitate Producer Statement - Design (PS1).
Refer to SELECTIONS specific design performance requirements.

Performance - Seismic (design by contractor)

1.16 SEISMIC - SPECIFIC DESIGN

Design the system and its anchorages/fixings to resist the earthquake loads of the seismic zone in accordance with NZS 1170.5. Refer to general section 1220 PROJECT for general details. Contact Rondo Building Services Pty Ltd for their internal engineering design service or to facilitate Producer Statement - Design (PS1).
Refer to SELECTIONS specific design performance requirements.

Quality control and assurance

1.17 INSPECTIONS

~

2 PRODUCTS

Materials - Rondo Steel Stud Drywall Ceiling System

2.1 STEEL STUD SECTIONS

Rondo stud sections to AS/NZS 4600. Steel Grade and zinc coating class G2 Z275 to AS 1397 with preformed service holes to stud webs and a range of BMT options. Refer to SELECTIONS for type.

2.2 STEEL TRACK SECTIONS

Rondo track sections to AS/NZS 4600. Steel Grade and zinc coating class G2 Z275 to AS 1397 with a range of widths and BMT options. Refer to SELECTIONS for type.

2.3 MECHANICAL JOINTS

Joint Type:	Fastener:
Type 1 (spans up to 3.0m or 2 or 3 span ceilings up to 4.0m)	1/#8-18 x 16mm wafer head tek screw in 2 places
Type 2 (spans larger than 3.0m)	2/#10-16mm tek screws
Type 3 (spans larger than 3.0m)	3/#10-16mm tek screws

2.4 SUSPENSION JOINT TYPE 1

30mm x 0.8mm hoop iron strapping wrapped around underside of purlin and fixed to web with 2/#8-18 x 16mm wafer head tek screws each side of purlin and screws.

2.5 SUSPENSION JOINT TYPE 2

Rondo angle bracket 553 fixed to purlin with 2/#8-18 x 16mm wafer head tek screws in 4 places.

2.6 SUSPENSION JOINT TYPE 3 - CONCRETE SOFFIT

Rondo angle bracket 247 fixed to stud with 2/#8-18 x 16mm tek screws and bracket fixed to concrete soffit with proprietary masonry anchor.

Lining and Insulation

2.7 PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed to AS/NZS 2588. Refer to SELECTIONS for type and thickness.

2.8 LINING BOARD

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Refer to SELECTIONS for type, thickness and finish.

2.9 INSULATION

Refer to SELECTIONS for type and thickness.

Access Panels

2.10 ACCESS PANEL

Refer to SELECTIONS.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 SUBSTRATE

Ensure substrate is plumb, level and in true alignment. Do not start erection if the substrate will not allow work of the required standard. Complete any remedial work found necessary before framing erection.

3.4 COMMENCING THIS WORK

Commencing this work means the substrate is accepted as allowing work of the required standard.

3.5 CO-ORDINATE SERVICES

Co-ordinate and co-operate with electrical and mechanical work to avoid conflict between suspension members and luminaires, diffusers, pipework and ducting. Confirm the provision of extra hangers and fixings.
Ensure co-operation with work in and above the ceiling, including the marking of specific ceiling tiles below major access points to above-ceiling services. Colour coded markings to follow the standards laid down by mechanical and electrical services.
Services and other attachments, attached to or supported by the ceiling grid system to AS/NZS 2785, ensure that:

- items over 7.5kg and items under 7.5kg but falling greater than 3m, require a tether to AS/NZS 2785, anchored to structure.
- items attached to the ceiling grid must be under 10kg mass, items over 10kg cannot be attached to the grid and must be independently supported.
- unless designed otherwise, the ceiling systems total load of services and other attachments must not exceed 3kg/m².
- light fittings installed to AS/NZS 2785 and NZS 4219.
- ceiling system clearances to structure and services etc. that are not attached to the ceiling system, to be to NZS 4219, and/or NZS 4541 for sprinklers.

3.6 SITE CONDITIONS

Do not begin installation until the building is closed in, fully glazed, the roof watertight, and mechanical and electrical duct work above the ceiling completed. To AS/NZS 2785, Appendix C, site Conditions, Installation and Inspections.

Installation generally

3.7 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.8 SETTING OUT

Set out the framing work true to line and square before starting erection.

3.9 INSTALL

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Installation to AS/NZS 2785 minimum standards, and the systems Rondo Professional Design Manual and Rondo Building Services Pty Ltd requirements.

Allowance for support members:

- Space required by the loads on the system and the type of ceiling.
- For the installation of services and accessories, including ductwork, light fittings and diffusers.
- Additional back support or suspension members for the fixing of services and accessories to prevent distortion, overloading or excessive vertical deflection.
- For access for maintenance of services.

Allowance for a ceiling system where failure of any one suspension point does not cause a progressive failure of the ceiling.
Allowance for height adjustment with a length adjustment device at each suspension point, permitting length variation of at least 50mm.

If required, allow for notch grid members at the junction with the perimeter trim to make sure the ceiling lining lies flat on the perimeter trim. Do not attach the suspension system to the lip or flange of purlins.

Fix, erect and fit to finish rigid, plumb, square and true to line and face. Where components required cutting on site, use metal snips, fine-toothed band or hack saws. Adjust all suspension systems and clips by laser level until they are all level. Hangers and bracing are not to be fixed closer than 150mm to plenum building services.

Install all movement joints required.

Services support to conform to the following:

- If the service has not been designed to accept the ceiling load, do not fix suspension members to services (e.g. ductwork).
- If services obstruct the ceiling supports, provide bridging and suspension on each side of the services.
- Do not support services terminals on ceiling lining, unless specified.

3.10 BULKHEADS

Form bulkheads to manufacturer requirements. Diagonally brace at regular intervals to provide lateral stability. In addition to the dead load of the bulkhead, all bulkheads should be designed for the following minimum loads:

- 0.25 kPa laterally.
- 0.15 kPa vertically.

3.11 INSTALL SEISMIC RESTRAINTS

Install ceiling system seismic restrains and bracing as required to prevent lateral movement and resist the imposed horizontal seismic force, to AS/NZS 2785.

3.12 PENETRATIONS

To AS/NZS 2785 and NZS 4219 generally, with sprinkler systems to NZS 4219 and/or NZS 4541. Accommodate recessed light fittings, air conditioning outlets and other electrical and/or mechanical services that are fixed to or pass through the ceiling system. Provide independent support for these as necessary.

3.13 ISOLATE

Isolate dissimilar metals with neoprene sheeting, tape or pipe lagging.

3.14 INSULATION

Install insulation to insulation manufacturer and Rondo Building Services Pty Ltd requirements.

3.15 LINING

Fix and finish lining boards to manufacturer and Rondo Building Services Pty Ltd requirements. Install services before lining. Stagger sheet joins.

3.16 ACCESSIBILITY

Provide access to the ceiling system and the in-ceiling and above-ceiling services so that maintenance and removal of any part can be carried out without damage to the ceiling system or panels.

3.17 ACCESS PANEL

Install to Rondo Panther installation requirements.

3.18 PROTECT EXISTING WORK

Protect adjacent existing work from damage during the installation.

Installation - Rondo Steel Stud Drywall Ceiling System

3.19 INSTALLATION - GENERAL

Installation to Rondo® Steel Stud Drywall Framing Systems Steel Framing Installation Guide, Rondo Professional Design Manual and Rondo Building Services Pty Ltd requirements. Fix, erect and fit to finish rigid, plumb, square and true to line and face.

3.20 INSTALLATION - STEEL STUD DRYWALL CEILING SYSTEM

Installation to Rondo Professional Design Manual and Rondo Building Services Pty Ltd requirements.

3.21 BRIDGING TRACK SECTIONS

Fit bridging in position with fasteners in accordance with the Rondo Professional Design Manual.

Completion

3.22 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to www.rondo.co.nz
Substitutions are not permitted.

4.1 FIRE RATED SYSTEMS

Location:	~
FRR:	~ / ~ / ~ minutes

Performance - Wind (design by contractor)

4.2 DESIGN PARAMETERS WIND - DESIGN BY CONTRACTOR

Wind design and performance criteria to AS/NZS 1170.2 as follows:

Parameter	**Wind**
Design wind speed (Vdes.Ø)	~ m/s
Terrain Category (Mz,cat)	~
Shield Factor (Ms)	~
Topographic multiplier (Mt)	~
Hill-shape multiplier (Mh)	~
Lee multiplier (Mlee)	~
Internal pressure coefficient (Cp,i)	~

Performance - Seismic (design by contractor)

4.3 DESIGN PARAMETERS SEISMIC - DESIGN BY CONTRACTOR

Seismic design and performance criteria to NZS 1170.5 as follows:

Parameter	**Value**
Building Importance Level	~
Design Working Life	~ years
Site Sub-soil Class	~
Near Fault Factor N(T,D)	~
Part Classification Category (P1-P7)	~
Interstorey Drift - ULS	~ mm
Interstorey Drift - SLS	~ mm

4.4 SEISMIC RESTRAINT

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Location: ~
Brand: ~
Type: ~
Material: ~

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Steel Stud Drywall Ceiling System

4.5 RONDO STEEL STUD AND TRACK CEILING SYSTEM

Location:	~
Type/Brand:	Rondo Steel Stud and Track Ceiling System
FRR:	~
Ceiling studs:	~
Wall track:	~
Bridging:	~
Fixing:	~

Access Panels

4.6 FIRE RATED ACCESS PANELS

Location:	~
Brand:	Rondo PANTHER® Access Panel Systems
Type:	Fire rated
Size:	~

Insulation & Linings

4.7 INSULATION

Location:	~
Brand:	~
Type:	~
Thickness:	~

4.8 PLASTERBOARD

Location:	~
Brand:	~
Type:	~
Thickness:	~
Finish:	~

4.9 LINING BOARD

Location:	~
Brand:	~
Type:	~
Thickness:	~
Finish:	~

5433E ECOPLY® FLOORING

1 GENERAL

This section relates to the use of Carter Holt Harvey Plywood Ltd (CHH PLY) Ecoply® plywood sheets for floors.

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

FSC®	Forest Stewardship Council®

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from fire
NZBC C/VM2	Protection from fire
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1604.3:2012	Preservative-treated wood-based products - Part 3: Plywood
AS/NZS 2269.0	Plywood - structural - specifications
NZS 3604	Timber-framed buildings

1.4 MANUFACTURER DOCUMENTS

Carter Holt Harvey Plywood Ltd documents relating to work in this section are:
Ecoply® Specification and installation guide December 2023
Ecoply® Plywood Products: Flooring, Product Technical Statement and BPIR.

Manufacturer/supplier contact details

Company	Carter Holt Harvey Plywood Limited
Web:	chhply.co.nz
Email:	info@ecoply.co.nz
Telephone:	0800 326 759

Requirements

1.5 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.6 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Performance

1.7 SURFACE FIRE PERFORMANCE - UNFINISHED FLOORING

Unfinished Ecoply® plywood flooring has a critical radiant flux 2.2kW/m² as defined by NZBC C/VM2 Appendix B, Table B1 and in accordance with performance requirements of NZBC C/AS2, 4.17.3 and Table 4.5 Critical Radiant Flux Requirements for Flooring.

2 PRODUCTS

Materials

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Components

2.1 NAILS - HOT DIPPED GALVANIZED

Hot dipped galvanized flat head, ring shank or annular grooved nails to Carter Holt Harvey Plywood Ltd requirements for size and use.

17 - 21mm plywood:	60mm x 2.8mm
25mm plywood:	75mm x 3.15mm

2.2 NAILS - STAINLESS STEEL

Stainless steel flat head, annular grooved nails to Carter Holt Harvey Plywood Ltd requirements for size and use.

17 - 21 mm plywood:	60mm x 2.8mm
25mm plywood:	75mm x 3.15mm

2.3 SCREWS IN TIMBER

Stainless steel, counter-sunk to Carter Holt Harvey Plywood Ltd requirements for size and use.

17mm plywood:	10g x 40mm
19 - 21 mm plywood:	10g x 45mm
25mm plywood:	10g x 50mm

2.4 ADHESIVE

Refer to SELECTIONS.

2.5 BRUSH ON TREATMENT

Soudal Metalex Ready to Use or Soudal Metalex Concentrated Timber Preservative. Clear or green colour product.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements. Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work.

Ensure support framing is completed to Carter Holt Harvey Plywood Ltd stated requirements for laying plywood sheets.

Ensure all Ecoply® square edge sheet edges and joints will be fully supported with framing width of minimum 45mm at each Ecoply® sheet joint.

Ensure moisture content is:

Timber:	18% maximum for framing

Application

3.4 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.5 TREAT

Treat cuts and holes in sheets with a brush-on timber preservative treatment.

3.6 SHEET LAYOUT

Lay sheets to Ecoply® Specification and Installation Guide (or specific design) stated requirements. Lay sheets in a staggered layout, face-grain of sheet at right-angles to support and with sheets in square, true alignment and plane. Provide a 2 to 3mm expansion gap between square edges of sheets and a 5mm expansion gap at the perimeter of the floor, unless otherwise specified. Lay sheets continuous over at least two spans. Refer to SELECTIONS for fixing requirements.

3.7 ADHESIVE FIXING

Apply a bead or daubs of adhesive to adhesive manufacturers and Carter Holt Harvey Plywood Ltd requirements and fastener pattern, work from the middle of the sheet outwards to develop glueline pressure.

3.8 MECHANICAL FIXINGS

Fixings at least 3 fastener diameters or 7 mm from square edges and 15mm from tongue and groove edges. Fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres.

3.9 WET AREAS

Ensure plywood is structural grade treated to H3 or H3.2 (CCA treated). Plywood substrates must have moisture content not more than 18% before installing membrane. With primed/sealed face and edges.

NOTE: Treated plywood must be allowed to breath for a minimum of 7 days before installation of membrane. Fixing must be to manufacturer specifications.
LOSP treated plywood must not be used.

Requirements if used for:
Flooring: Stress grade F8/F5, minimum thickness 18mm with framing at minimum 400mm centres both ways, or min 21mm with framing at 600mm centres both ways. Fixing, glue and stainless steel screws.

Completion & Commissioning

3.10 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

For further details on selections go to chhply.co.nz
Substitutions are not permitted to the following, unless stated otherwise.

Materials

Components

4.1 ADHESIVE

Type: ~

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5571 TIMBER STAIRS

1 GENERAL

This section relates to the fabrication and installation of interior timber stairs and landings.

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

FSC	Forest Stewardship Council
PEFC	Programme for the Endorsement of Forest Certification

Documents

1.3 DOCUMENTS

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

NZBC D1/AS1	Access routes
AS/NZS 1860.1	Particleboard flooring - Specifications
BRANZ BU 497	Stair construction

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

2 PRODUCTS

Materials

2.1 SOLID TIMBER COMPONENTS

Refer to SELECTIONS/DRAWINGS.

3 EXECUTION

Conditions

3.1 GENERALLY

Execution to include those methods, practices and processes contained in the current syllabus for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

Check site dimensions. Carry out machining within the practices recommended for the particular timber, wood product or pre-finished wood product being used. Machine drill and cut holes and recesses and form joints to the componentry manufacturer's recommendations. Work to be accurate, square and true to line and face.

Application

3.2 FABRICATE AND INSTALL TIMBER STAIRS

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Fabricate and install stair flights and landings to comply with NZBC acceptable solution D1/AS1:4.0 Stairways, and unless detailed otherwise to BRANZ BU 497. House and wedge treads and risers 15mm into strings, all glued, wedged and blocked. Form nosing overhangs of 25mm by splaying risers forward to finish flush with the front of the treads.

Completion

3.3 LEAVE

Leave work to the standard required by following procedures.

3.4 REMOVE

Remove all debris, unused materials and elements from the site.

4 SELECTIONS

4.1 TIMBER STAIRS

Strings:	~mm
Treads:	~mm
Risers:	~mm
Finish:	~

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5574 INTERIOR HANDRAILS & TIMBER BALUSTRADES

1 GENERAL

This section relates to the fabrication and installation of interior timber balustrades.

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

FSC	Forest Stewardship Council
PEFC	Programme for the Endorsement of Forest Certification

Documents

1.3 DOCUMENTS REFERRED TO

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

NZBC B2/AS1	Durability
NZBC F4/AS1	Safety from falling
NZS 3602	Timber and wood-based products for use in building

1.4 MANUFACTURER DOCUMENTS

Manufacturer and supplier documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~
Facsimile:	~

2 PRODUCTS

2.1 SOLID TIMBER COMPONENTS

Timber species, grade, installation moisture and treatment to NZS 3602, table 2, and NZBC B2/AS1. Refer to SELECTIONS/DRAWINGS.

2.2 HARDWARE

Handrail brackets, metal supports, angles and sundry fittings, all as shown and described on the drawings.

3 EXECUTION

Conditions

3.1 GENERALLY

Execution to include those methods, practices and processes contained in the current syllabus for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

Check site dimensions. Carry out machining within the practices recommended for the particular timber, wood product or pre-finished wood product being used. Machine drill and cut holes and recesses and form joints to the componentry manufacturer's recommendations. Work to be accurate, square and true to line and face.

Application

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3.2 BALUSTRADING

Fabricate and install the balustrading as detailed, complete with all associated metal componentry and hardware. Unless otherwise detailed construct to comply with NZBC F4/AS1.

Completion

3.3 LEAVE

Leave work to the standard required by following procedures.

3.4 REMOVE

Remove all debris, unused materials and elements from the site.

4 SELECTIONS

4.1 TIMBER BALUSTRADES

Location: ~
Timber: ~
Finish: ~

4.2 ACCESSORIES

Brackets: ~
Finish: ~

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6122A ARDEX FLOOR SUBSTRATE PREPARATION

1 GENERAL

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This section relates to preparing for and carrying out floor levelling work over a range of substrates, prior to the installation of floor coverings.

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

NZS AS 1884	Floor coverings - Resilient sheet and tiles - Installation practices
NZS 3114	Specification for concrete surface finishes

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:

ARDEX floor levelling compounds manual

Copies of the above literature are available from ARDEX:

Web:	www.ardexnz.com
Email:	info@ardexnz.com
Telephone:	0800 2 ARDEX (27339)

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

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

Warranty period:	10 years
Form of warranty:	ARDEX standard form

Refer to the general section 1237 WARRANTIES for details of when completed warranties must be submitted.

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified ARDEX materials, or associated products.

1.6 QUALIFICATIONS

Applicators to be experienced in the application of floor levelling compounds. Application to be strictly in accordance with ARDEX technical literature.

1.7 SYSTEMS ARDEX PROJECT

Contact ARDEX with any relevant key dates and for a list of approved applicators. The contractor is to contact ARDEX prior to starting the contract.

2 PRODUCTS

3 EXECUTION

Conditions

3.1 COMPLY

Comply with all Ardex requirements and instructions.

3.2 STORE

Store materials under conditions that ensure no deterioration or damage.

3.3 CHECK SUBSTRATE

Check that the substrate will allow work of the required standard. Complete any remedial work identified before commencing any floor levelling work.

Application - substrate preparation

3.4 PREPARATION - GENERAL

Ensure that all surfaces are sound, clean and free of oil, grease, wax dirt, asphalt, curing compounds, latex and gypsum compounds, dust, paint, or any contaminants which might act as a bond breaker. Carry out moisture test and PH test in accordance with NZS AS 1884. Refer to the Ardex floor levelling compounds manual for specific and detailed instructions for various substrates and their condition.

Completion

3.5 REMOVE

Remove all debris, unused materials and elements from the site.

3.6 PROTECT

Protect completed work from damage for the period between completion of the floor levelling work and completion of flooring.

4 SELECTIONS

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

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6141MF MEGAFLOOR™ POLISHED CONCRETE

1 GENERAL

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This section relates to the installation of Polished Concrete Ltd, **Megafloor™** ground polished concrete finish to new or existing concrete surfaces.
It includes the following exposure range:

- Megafloor™ High Street
- Megafloor™ Urban
- Megafloor™ Beach House
- Megafloor™ Warehouse
- Megafloor™ Al Fresco
- with various finishes and gloss levels; Premium, Classic, Standard, Exterior

1.1 RELATED WORK

Refer to the appropriate concrete section(s) for mix design, concrete placing, finishing and curing.

Documents

1.2 DOCUMENTS

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

NZBC D1/AS1	Access routes
NZS 3114	Specification for concrete surface finishes

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
Joint and Crack Filler User Guide
Repair and Patch Filler User Guide
Megafill Liquid Grout User Guide
Megahard Densifier User Guide
Megaguard Stain Protection User Guide
Megafloor™ Cleaning & Maintenance Guide

Manufacturer/supplier contact details

Company:	**Polished Concrete Ltd**
Web:	www.megafloor.co.nz
Email:	info@megafloor.co.nz
Telephone:	0800 4765474

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years	For materials and finish

- Provide this warranty on the Megafloor™ standard form. Refer to Megafloor.co.nz for warranty period and details of warranty conditions.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

2 years	For application by certified or approved Megafloor™ applicator

- Provide this warranty in the standard form in the general section 1237WA WARRANTY AGREEMENT
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS

Megafloor™ requires the work to be carried out by a certified or approved contractor.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

NOTE: All ground polished concrete surfaces to be completed to the system specified in SELECTIONS and to Megafloor™ installation instructions.

1.8 TECHNIQUE DISCUSSION - CONCRETE PLACEMENT

Advise the concrete placer of the areas scheduled for ground/polished finishes. Ensure the placed concrete to be ground is not overworked resulting excess sand /cement paste at the concrete surface

1.9 TECHNIQUE MEETING

Before commencing work, arrange a meeting with the contract administrator to confirm the method of carrying out the work and
protection of the work.

1.10 INFORMATION FOR OPERATION AND MAINTENANCE

Provide the Megafloor™ maintenance instructions to the owner at the completion of the work. A condition of the warranty is that the Megafloor™ must be cleaned and maintained following Megafloor™ recommended guides.

Performance - Slip resistance

1.11 SLIP RESISTANCE - SURFACES EXEMPT FROM TESTING

Walking surfaces comply with NZBC D1/AS1, Table 2 for slip resistance requirements and are exempt from testing.

2 PRODUCTS

Floor - exposure range

2.1 MEGAFLOOR™ URBAN

A medium grind system (random exposure) which exposes top of stones/aggregate to a depth of 2-3 mm. Refer to SELECTIONS for finish and gloss options.

Components

2.2 JOINT AND CRACK FILLER

A polymer-modified and fibre reinforced cement based product. Use for indoor skim coats, feather finish, expansion joints and crack repair. Creates a strong and durable high compression strength surface. Mix 2 parts to 1 part water, trowel application. 30-90 minutes rapid set.

2.3 REPAIR AND PATCH FILLER

A fast setting cementitious product. Use for indoor and outdoor concrete surfaces, feather finish, filling large patches and creating ramping elevations up to 75mm. Creates a strong and durable high compression strength surface. Mix 4 parts to 1 part water, trowel application. 30-90 minutes rapid set, 16 hours curing time.

2.4 MEGAFILL LIQUID GROUT

A polymerised liquid grout. Use for filling smaller pores and cracks, where normal filling is inefficient. The grinding machine is used on speed 0 to push the grouting into the floor.

2.5 MEGAHARD DENSIFIER

Megahard (densifier) for hardening and strengthening the concrete surface.

Surface finish/sealer

2.6 PREMIUM

Premium finish is 400-3000 grit resin diamond polished finish with a penetrating stain guard sealer. Refer to SELECTIONS for gloss type.

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Tools and equipment

2.7 GRINDING AND POLISHING

Megaworx metal bond tools for grinding to suit application. Megaworx diamond resin bond tools for polishing to suit application.

2.8 BURNISHING PAD

A mechanical, chemical free diamond pad for Megafloor™, operated on high speed burnisher after job completion or after optional stain protection application. Twister™ type to be used should be same colour code as the last resin polish code.

2.9 FINISHING MACHINE

Planetary grinding and polishing machine.

3 EXECUTION

Conditions

3.1 CONFIRM CONCRETE SURFACE

Confirm concrete surface is of the required standard for the concrete polishing and finishing processes. Do not proceed if placed concrete is not capable of delivering the specified finish. Seek written direction from the contract administrator as to what action is required.
Before proceeding work confirm with the contract administrator that the concrete pavement or floor has been placed to NZS 3114, a Class U3 trowelled (floor) finish.

3.2 PROTECT GROUND SURFACES - BUILDING NOT WATERTIGHT

Main contractor to ensure the concrete floor area is protected from damage.

After the first stage of grinding and prior to any further grinding taking place, ensure the surface of the concrete is swept down or hosed off at the end of each day; to prevent staining due to puddling of mud oxides, timber sawdust leaching and rusting nails. Do not chip the surface or spill glues, solvents, fuel, oil or other contaminants.

Do not cover the floor area to be ground with any type of continuous membrane. Do not store heavy stacks of materials for long periods of time as these can cause differential curing and result in permanent lines, shapes and colour shades in the surface concrete.

3.3 PROTECT GROUND SURFACES - WATERTIGHT BUILDING

Main contractor to ensure the concrete floor area is protected from damage.

Install and maintain sheet material that is breathable, non sticky, spill and impact resistant over the floor between the finishing of polish grinding process and completion of the work.

Do not use any product with adhesive backing directly to the floor surface. If masking tape is necessary for delicate surfaces ensure it is not left on the floor for more than a day.

3.4 PROTECTION - ADJACENT SURFACES

Cover glass and other surfaces to protect from damage that is caused by cementitious dust.

Installation - general

3.5 SAW CUTS

Fill saw cuts in concrete slab with Joint and Crack Filler to Megafloor™ requirements, prior to commencing grind and polishing procedure.

3.6 EDGES - GRIND AND POLISHING

Grind and polish all edges to show the same aggregate as the main floor area using the same polishing resin pads as those on the floor grinding machine. Ensure that each edge step is complete before the corresponding floor grinder step to avoid an edge line pattern in the floor.

Installation - Megafloor™ Urban

3.7 APPLY JOINT & CRACK FILLER/REPAIR & PATCH FILLER

Grout construction joints, decorative cuts and fill any minor cracks and surface repairs prior to first grinding cut.

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3.8 METAL BOND GRINDING

7 days minimum after placing of the concrete, grind the floor with Megaworx Redilock metal bond diamond shoes until medium aggregate exposure is consistent over the surface. Ensure aggregate is reasonably consistent over the surface.

3.9 LIQUID GROUT

Grout the air/pin holes left in the concrete surface. Grind and remove residue liquid grout immediately once dry with Megaworx metal bond diamond shoe

3.10 APPLY DENSIFIER

Apply Megahard densifier in accordance with User Guide instructions.

3.11 POLISH FLOOR

Polish the floor in multiple steps to the appropriate grit level with Megaworx resin diamond tools to achieve the selected finish.

Installation - surface finish/sealer

3.12 APPLY SURFACE FINISH/PROTECTION SEALER

Apply selected surface finish in accordance with manufacturer's User Guide instructions.

Completion

3.13 LEAVE

Leave work to the standard required by following the Megafloor™ procedures.

3.14 REMOVE

Remove debris, unused materials and elements from the site.

3.15 PROTECT POLISHED CONCRETE

It is the main contractor's responsibility to protect floor from damage. Provide protection by laying a breathable sheet material for the period between completion of the polishing and completion of the contract works.
Important: Do not use any product with adhesive backing including masking tape directly to the floor.

3.16 NOTIFY

Notify Polished Concrete Ltd to arrange sign off and complete Megafloor™ documentation.

4 SELECTIONS

For further details on selections go to www.megafloor.co.nz
Substitutions are not permitted to the following, unless stated otherwise.

Floor finishing system

4.1 MEGAFLOOR™ URBAN

Location:	~
Exposure type:	Urban

Surface finish/sealer

4.2 MEGAFLOOR™ PREMIUM FINISH

Type:	Premium
Finish (gloss):	~
Description:	Diamond polishing, solvent based penetrating stain guard sealer

Floor protection

4.3 PROTECTION

Location:	~
Type:	~

6221A ARDEX TILING SOLUTIONS

1 GENERAL

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This section relates to the preparation of floor and wall surfaces for tiling systems with ARDEX Tiling Solutions:

- Acoustic underlays
- Levelling screeds
- Primers
- Undertile heating
- Waterproofing systems
- Adhesives
- Sealants
- Grouts

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

DTA	DTA New Zealand
WMAI	Waterproofing Membrane Association (NZ) Incorporated

Documents

1.3 DOCUMENTS

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

NZBC D1/AS1	Access routes
NZBC E3/AS1-AS2	Internal moisture
AS 3958.1	Ceramic tiles - Guide to the installation of ceramic tiles
AS/NZS 4671	Steel reinforcing materials
WMAI	Code of Practice for Internal Wet Area Membrane Systems

1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:

ARDEX Tiling Solutions
BRANZ Appraisal 472 - ARDEX Undertile Internal Liquid Waterproofing Membranes
BRANZ Appraisal 473 - ARDEX Undertile External Liquid Waterproofing Membranes
BRANZ Appraisal 727 -ARDEX Undertile Sheet Membrane (WPM 750 and WPM 1000)

DTA New Zealand - Architectural Trims catalogue. Refer to www.dtanz.co.nz

Copies of the above literature are available from ARDEX

Web:	www.ardex.co.nz
Email:	info@ardexnz.com
Telephone:	0800 227339

Warranties - waterproofing

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years	For materials

- Provide this warranty on the ARDEX standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

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1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
15 years For execution

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Warranties - tiling

1.7 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:
10 years For materials

- Provide this warranty on the ARDEX standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.8 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
5 years For execution

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.9 NO SUBSTITUTIONS

Substitutions are not permitted to any specified ARDEX materials, or associated products, components or accessories.

1.10 QUALIFICATIONS

Waterproofing work to be carried out by an ARDEX approved waterproofing applicator.
Tiling to be carried out by competent workers experienced with the materials and in the techniques specified.

1.11 SAMPLES

Refer to the general section 1270 CONSTRUCTION for details of how samples will be reviewed and how instructions to proceed will be given.Provide the following samples for review:

	Sample A	Sample B	Sample C
Sample description:	~	~	~
Sample type:	~	~	~
Number:	~	~	~
Location:	~	~	~
Supporting documentation:	~	~	~
Reviewer:	Contract administrator ~	Contract administrator ~	Contract administrator ~
Time for review:	10 working days ~	10 working days ~	10 working days ~
Review criteria:	~	~	~

1.12 DEFLECTION CRITERIA FOR SUSPENDED FLOORS

Check that the floor is rigid enough for the tiling. Deflection of suspended floors should not exceed 1/360th of the span under dead load and live load.

1.13 SYSTEMS ARDEX PROJECT

Contact ARDEX with any relevant key dates and for a list of approved applicators. The contractor is to contact ARDEX prior to starting the contract.

Web: www.ardex.co.nz
Email: info@ardexnz.com
Telephone: 0800 2 ARDEX (27339)

Performance

1.14 QUALITY ASSURANCE

Follow and complete ARDEX QA documents and submit to ARDEX on completion with request for warranty.

Performance - Slip resistance

1.15 SLIP RESISTANCE - SURFACES EXEMPT FROM TESTING

Walking surfaces comply with NZBC D1/AS1, Table 2 for slip resistance requirements and are exempt from testing.

2 PRODUCTS

Materials -

2.1 ARDEX LQ 92

ARDEX LQ 92 is a cement-based underlay for levelling uneven concrete floors prior to tiling. When mixed with water, LQ 92 provides a smooth, pourable, free-flowing and self-smoothing material that can be applied to a thickness of 25mm down to a feather edge.

2.2 ARDEX A38 SCREED

ARDEX A 38 is a rapid-set, cement-screed with aggregate for fast installations. To be mixed with ARDEX Engineered Sand as per datasheet at a 5:1 ratio.

2.3 ARDEX MULTIPRIME - POROUS SUBSTRATES

ARDEX Multiprime is an internal or external primer suitable for porous substrates. Suitable for concrete, wood and fibre-cement sheet substrates. Alternatively. Contact ARDEX for recommendations.

2.4 ARDEX P9 - NON-POROUS SUBSTRATES

ARDEX P9 is a single-part, water-based primer for non-porous substrates. Contact ARDEX for recommendations.

Materials - Waterproofing

2.5 INTERNAL WATERPROOFING SYSTEM

Refer to SELECTIONS for option.

- ARDEX Superflex WPM 001, is a BRANZ Appraised, pre-mixed liquid waterproofing membrane specifically designed for use under tiles.
- ARDEX WPM 002 is a BRANZ Appraised, two-part liquid waterproofing membrane specifically designed for use under tiles especially in external applications. Suitable for permanent immersion.
- ARDEX WPM 750 is a BRANZ Appraised sheet waterproofing membrane for internal use under tiles.
- ARDEX WPM 155 is a BRANZ Appraised, rapid-drying, liquid waterproofing membrane for internal or external use.

Materials - Additives

2.6 ARDEX E 90

Synthetic dispersion additive for use with ARDEX cement-based adhesives, to increased bond strength, elasticity and water resistance, where movement is anticipated and in external application of dark tiles.

Materials - Tile adhesives

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2.7 ARDEX X 77

High performance, fibre reinforced, polymer modified floor and wall adhesive with Microtec Technology to give exceptional properties of adhesion. Suitable for use with natural stone, ceramic, porcelain and large format tiles and swimming pools.

Materials - Sealants - grouts

2.8 ARDEX SEALANTS

ARDEX SE acetic cure silicone is ideal for movement joints within a tiling system.
ARDEX ST neutral cure silicone is ideal for bond breakers or movement joints within a tiling system.
Sealants and back-up materials as described in clause 2.7 of AS 3958.1 and clause 2.6 of AS 3740.
Colours match some grout colours

2.9 ARDEX GROUTS

ARDEX FG 8 cement-based grout for joints 1mm to 8mm wide. Ideal for wet areas when mixed with ARDEX Grout Booster additive.
ARDEX FS DD cement-based, fine sanded grout for joints 1mm - 4mm.
ARDEX EG 15 epoxy grout with excellent stain and chemical resistance for joints 1.5mm to 15mm wide.

2.10 ARDEX GROUT BOOSTER

A water-based, synthetic polymer grout additive formulated for use with cement-based grouts for improved adhesion strength, flexibility and abrasion resistance.

Components

2.11 STRIPS AND WEATHERBARS

Unless otherwise specified DTA tile trim, edge strips, floor finish divider strips and weather bars shall be aluminium.

2.12 EXPANSION JOINT, METAL AND RUBBER

DTA expansion joints available in Aluminium, Brass and Stainless Steel with either a polyurethane or Neoprene insert. All come in a large range of sizes and should be selected based on the flooring material used. The standard widths of expansion joint are 6mm and 10mm, larger custom sizes can be made to suit the requirements of each job.

3 EXECUTION

General

3.1 HANDLING AND STORAGE

Take delivery of packets of tiles undamaged and dry. Handle tiles with care to avoid chipping, soiling and damage. Store on hard level standings in non-traffic, non-work areas that are enclosed, clean and dry.

3.2 CHECK TILES

Check tiles to ensure that they are as specified, from the same batch, of a consistent colour and pattern and sufficient to complete the work. Reject tiles that vary widely in colour or pattern. Reject tiles that are damaged.

3.3 CONFIRM LAYOUT

Before commencing work confirm the proposed layout of tiles and expansion joints and other visual considerations of the finished work.

3.4 SETTING OUT

Before commencing the setting out confirm the number and location of cut tiles. Minimise in number with no cut tiles less than half size and only at the perimeter of the work.

3.5 PREPARATION OF BACKGROUNDS

Prepare backgrounds in accordance with AS 3958.1, section 4 and to the manufacturer's instructions for the selected substrate. See also the ARDEX Flooring manual by visiting www.ardex.co.nz/

Conditions

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3.6 SERVICES AND ACCESSORIES

Ensure that all services and accessories are in place and located to suit the tile layout, and that the substrate, background and adjoining surfaces (with the preparation called for in this section) are of the quality necessary to allow tiling of the required standard.

3.7 DO NOT START

Do not start laying tiles until concrete floors are cured, moisture content of floors is such that shrinkage is complete, thermal movement has been accommodated and the levels and surface finish will allow for tile laying of the required standard.

3.8 SUBSTRATE TEMPERATURE

Do not carry out tiling where the substrate temperature is below 5°C or above 40°C.

3.9 MOISTURE CONTENT

Ensure the floor is dry and if in doubt check for moisture content by hygrometer. Do not proceed with tiling work until readings for the whole area show 75% relative humidity or less. Alternatively, see ARDEX moisture barriers.

Application

3.10 APPLICATION GENERALLY

Prepare backgrounds as described in AS 3958.1, Section 4. Suitably prepare backgrounds and substrates to the manufacturer's instructions to receive the bedded finish. Remove all dirt, dust, grease, oil, loose particles and any other form of contamination or deleterious material. Ensure that substrates are sound and dry.

Installation to be in accordance with AS 3958.1, Section 5, including setting out, fitting, movement joints, sealants, tile finish and joints, and grouting.

3.11 BACKGROUND MATERIALS

Ensure that the installation of background materials and substrate materials meets relevant standards and the manufacturer's instructions. Inspect background and substrate materials for any conditions unsuitable for tiling over. Do not commence work until the affected area is rectified. Confirm any specific preparation required for the adhesive being used.

Waterproofing

3.12 WET AREA WATERPROOFING

Provide waterproofing to wet areas in accordance with NZBC E3/AS1-AS2 and WMAI Code of Practice for Internal Wet Area Membrane Systems

Material:	Refer to SELECTIONS
Installation:	Supply and install waterproofing membrane to the manufacturer's recommendations by an approved ARDEX installer.

Screed / Cement Render

3.13 APPLY ARDEX SCREED

Prepare and apply screed system as per ARDEX requirements and instructions, including substrate preparation, mixing, applying, number of coats, finishing and curing. Protect from damp, condensation and water for at least 24 hours once application is completed.

Tiling

3.14 ADHESIVE APPLICATION METHODS

Ensure that the whole of the back of the tile is in good contact with the adhesive with no voids. Remove a tile periodically during installation to ensure correct coverage. Do not fix tiles over skinned adhesive.

Notched trowel method

- Adhesive application to be as described in AS 3958.1, clause 5.6.2(a). Notched trowel sizes shall be 4.5mm x 4.5mm x 4.5mm (mosaics) 6mm x 6mm x 6mm, 10mm x 10mm x 10mm, 12mm x 12mm x 12mm. Use an appropriately notched trowel to achieve full coverage.

Buttering method

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- Adhesive application to be as described in AS 3958.1, Clause 5.6.2(c).

Tiles in awkward locations

- The buttering method may be required, or fixing might be necessary to achieve full bedding, even though the notched trowel method is used generally.

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3.15 SETTING OUT

Setting out, cutting and fitting of tiles to be as described in AS 3958.1, clauses 5.4.2 and 5.4.3. Set out tiling as shown on the drawings. Confirm bond and pattern before installing. Provide even and correct falls to floor tiles where required, including falls to floor wastes. Ensure that a level finish is provided at wall lines. Where falls are not required ensure that the tiles are laid level.

3.16 TILE FINISH AND JOINTS

Provide tile finish and joints, including tolerances, as described in AS 3958.1, clause 5.4.6. Joint widths to be suited to tile and to the manufacturer's instructions.

3.17 MOVEMENT JOINTS

Provide movement joints as described in AS 3958.1, clause 5.4.5 and AS 3740, clause 3.13.7.

Depth:	Movement joints to go right through the tile and bed to the background.
Width:	Minimum 6mm.
Corner locations:	In wall tiling at internal vertical corners; in floor tiling at walls, columns, nibs, hobs and similar.
Interruptions:	Around sanitary fixtures, around fixtures interrupting the tile surface; at junctions with joinery fixtures, including window and door frames and built in cupboards; at changes in substrate or background.
Large areas:	In floor tiling provide joints at not less than 4.5 metres spacing in both directions and 3.5 metres externally. In wall tiling provide vertical joints at not less than 3.5 metres spacing along the length of a wall. In wall tiling, provide horizontal joints at each storey rise in the height of a wall. Over all existing expansion joints.

3.18 GROUTING

Grout tiling to AS 3958.1, clause 5.7.

3.19 SILICONE

Apply ARDEX SE acetic cure or ARDEX ST neutral cure silicone to movement joints between tiles, and at junctions to tiled walls and tiled floors. The silicone should only be fixed to two surfaces to allow movement. On flat joints use a polyethylene tape or release agent and on floor to wall joints greater than 10mm deep use a backing rod.

Completion

3.20 REPLACE

Replace damaged tiles or elements.

3.21 CLEANING

Upon completion of setting and grouting, thoroughly sponge and wash the tiles to leave them completely clean and without blemish. Finally polish glazed tiles with a clean dry cloth.

3.22 LEAVE

Leave work to the standard required by following procedures.

3.23 REMOVE

Remove debris, unused materials and elements from the site.

3.24 PROTECT TILES

Protect tiles from damage. Ensure tiles are not disturbed by foot traffic for at least 24 hours after laying and after grouting. Provide protection to tiles by laying sheet material such as insulating board for the period between completion of laying and completion of the contract works.

4 SELECTIONS

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

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Tile Selections

4.1 TILES

Location:	~
Supplier:	~
Type:	~
Pattern/number:	~
Colour:	~
Edging:	~

ARDEX typical system - commercial floors & walls

4.2 ARDEX SYSTEM - FOR CERAMIC OR PORCELAIN TILES

Substrate Floors:	~
Substrate Walls:	~
Primer:	ARDEX Multiprime
Levelling:	ARDEX LQ 92
Tile adhesive floor:	ARDEX X 77
Tile adhesive wall:	ARDEX X 77
Grout:	~
Grout colour:	~
Silicone:	~
Silicone colour:	~

4.3 ARDEX SYSTEM - FOR LARGE FORMAT TILES

Substrate Floors:	~
Substrate Walls:	~
Primer:	ARDEX Multiprime
Levelling:	ARDEX LQ 92
Tile adhesive floor:	ARDEX X 77
Tile adhesive wall:	ARDEX X 77
Grout:	~
Grout colour:	~
Silicone:	~
Silicone colour:	~

4.4 ARDEX SYSTEM - SCREED

Screed:	ARDEX A 38

4.5 ARDEX SYSTEM - WATERPROOFING

Waterproofing:	ARDEX WPM 750

Spares & maintenance products

4.6 SPARES & MAINTENANCE PRODUCTS

Refer to the general section 1270 CONSTRUCTION for details of how spares and maintenance products will be handled. Provide the following spares and maintenance products:

Item:	~
Quantity:	~
Location:	Refer to 1270 CONSTRUCTION

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6221M MAPEI® TILING SOLUTIONS

1 GENERAL

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This section relates to floor and wall tiling systems with Mapei® tiling products:

- primers / sealers
- acoustic underlays
- wet area membranes
- adhesives
- grouts
- sealants

1.1 RELATED WORK

Refer to ~ for ~

Documents

1.2 DOCUMENTS

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

NZBC D1/AS1	Access routes
NZBC E2/AS1	External moisture
NZBC E3/AS1	Internal moisture
AS 3740	Waterproofing of wet areas within residential buildings
AS 3958.1	Ceramic tiles - Guide to the installation of ceramic tiles
NZS 4121	Design for access and mobility - Buildings and associated facilities
BRANZ	Good practice guide: Tiling

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

MBP (NZ) Ltd. documents relating to this part of the work:
Mapei® catalogue - Products for Ceramics and Stone Products
Mapei® product Technical Data Sheets
BRANZ Appraisal 484 - Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes
BRANZ Appraisal 485 - Mapelastic, Mapelastic Smart and Mapelastic Turbo External Waterproofing Membranes

Manufacturer/supplier contact details

Company:	MBP (NZ) Ltd.
Web:	www.mbpltd.co.nz
Email:	enquiries@mbpltd.co.nz
Telephone:	09 921 1994

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a tile manufacturer/supplier warranty:

2 years:	For tiling products

- Provide this warranty on the manufacturer/supplier standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a Mapei® products manufacturer/supplier warranty:

15 years:	For Mapelastic AquaDefense, Mapelastic Smart and Mapegum WPS
10 years	For other Mapei® tiling products

- Provide this warranty on the manufacturer/supplier standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
2 years: For workmanship

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS WORKERS – MANUFACTURER / SUPPLIER REQUIREMENTS

Workers to be approved MBP (NZ) Ltd. applicators. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified Mapei® systems, components and associated products listed in this section.

1.9 DEFLECTION CRITERIA FOR SUSPENDED FLOORS

Check that the floor is rigid enough for the tiling. Deflection of suspended floors should not exceed 1/360th of the span under dead load and live load.

Performance

1.10 INTERNAL / EXTERNAL MOISTURE

Wet area membranes under tiled areas to AS 3740, NZBC E2/AS1, NZBC E3/AS1 and to BRANZ Good Tiling Practice.

Performance - Slip resistance

1.11 SLIP RESISTANCE - PREVIOUSLY TESTED SURFACE

The following walking surfaces have previously been tested for slip resistance, and comply with NZBC D1/AS1 requirements.
~

Quality control and assurance

1.12 INSPECTIONS

~

2 PRODUCTS

Materials - floor covering

2.1 TILES

Refer to SELECTIONS for option.

Primers/sealers

2.2 GENERAL PURPOSE PRIMER

Primer 3296, acrylic primer in water dispersion for porous substrate for use in interior and exterior applications.

2.3 LEVELING COMPOUND PRIMER

Eco Prim T Plus, acrylic primer in water dispersion to improve adhesion of leveling compounds on absorbent and non-absorbent substrates, for interior use only.

2.4 NON-POROUS SUBSTRATE PRIMER - SINGLE COMPONENT

ECO Prim Grip Plus, one component acrylic primer of synthetic resin in water dispersion for interior and exterior use.

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2.5 MOISTURE BARRIER EPOXY PRIMER & PROTECTIVE COATING

Planiseal MR, two component water based epoxy primer and moisture barrier for positive and negative hydrostatic pressure for interior and exterior use.

Adhesives

2.6 RAPID SETTING ADHESIVE - CERAMIC TILES/NATURAL STONE

Granirapid, a high performance, deformable, fast setting and hydrating two- component cementitious adhesive.

2.7 RAPID SETTING ADHESIVE - CERAMIC TILES/MARBLE/NATURAL STONE

Keraquick Maxi S1, a high performance, deformable, fast setting and hydrating non-slip cementitious adhesive. Suitable for application in layers up to 15mm thick.

2.8 ELASTICITY LATEX ADMIXTURE

Latex Plus is a water dispersion of a flexible polymer. Mix with Keraquick Maxi S1 to improve deformability.

2.9 CEMENT BASED POWDER ADHESIVE AND ADDITIVE

Kerabond Plus, a cement based powder mixed with Isolastic, a latex additive to impart elasticity.

2.10 NON-POROUS SUBSTRATE SPECIAL PURPOSE ADHESIVE

Keralastic T, a high performance, two component, polyurethane adhesive for ceramic tiles and natural stone.

2.11 MULTI SUBSTRATE CEMENT BASED ADHESIVE

Keraflex Maxi S1, a high performance, deformable cementitious adhesive with extended open time and no vertical slip for ceramic tiles and stone material, with Low Dust Technology.

2.12 CEMENT BASED POWDER ADHESIVE AND ADDITIVE - RAPID SETTING

Keraquick S1 zero, a high performance, deformable, fast setting cementitious adhesive with no vertical slip, mixed with Latex Plus, a latex admixture introducing elasticity to provide improvement of deformability.

2.13 EPOXY ADHESIVE

Kerapoxy Adhesive, a two component epoxy adhesive with no vertical slip for ceramic tiles and natural stone material.

2.14 PREMIXED ADHESIVE

Ultramastic III, a high performance, ready to use paste adhesive with no vertical slip and extended open time, for ceramic tiles.

2.15 CEMENT BASED ADHESIVE – MOSAICS

Adesilex P10, mixed 50/50 Water and Isolastic additive. A high performance white cementitious adhesive with no vertical slip for bonding of glass, ceramic and marble mosaics.

2.16 CEMENTITIOUS DEFORMABLE ADHESIVE - TILES

Ultralite S1 Flex, one component lightweight deformable cement and synthetic resin based adhesive for use in interior and exterior applications.

2.17 CEMENTITIOUS HIGHLY DEFORMABLE ADHESIVE - TILES

Ultralite S2 T Flex, one component lightweight highly deformable, thixotropic cement and synthetic resin based adhesive for use in interior and exterior applications including external facade tiling.

2.18 CEMENTITIOUS HIGHLY DEFORMABLE RAPID SETTING ADHESIVE - TILES

Ultralite S2 Quick, one component lightweight highly deformable rapid setting cement and synthetic resin adhesive for use in interior and exterior applications including external facade tiling.

Grouts

2.19 POLYMER-MODIFIED MULTI-PURPOSE CEMENTITIOUS GROUT

Ultracolor Plus, a fast setting and drying, high performance, polymer-modified, anti-efflorescence, water-repellent grout for joints from 2mm to 10mm, with DropEffect and anti-mould with BioBlock technology.

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2.20 EPOXY GROUT

Kerapoxy, a high performance, two-component, acid-resistant epoxy grout for joints of at least 3mm, for ceramic tiles and natural stone material.

2.21 KERAPOXY EASY DESIGN GROUT

Kerapoxy Easy Design Grout is a high performance, two-component, acid-resistant epoxy grout for joints of at least 1mm, for ceramic tiles and natural stone material.

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Sealants

2.22 MULTI-PURPOSE SILICON SEALANT

Mapesil AC and Primer FD, a solvent-free, acetic cross-linking mildew-resistant silicon sealant with an associated adhesive enhancing primer.

2.23 NEUTRAL SILICON SEALANT - NATURAL STONE

Mapesil LM, an odourless one-component neutral cross-linking, silicon sealant for natural stone.

2.24 SINGLE COMPONENT POLYURETHANE SEALANT

Mapeflex PU40, a single component, thixotropic, polyurethane based sealant with a low modulus of elasticity.

Components - waterproofing

2.25 WATERPROOFING TAPE - MAPEBAND SA

Mapeband SA, an alkali resistant butyl self-adhesive waterproof tape.

2.26 WATERPROOFING TAPE - MAPEBAND EASY

Mapeband Easy, an alkali resistant rubber tape with a non-woven fabric face and back.

2.27 WATERPROOFING MEMBRANE SYSTEM - INTERIOR USE

Mapegum WPS, a fast drying, synthetic resin-based liquid elastic membrane for interior waterproofing. To waterproof edges and expansion joints use Mapeband Easy, Mapeband SA

2.28 WATERPROOFING MEMBRANE SYSTEM - INTERIOR USE

Mapelastic AquaDefense, a one component, solvent-free, ready-to-use, quick drying synthetic resin based paste in water dispersion for interior applications. Provides a waterproofing layer to concrete, concrete block, cementitious screeds and render, plasterboard and fibre cement board before laying ceramic, stone and mosaic tiles. To waterproof edges and expansion joints apply Mapeband Easy, Mapeband SA.

2.29 WATERPROOFING MEMBRANE - MULTI PURPOSE USE

Mapelastic Smart, a two component flexible cementitious waterproofing membrane, for interior and exterior ceramic tile and natural stone To reinforce waterproof protection layers and anti-fracture layers use Mapenet 150 waterproof reinforcing mesh or Mapetex Sel. To waterproof edges and expansion joints use Mapeband Easy (do not use Mapeband SA for areas of full immersion).

Components - cleaning

2.30 GROUT & TILE CLEANING AGENT

Keranet, an acid-based general tile cleaner.

2.31 CLEANER

Ultracare Kerapoxy Cleaner, a high performance cleaner for epoxy grout.

2.32 SOLVENT GEL

Pulicol 2000, a solvent based gel for removing old natural and synthetic resin-based adhesives, paint and grouts/grout residue.

Accessories

2.33 STRIPS AND WEATHERBARS

Unless otherwise specified edge strips, floor finish divider strips and weather bars shall be aluminium.

2.34 EXPANSION JOINT, METAL AND RUBBER

Clear anodised aluminium/brass with metal anchor to set into in-situ concrete, cement screed/bed and complete with rubber infill.

2.35 EXPANSION JOINT, METAL AND COMPOUND

Aluminium/brass angles with high density foam rubber insert and jointing compound.

2.36 EXPANSION JOINT, PLASTIC

Rigid stabilised PVC sides with flexible central section.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.
Check that maximum variation in the plane of the substrate is no greater than ±4mm in 2 linear metres before commencing tiling.

3.4 CHECK TILES

Check tiles to ensure that they are as specified, from the same batch, of a consistent colour and pattern and sufficient to complete the work. Reject tiles that vary widely in colour or pattern. Reject tiles that are damaged.

3.5 CONFIRM LAYOUT

Before commencing work confirm the proposed layout of tiles and expansion joints and other visual considerations of the finished work.

3.6 BACKGROUND MATERIALS

Ensure that the installation of background materials and substrate materials meets relevant standards and the manufacturer's instructions. Inspect background and substrate materials for any conditions unsuitable for tiling over. Do not commence work until the affected area is rectified. Confirm any specific preparation required for the adhesive being used.

3.7 PREPARATION OF BACKGROUNDS

Prepare backgrounds in accordance with AS 3958.1, section 4 and in accordance with the Mapei® instructions for the selected substrate.

3.8 FALLS

Form screeds in areas where water is used in significant amounts with a deviation from plane of not more than 5mm over 3 metres. Unless otherwise specified form screeds with the following falls:

Unless stated otherwise provide minimum fall gradients to BRANZ Good Practice Guide - Tiling, clause 6.6 Falls in floors.

1 : 40 minimum	For tiled decks which also act as a roof
1 : 60 minimum	For paving over ground
1 : 50 minimum	For unenclosed shower bases (to NZBC E3/AS1, 3.3.5)
1 : 60 minimum	For enclosed shower bases
1 : 50 minimum	For shower bases for people with disabilities (to NZS 4121, 10.5.11.3 (b).)
1 : 60 minimum	For commercial kitchens or similar

3.9 WATERPROOFING WET AREAS

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Areas to be waterproofed shall be in accordance with NZBC E3/AS1, AS 3740 and BRANZ Good Practice Guide -Tiling Section 7: Waterproofing interior wet areas, as shown on the drawings or stated in SELECTIONS.

3.10 SERVICES AND ACCESSORIES

Ensure that all services and accessories are in place and located to suit the tile layout, and that the substrate, background and adjoining surfaces (with the preparation called for in this section) are of the quality necessary to allow tiling of the required standard.

3.11 DO NOT START

Do not start laying tiles until concrete floors are cured, moisture content of floors is such that shrinkage is complete, thermal movement has been accommodated and the levels and surface finish will allow for tile laying of the required standard.

3.12 SUBSTRATE TEMPERATURE

Do not carry out tiling where the substrate temperature is below 5°C or above 40°C.

3.13 MOISTURE CONTENT

Ensure the floor is dry and if in doubt check for moisture content by hygrometer. Do not proceed with tiling work until readings for the whole area show 75% relative humidity or less.

Application

3.14 APPLICATION GENERALLY

Prepare backgrounds as described in AS 3958.1, Section 4. Suitably prepare backgrounds and substrates in accordance with the manufacturer's instructions to receive the bedded finish. Remove all dirt, dust, grease, oil, loose particles and any other form of contamination or deleterious material. Ensure that substrates are sound and dry.

Installation to be in accordance with AS 3958.1, Section 5, including setting out, fitting, movement joints, sealants, tile finish and joints, and grouting.

Application of primers/ sealers, undertile membranes, waterproofing, adhesives grouts and sealants to comply with MAPEI® technical data sheets and application details for specific products.

3.15 SUBSTRATE PREPARATION

Refer to 6192 FLOORING SUBSTRATE PREPARATION for preparation of substrates for laying of ceramic tiles and natural stone.

3.16 PRIMERS/SEALERS

Apply primers to MAPEI® technical data sheets and application details for specific product.

3.17 WET AREA MEMBRANE WATERPROOFING

Apply wet area waterproofing systems in accordance with MAPEI® technical data sheets and requirements.

3.18 SETTING OUT

Setting out, cutting and fitting of tiles to be as described in AS 3958.1, clauses 5.4.2 and 5.4.3. Set out tiling as shown on the drawings. Confirm bond and pattern before installing. Provide even and correct falls to floor tiles where required, including falls to floor wastes. Ensure that a level finish is provided at wall lines. Where falls are not required ensure that the tiles are laid level.

3.19 TILE FINISH AND JOINTS

Provide tile finish and joints, including tolerances, as described in AS 3958.1, clause 5.4.6. Joint widths to be suited to tile and in accordance with the manufacturer's instructions.

3.20 MOVEMENT JOINTS

Install movement joints with a minimum joint width of four times the expected movement. Provide a 9 to 10mm minimum joint width for exterior joints at 3.6m maximum spacings and a 12mm minimum joint width for 4.8m maximum spacings. Increase joint width by 1.5mm for each 10°C over or below a 35°C temperature range.

Provide movement control joints:

- to coincide with control joints in the substrate / structure.
- where substrate material changes.
- where tiles are restrained by building elements.

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- where flexing of the structure will occur.
- to the perimeter of tiles that abut another material.
- where tile surfaces change in plane.
- where tile type changes.
- radiating from an external corner of an L-shaped tiled area

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Provide movement joints at 4.5m spacing to tiled floors exposed to direct sunlight and at 6m maximum spacing for shaded internal tiled floors (reduce these spacings by 15 to 20% for flexible organic adhesives).

Provide movement joints at 3 to 4.5m centres along the length of internal and external walls (reduce these spacings by 15 to 20% for flexible organic adhesives) and at storey heights.

3.21 APPLY ADHESIVE

Apply and float thick or thin bed of cement based adhesive to 6mm maximum and 3mm minimum bed thickness to the tile manufacturer's requirements. Rib surface with a notched trowel, press tiles and place with 3mm grout joints and to obtain adequate coverage by adhesive on the back of each tile to AS 3958.1.

3.22 GROUTING

Apply grout to tiling in accordance with Mapei® technical data sheets and application details for specific product and as described in AS 3958.1, clause 5.7.

3.23 SEALING

Apply sealants to tiling in accordance with Mapei® technical data sheets and application details for specific product.

3.24 CLEAN TILES

Upon completion of setting and grouting, thoroughly sponge and wash the tiles to leave them completely clean and without blemish. Use Mapei Keranet to clean tiles of cementitious residue as necessary and Mapei Kerapoxy Cleaner to remove residues of epoxy grout from tile surfaces. Finally polish glazed tiles with a clean dry cloth.

Completion & Commissioning

3.25 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

3.26 COMPLETION - TESTS & CERTIFICATION

Refer to 1270 CONSTRUCTION for general test and certification requirements at completion.
~

4 SELECTIONS

For further details on selections go to www.mbpltd.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

Materials

4.1 MAPEI® PRIMERS/SEALERS

Location: ~
Type: Mapei® ~

4.2 MAPEI® ADHESIVES

Location: ~
Type: Mapei® ~

4.3 MAPEI® WATERPROOFING TAPE

Location: ~
Type: ~

4.4 MAPEI® WATERPROOFING MEMBRANE REINFORCING MESH

Location: ~
Function: ~

Type: ~

4.5 MAPEI® GROUT

Location: ~
Type: Mapei® ~
Additive: ~
Colour: ~

4.6 MAPEI® SEALANT

Location: ~
Type: Mapei® ~
Colour: ~

Components

4.7 MAPEI® - MAPEGUM WPS WATERPROOFING MEMBRANE SYSTEMS

Location: ~
Membrane: Mapegum WPS
Edges: ~
Expansion joints: ~

4.8 MAPEI® - MAPELASTIC AQUADEFENSE WATERPROOFING MEMBRANE SYSTEMS

Location: ~
Membrane: Mapelastic AquaDefense
Waterproof edges: ~
Waterproof expansion joints: ~

4.9 MAPEI® - MAPELASTIC SMART WATERPROOFING MEMBRANE

Location: ~
Membrane: Mapelastic Smart
Reinforcement: Mapenet 150 waterproof reinforcing mesh
Waterproof edges: ~
Waterproof expansion joints: ~

Accessories

4.10 ITEM

Location: ~
Type: ~
Brand/model: ~

Spares & maintenance products

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6413 RUBBER SURFACING

1 GENERAL

This section relates to the supply and installation of rubber surfacing complete with skirting, nosing, trims and edgings.
It includes:

- rubber sheet
- rubber tiles

1.1 RELATED WORK

Refer to ~ for ~

Documents

1.2 DOCUMENTS

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

NZBC C/AS2	Protection from fire
NZBC D1/AS1	Access routes
NZS/AS 1884	Floor coverings - Resilient sheet and tiles - Installation practices

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

1 year:	For materials

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

1 year:	For execution

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

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1.8 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Performance

1.9 SSURFACE FIRE PROPERTIES FOR FLOORING

Flooring to be non-combustible or have a Critical Radiant Flux to NZBC C/AS2, Table 4.5. Refer to SELECTIONS.

Performance - Slip resistance

1.10 SLIP RESISTANCE - SURFACES EXEMPT FROM TESTING

Walking surfaces comply with NZBC D1/AS1, Table 2 for slip resistance requirements and are exempt from testing.

2 PRODUCTS

Materials

Accessories

2.1 ADHESIVE

To suit the sheet/tile material and the substrate and to the flooring manufacturer's requirements.

2.2 JOINT SEALANT

To suit the sheet/tile material and to the flooring manufacturer's requirements.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

Maintain rolls of sheet, packages of tiles and accessories undamaged and dry. Store rolls upright with other material on level surfaces in non-traffic, non-work areas that are enclosed, clean and dry.

Avoid distortion, stretching, marking and damage to edges while shifting, unrolling and handling sheet, tiles and accessories. Handle tiles "back to back" and "face to face" to avoid wax transfer.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work. Carry out such additional preparatory work as required in bringing the substrate to suitable condition.

Confirm moisture content of substrate in accordance with NZS/AS 1884. Appendix A and for pH for concrete substrates in accordance with NZS/AS 1884. Appendix B. Do not commence laying rubber tiles until readings for the whole area are within acceptable levels as follows:

Moisture content:	Timber substrate - 8 -12% for air conditioned buildings - 10 -14% for intermittently heated buildings - 12 -16% for unheated buildings
	Concrete substrate 75%RH
pH:	Concrete substrate 9-10pH

3.4 PREPARATION

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Check that each colour supplied is from the same batch. Follow the flooring manufacturer's requirements for preparatory conditioning of rolls and working temperatures and conditions before, during and after laying. Protect work from solar heat gain. Switch off under-floor heating during and for 48 hours either side of the work period.

3.5 BEFORE COMMENCING WORK

Ensure that the building is enclosed, wet work complete, doors hung and lockable, finishes and trim complete, and good lighting available, before starting work

3.6 PROTECTION

Protect adjoining work surfaces and finishes during the installation.

3.7 LAYOUT

Before beginning installation confirm the proposed layout of material, location of seams and other visual considerations of the finished work.

3.8 LAYING GENERALLY

Carry out the whole of this work to NZS/AS 1884, and the flooring manufacturer's requirements.

Application - general / substrate preparation

3.9 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.10 PREPARING NEW CONCRETE

Clear substrate of debris, clean off surface contamination and carry out surface repairs using a proprietary levelling compound. Carefully feather out at perimeters of repaired areas. Grind level, then vacuum to remove dust.

Application - laying

3.11 APPLICATION OF ADHESIVE

Apply approved adhesive by trowel and "wetted" roller as required by the flooring manufacturer and without trowel marks after setting. Follow requirements for open time, taking note of the substrate porosity, ambient temperature and relative humidity. Remove excess adhesive as the work proceeds using required techniques.

3.12 FITTING ACCESSORIES

Scribe, fit, adhere or otherwise fix true to line and face to the flooring manufacturer's requirements for each particular location.

Completion

3.13 CLEAN AND BUFF

Strip protective wax coating before cleaning and buffing according to the manufacturers requirements to achieve the slip resistant properties. Vacuum off, damp mop with a low foam neutral detergent, allow to dry and finally buff with a rotary machine using suitable pads at 300 rpm. Leave surfaces free of adhesive, dirt and debris and to the standard required by following procedures.

3.14 PROTECT

Protect completed work from damage for the period between completion of laying and completion of the contract works.

3.15 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

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

Performance – Fire Surface Properties

4.1 SURFACE FIRE PROPERTIES FOR FLOORING

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Critical Radiant Flux	Flooring	Location
~	~	~

Materials

Accessories

4.2 ADHESIVE

Location: ~
Brand/type: ~

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6512 CARPET TILES

1 GENERAL

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This section relates to the supply and installation of carpet tiles.
It includes:

- nylon
- wool fibre
- polymer-backed

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

NZBC C/AS2	Protection from fire
AS/NZS 2455.1	Textile floor coverings - installation practice - General
AS/NZS 2455.2	Textile floor coverings - installation practice - Carpet tiles

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years:	For materials

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

1 years:	For execution

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Performance

1.8 SURFACE FIRE PROPERTIES FOR FLOORING

Flooring to be non-combustible or have a Critical Radiant Flux to NZBC C/AS2, Table 4.5. Refer to SELECTIONS.

2 PRODUCTS

Materials

2.1 CARPET TILES

Nylon/wool fibre fusion-bonded to a polymer, PVC or bitumen backing.

2.2 ADHESIVE

A pressure release adhesive. Refer to SELECTIONS for brand.

2.3 FLOOR LEVELLING COMPOUND

Refer to SELECTIONS.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products. Keep carpet tiles dry. Protect from damage

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work. Ensure all fittings and fixtures around which the carpet tiles are to be scribed are in place. Carry out such additional preparatory work as required in bringing the substrate to suitable condition.

Confirm moisture content of substrate in accordance with AS/NZS 2455.1. Appendix B Do not commence laying carpet tiles until readings for the whole area are within acceptable levels as follows:

Moisture Content:	Timber substrate - 8 -12% for air conditioned buildings - 10 -14% for intermittently heated buildings - 12 -16% for unheated buildings
	Concrete substrate 75%RH

3.4 TEMPERATURE

Floor temperature:	Minimum 16°C.
Concrete pH:	No more than 10.0.
Carpet tiles:	Conditioned at 16°C for a minimum of 24 hours prior to installation.

3.5 BEFORE COMMENCING WORK

Ensure that the building is enclosed, wet work complete, doors hung and lockable, finishes and trim complete, and good lighting available, before starting work.

3.6 PROTECTION

Protect adjoining work surfaces and finishes during the carpet installation.

3.7 LAYOUT

Plan the general layout to:

- to conform with any special pattern requirements as detailed
- to maximise perimeter and cut module sizes and
- subject to any specific design instructions, to ensure that tiles are laid parallel to the longest wall.

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Application - general / substrate preparation

3.8 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.9 PREPARING NEW CONCRETE FLOOR

To be level, smooth, clean, cured and dry. Remove loose material and dust.

Application - carpet tile laying

3.10 LAYING GENERALLY

Lay in accordance with AS/NZS 2455.1, AS/NZS 2455.2 and the carpet tile manufacturer's own installation instructions.

3.11 LAYING DIRECTION

Lay in a mono direction, except where specifically instructed otherwise.

3.12 CUTTING OF TILES

Cut tiles from the back, using the carpet tile manufacturer's required cutting technique.

Completion

3.13 PROTECTION

Provide the following temporary protection of the finished work:
~

3.14 SPECIAL PROTECTION

Self adhesive carpet protective film: ~

3.15 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

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

Performance – Fire Surface Properties

4.1 SURFACE FIRE PROPERTIES FOR FLOORING

Critical Radiant Flux	Flooring	Location
~	~	~

Materials

4.2 CARPET TILES

Location: ~
Brand: ~
Type: ~
Pattern/colour: ~
Face yarn: ~
Backing: ~
Pile weight: ~ g/m²

4.3 ADHESIVE

Brand: ~
Type: ~

4.4 FLOOR LEVELLING COMPOUND

Location: ~
Type/brand: ~

Spares & maintenance products

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6612J JACOBSEN ENTRANCE MATTING SYSTEMS

1 GENERAL

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This section relates to the supply and installation of **Jacobsen** entrance matting systems.
It includes:

- modular entrance matting system
- customized entrance matting systems
- entrance mat tiles
- associated detail trims

1.1 RELATED WORK

Refer to ~ for ~.

Documents

1.2 DOCUMENTS

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

NZBC C/AS2	Protection from fire
ISO 9239.1	Reaction to fire tests for flooring - Part 1: Determination of the burning behaviour using a radiant heat source

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
Jacobsen Connexx entrance matting system brochure
Jacobsen Shaw Stepping Out entrance mat tile brochure
Jacobsen Tredsafe Detail Trim brochure

Manufacturer/supplier contact details

Company:	**Jacobsen**
Web:	www.jacobsen.co.nz
Email:	support@jacobsen.co.nz
Freephone:	0800 800 460

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

5 years:	For materials

- Provide this warranty on **Jacobsen** standard form (if not available, use the standard form in 1237WA WARRANTIES section)
- Commence the warranty from the date of Practical Completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer warranty:

1 year:	For ~ installation

- Provide this warranty on the installer standard form (if not available, use the standard form in 1237WA WARRANTIES section)
- Commence the warranty from the date of Practical Completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

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Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any **Jacobsen** specified system, or associated components and products.

1.8 SAMPLES

Refer to the general section 1270 CONSTRUCTION for details of how samples will be reviewed and how instructions to proceed will be given. Provide the following samples for review:

	Sample A	Sample B	Sample C
Sample description:	~	~	~
Sample type:	~	~	~
Number:			
Location:			
Supporting documentation:			
Reviewer:	Contract administrator	Contract administrator	Contract administrator
Time for review:	10 working days	10 working days	10 working days
Review criteria:			

1.9 QUALIFICATIONS

Matting installers to be competent, experienced workers familiar with the **Jacobsen** materials and techniques specified.

1.10 INFORMATION FOR OPERATION AND MAINTENANCE

Refer to the general section 1239 OPERATION & MAINTENANCE for provision of the following general operation and maintenance information as electronic PDF format documents:
~
Provide this information prior to Practical Completion.

Performance

1.11 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Applicators approval certificate from the manufacturer / importer / distributer
- Manufacturer's / supplier's warranty
- Installer's / applicator's warranty
- Producer Statement (PS3) - Construction from the applicator / installer
- Producer Statement (PS4) - Construction Review from an acceptable suitably qualified person
- Other information required by the BCA in the Building Consent Approval documents.

1.12 SURFACE FIRE PERFORMANCE

Products are tested to ISO 9239.1 and achieve the minimum critical radiant flux requirements of NZBC C/AS2, Table 4.5, Critical radiant flux requirements for flooring. Refer to SELECTIONS.

2 PRODUCTS

Materials

2.1 MAT TILE

Shaw Contract Welcome II, Steppin Out Collection, a heavy sisal or rib textured matting tile comprised of:

- backing, made up of 100% thermoplastic polyolefin compound with a high performance pre-coat and a reinforcing layer.
- carpet fibre, consisting of 100% solution dyed P.E.T.
- construction, ribbed thermal bonded needle punch modular

Available in 610mm x 610mm x 4mm thick tiles. Refer to SELECTIONS for size and colour options.

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Components

2.2 DETAIL TRIMS

Tredsafe Detail Trims, a range of detail trims constructed of aluminium or PVC, used for transition or junction points between different floor levels. Refer to SELECTIONS for range of detail trims.

Accessories -Shaw Contract stepping out

2.3 ADHESIVE - FOR BONDING MATTING TO SUBSTRATE

- 'Shaw Lok Dots' pressure sensitive adhesive
- Shaw Contract Lokworx+ Carpet Tile Adhesive
- J-System 12 Pressure Sensitive Adhesive.

3 EXECUTION

Conditions

3.1 INSPECTION

Before starting work inspect the substrate to ensure that it will allow work of the required standard where the matting is to be installed.

3.2 PROTECTION

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements. Protect adjoining work surfaces and finishes during the matting/trim installation.

3.3 LAYOUT

Plan the general layout to:

- to conform with pattern orientation requirements as specified
- to maximize perimeter and mat sizes

3.4 STANDARDS AND TOLERANCES

Refer to the general section 1270 CONSTRUCTION for general requirements.

3.5 TEMPERATURE

Floor temperature:	Minimum 16°C.
Concrete pH:	No more than 10.0.

3.6 DELIVERY, STORAGE & HANDLING OF PRODUCT

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of product. Keep matting dry. Protect from damage.

Installation - substrate preparation

3.7 PREPARING NEW CONCRETE

Clear substrate of debris, clean off surface contamination and carry out surface repairs using appropriate J-SYSTEM Levelling Compound. Carefully feather out at perimeters of repaired areas. Grind level, then vacuum to remove dust. Check moisture content to NZS/AS 1884, Appendix A and do not commence laying vinyl until readings for the whole area show 75% relative humidity or less.

3.8 PREPARING NEW TIMBER BOARD OR PARTICLEBOARD

Clear substrate of debris, clean off surface contamination and carry out surface repairs using J-SYSTEM Levelling Compound. Carefully feather out at perimeters of repaired areas. Grind smooth, then vacuum to remove dust. Check for moisture content to NZS/AS 1884, Appendix A, and do not commence final sanding or laying until readings for the whole area show a moisture content of:

- 8-12% for air conditioned buildings
- 10-14% for intermittently heated buildings
- 12-16% for unheated buildings.

3.9 PREPARING EXISTING CONCRETE

Strip off existing floor coverings, adhesive and surface contaminants. Ensure concrete is dry. Check moisture content to NZS/AS 1884, Appendix A and do not commence laying vinyl until readings for the whole area show 75% relative humidity or less. Carry out minor repairs using a cement-based levelling compound, carefully feathered out at perimeters of repaired areas. Grind level, then vacuum to remove dust.

Resurface concrete using appropriate J-SYSTEM Levelling Compound to required thickness to provide a sound and level base.

3.10 PREPARING EXISTING TIMBER BOARD OR PARTICLEBOARD

Strip off existing floor coverings, machine sand to remove adhesive and surface contaminants. Then vacuum to remove all dust prior to installing underlay sheets.

3.11 TIMBER BOARD OR PARTICLEBOARD - LAYING THINLINE MDF UNDERLAY

Lay underlay sheets with joints staggered, with a 0.5mm gap between sheets and 2mm gap at all perimeters. Use 18mm divergent staples at 100mm centres throughout the whole sheet and 30mm apart, 18mm in from the edges of the sheets. Punch staples below the surface and sand joints level.

3.12 TIMBER BOARD OR PARTICLEBOARD - LAYING MASONITE UNDERLAY

Underlay using 5.5mm Masonite with joints staggered and with a 0.4mm gap between sheets and 3mm gap at all perimeters. Use 22mm narrow crown staples at 150mm centres throughout the whole sheet and 75mm apart, 10mm in from the edges of the sheets. Punch staples 0.4mm below the surface and sand joints level.

Installation - mat tile

3.13 INSTALL MAT TILE

Install mat tiles using J-SYSTEM 12 Pressure Sensitive Carpet Tile Adhesive.

Installation - components

3.14 INSTALL DETAIL TRIM

Install detail trims in accordance with Jacobsen requirements.

Completion

3.15 REPLACE

Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of temporary protection and cleaning. Replace damaged or marked matting.

3.16 LEAVE

On completion of the installation thoroughly vacuum the finished matting, using the vacuuming technique recommended by the matting manufacturer. Leave surfaces free of adhesive, dirt and debris and to the standard required by following procedures.

3.17 REMOVE

Remove debris, unused materials and elements from the site.

3.18 PROTECT

Protect completed work from damage for the period between completion of installation and completion of the contract works.

3.19 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and, if required, commissioning requirements.

4 SELECTIONS

For further details on selections go to www.jacobsen.co.nz
Substitutions are not permitted to the following, unless stated otherwise.

Materials

4.1 JACOBSEN MAT TILES

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Location: ~
Manufacturer: Shaw Contract Group
Brand/Type: Shaw Contract Welcome II, Steppin Out Collection
Adhesive: ~
Colour: Charcoal
CRF: 4.7 kW/m2

Components

4 2 TREDSAFE DETAIL TRIMS

Location: ~
Manufacturer: Tredsafe
Type: ~
Range: ~

Spares & maintenance products

4 3 SPARES & MAINTENANCE PRODUCTS

Refer to the general section 1270 CONSTRUCTION for details of how spares and maintenance products will be handled. Provide the following spares and maintenance products:
Item: ~
Quantity: ~
Location: Refer to 1270 CONSTRUCTION

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6700 PAINTING GENERAL

1 GENERAL

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This section relates to the general matters related to painting work

1.1 RELATED WORK

Refer to 6711 PAINTING EXTERIOR for exterior paint systems.
Refer to 6721 PAINTING INTERIOR for interior paint systems.

1.2 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

APAS	Australian Paint Approval Scheme
MPNZA	Master Painters New Zealand Association Inc.
VOC	Volatile organic compound

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from fire
AS/NZS 2311	Guide to the painting of buildings
AS/NZS 2312.1	Guide to the protection of structural steel against exterior atmospheric corrosion by the use of protective coatings - Paint Coatings
AS/NZS 5131	Structural steelwork - Fabrication and erection
AS/NZS ISO 9001	Quality management systems - requirements
SNZ TS 3404	Durability requirements for steel structures and components
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry
WorkSafe	Guidelines for the management of lead-based paint
MPNZA	Specification manual
MPNZA	Health and Safety Programme

Health and Safety at Work Act 2015

1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified manufacturer's system, or associated components and products.

1.6 QUALIFICATIONS

Painters to be a member of MPNZA and experienced competent workers, familiar with the materials and the techniques specified.

1.7 HEALTH AND SAFETY

Refer to the requirements of the Health and Safety at Work Act 2015 and WorkSafe: 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 required 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.

Refer to WorkSafe: Guidelines for the management of lead-based paint for the required procedures and precautions when:

- treating/removing lead-based paint
- burning off paint
- sanding off paint
- using solvent based paint removers.

1.8 MATERIAL SAFETY DATA SHEET

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

Warranties

1.9 WARRANTY

Warrant this work under normal environmental and use conditions against failure.
2 years: Warranty period

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

Performance

1.10 MANUFACTURER'S INSPECTION

Allow the paint manufacturers to inspect the work in progress and to take samples of their products from site if requested.

1.11 INSPECTION OF WORK

Inspection of the whole of the work at each of the stages scheduled may be made. Agree a programme that will facilitate such inspection, including notification when each part and stage of the work is ready for inspection.

2 PRODUCTS

Materials

2.1 PAINT TYPES

Use the manufacturer's complete system and only the products specified.

2.2 MATERIALS GENERALLY

Use only the Manufacturer's products which are guaranteed for their consistency and performance under AS/NZS ISO 9001 and APAS approval, prepared, mixed and applied as directed in the Manufacturer's specification sheets, specification manuals and product data sheets.

2.3 THINNERS AND ADDITIVES

Only use thinners or additives within the stated limits for the particular situations specified.

Accessories

2.4 FILLERS

For recommendations on; fillers, stopping, paint strippers, cleaning agents, etching solutions, mould inhibitors, rust inhibitors, knotting and other commodities used for the surface preparation, refer to the manufacturer of the specified coating.

3 EXECUTION

Conditions

3.1 EXECUTION

To conform to manufacturer's requirements and those methods, practices and techniques contained in AS/NZS 2311, the MPNZA Specification manual, and WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry.

3.2 PREPARE

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Prepare surfaces to the coating manufacturer's requirements.

3.3 COATED SURFACES

Ensure that substrate surfaces are able to achieve the specified finish.

3.4 PRE-PRIMED SURFACES

Sand down any breakdown or damage of the primer to a sound surface and immediately re-prime.

3.5 BRUSH DOWN

Brush down surfaces immediately before application, to remove dust, dirt and loose material.

3.6 COMPATIBILITY

Check that materials are as required by the paint manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other. Use paint from the same manufacturer for each paint system. If not compatible, obtain instructions before proceeding.

3.7 TREATED SURFACES

Where surfaces have been treated with preservatives or fire retardants, check with the treatment manufacturer that coating materials are compatible with the treatment and do not inhibit its performance. If they are not compatible, obtain instructions before proceeding.

3.8 BACK PAINTING

Co-ordinate with cladding and/or lining installer as to who will do the work and timing.

Exterior
For exterior cladding and trim that require on site finishing, paint the back and exposed bottom edges at the base of the cladding (generally, bottom plate overhang and horizontal flashings) to the manufacturer's requirements, but at least to 150mm up from base. Coating to match front finish, generally apply 2 coats or 1 coat if pre-primed.
Refer to appropriate exterior paint sections SELECTION clauses for claddings to be back painted.

Interior
For lining and trim that require on site finishing and/or back painting (usually wet areas), paint the back and exposed bottom edges at the base of the lining, to the manufacturer's requirements, but at least to 150mm up from base. Coating to match front finish, generally apply 2 coats or 1 coat if pre-primed, or if no front finish seal to manufacturer's requirements.
Refer to appropriate interior paint sections SELECTION clauses for linings to be back painted.

3.9 ANCILLARY SURFACES

The coatings listed in schedules and elsewhere are of necessity simplified. Coat ancillary exposed surfaces to match similar or adjacent materials or areas, except where a fair-faced natural finish is required or items are completely prefinished. In cases of doubt obtain instructions before proceeding.

3.10 HARDWARE

Do not paint hinges or hardware that cannot be removed. If items can be removed, carefully remove hardware, fixtures and fittings before commencing work. Set aside where they cannot be damaged or misplaced and replace on completion.

3.11 PROTECTION

Use dropsheets, coverings and masking necessary to protect adjoining fixtures, fittings and spaces from paint drops, spots, spray and damage.

Preparation - gypsum plaster

3.12 PREPARING GYPSUM PLASTER

Fill and sand small crevices and cracks. Surface moisture content not to exceed 12% at time of coating.

Preparation - painted surfaces generally

3.13 SURFACE PREPARATION

Refer to the Manufacturer's specification sheets and product data sheets. Carry out the preparatory work required by them for each of the substrates.

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For interior surfaces such as paper faced plasterboard use the Manufacturer's recommended finishing compound as an aid to achieving a Level 5 finish.

3.14 MOULD

Sterilise surface mould by washing or sponging the whole surface with a one part sodium hypochlorite household bleach to three parts clean water solution. Allow bleach to act for 30 minutes and wash off with clean water. Wash cloths and sponges regularly in clean water. Reapplication may be necessary. Treat with anti-mould solution to the treatment manufacturer's requirements.

3.15 GAP FILLING

Fill cracks, holes, indented and damaged surfaces with putty, plaster filler, wood filler, or plastic wood, as appropriate and in accordance with the paint manufacturer's requirements. Allow to dry or set before sanding back level with the surface. Prime coat or seal the timber before using putty. Wet cement or gypsum base plasters before applying filler. Use only Portland cement base types, or water-insoluble organic-based gap fillers in exterior or wet areas.

Application - before applying final coatings

3.16 OFF-SITE WORK

Carry out off-site preparation and coating under cover, in a suitable environment and with adequate lighting. Store items both before and after coating in a clean, dry area, protected from the weather and mechanical damage, properly stacked and spaced to permit air circulation and to prevent sticking of surfaces.

3.17 PRIMING JOINERY

Before priming preservative treated timber ensure that any cut surfaces have been retreated. Liberally coat end grain, allow to soak in and then recoat. Ensure LOSP. treated joinery has dried sufficiently to lose odour.

3.18 CONCEALED JOINERY SURFACES

Apply off-site coatings to all surfaces including those which will be concealed when incorporated into the building.

3.19 CONCEALED METAL SURFACES

Apply primer to suit the coating system to all metal surfaces which will be concealed when incorporated into the building.

3.20 DOORS

Prime or seal and paint all six faces of doors before hanging.

3.21 BEAD GLAZING

Before glazing apply the first two coats, or the primer and one undercoat, to rebates of stained, varnished or painted joinery and beads.

3.22 PUTTY GLAZING

Follow putty manufacturers recommendations for application, drying, and painting. Ensure that the putty is fully protected by the coating system as soon as it is sufficiently hard.

Application - generally

3.23 PAINTING GENERALLY

Comply with the paint manufacturer's requirements and any additional requirements in this specification.

3.24 MIXING

Thoroughly mix paints. Lift any settled pigment and ensure the paint is homogenous.

3.25 ENVIRONMENT

Paint exterior surfaces only in favourable weather conditions:

- warm dry days without frost or heavy dews
- avoid painting in direct sunlight any surfaces that absorb heat excessively
- as far as possible apply paint in the temperature range 15°C to 25°C
- do not paint if temperatures fall outside the range of 10°C and 35°C unless paints with the necessary temperature tolerance have been specified

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- do not apply solvent borne paint if moisture is present on the surface

3.26 SEQUENCE OF OPERATIONS

Painting work to generally follow the following sequences:

- back painting and pre-installation painting, then post-installation exposed-face painting
- complete surface preparation before commencing painting
- apply paint in the specified sequence using the specified paint
- allow full drying time between coats to the paint manufacturer's requirements
- do not expose primers, undercoats and intermediate coats beyond manufacturers stated instructions before applying the next coat
- finish broad areas before painting trim
- ensure batch numbers of tins are matched for whole areas
- internally, paint ceilings before walls and walls before joinery, trim and other items

3.27 PAINT APPLICATIONS

Select brush, roller, or pad and apply paint to the requirements of the paint manufacturer and to obtain a smooth even coating of correct thickness, uniform gloss and colour.

3.28 DRYING TIME

Before handling or applying the next coat of paint, give each coat the full drying time as required by the paint manufacturer. Ensure that surfaces are dry and that condensation does not occur before the paint reaches surface-dry condition.

3.29 LIGHTLY SAND

Lightly sand primers, sealers, undercoats and intermediate coats to remove dust pick-up, protruding fibres and coarse particles. Remove dust immediately before applying the next coat.

3.30 DEFECTIVE WORK

Correct defective work immediately and re-coat as required, following precisely the paint system specified.

3.31 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 specified number of coats applied
- no blemishes such as runs, sags, crinkling, fat edges, entrained paint skins, hairs, dust, bare or starved patches, cracks, brush marks, ladder marks and blistering
- proper covering of corners, crannies, thin edges, cracks, end grain and other difficult places of application

Completion

3.32 CLEAN

Clean adjoining surfaces, glass and fittings of any paint contamination. Clean off glass indicators at completion of the building works. Clean glass inside and out to a shining finish.

3.33 CLEAN EQUIPMENT

Use the Manufacturer's environmental wash system for the cleaning of water-based paint and plasters from brushes, rollers, plastering or spray equipment to separate the solids from the water component for safe disposal.

3.34 LEAVE

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

3.35 REMOVE

Remove dropsheets, coverings and masking to leave surrounding surfaces and areas clean, tidy and undamaged. Remove debris, unused materials and elements from the site.

3.36 REPLACE HARDWARE

Replace hardware without damage to it or the adjoining surface. Leave properly fitted and in working order.

4 SELECTIONS

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4.1 SELECTIONS

Refer to 6711 PAINTING EXTERIOR and 6721 PAINTING INTERIOR for selections.

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6742 FIRE RATED COATINGS - STEELWORK

1 GENERAL

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This section relates to sprayed fire protection coatings for use over structural steel framing to provide the specified fire resistance ratings and to meet the fire hazard classifications.

Related work

1.1 RELATED SECTIONS

Refer to ~ for ~.
Refer to Structural Steelwork section for fabrication of structural steelwork.

Documents

1.2 DOCUMENTS

Documents referred to in this section are:

NZBC C/AS2	Protection from Fire
AS 1627.4	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Abrasive blast cleaning
AS 1627.9	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Pictorial surface preparation standards for painting steel surfaces
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~
Facsimile:	~

Requirements

1.4 QUALIFICATIONS

Applicators to be competent workers experienced with the materials and the techniques specified, licensed by the fire protection coating supplier, and hold a current certificate.

Performance

1.5 FIRE RESISTANCE RATINGS

Provide schedules fire resistance ratings to NZBC C/AS2, 2.3 **Fire resistance ratings**. Refer to SELECTIONS for required ratings.

1.6 TEST

Test on site for thickness as the work proceeds and certify on completion the coating thickness and density for each structural element.

1.7 SUPPLIER

Supplier to:

- Certify that the mixture and method of application meet the test requirements of NZBC C/AS2, C5.1 **Fire resistance** as structural elements
- Calculate and schedule the thickness and density of the coating and the quantity of mixture needed for each structural element to achieve the fire resistance rating required
- Certify that the correct quantity of coating mixture has been supplied for each structural

element

1.8 SUPERVISION

Provide qualified, experienced personnel to supervise the application.

2 PRODUCTS

Materials

2.1 REINFORCEMENT

Corrosion protected steel wire mesh or expanded steel mesh to the coating supplier's requirements.

2.2 CEMENTITIOUS FIRE RATED COATING MATERIAL

Single package factory controlled pre-mix of vermiculite and Portland cement compound.

Accessories

2.3 PRIMER

As required by coating manufacturer.

2.4 WATER

Clean and free from any organic and mineral impurities not compatible with the sprayed fireproofing materials.

3 EXECUTION

Conditions

3.1 DELIVER

Deliver material to the site in sealed bags, labelled to show coating manufacturer, mix proportions and other necessary information. Store in a dry place.

3.2 INSTALLATION OF SUNDRY ATTACHMENTS

Ensure clips, hangars, supports, sleeves, precast concrete panel connections and other attachments specified under other work sections are placed and fixed before the application of the coating.

3.3 INSTALL LATER

Install ducts, piping, conduit and any other suspended equipment likely to interfere with application and coverage, after completion of the coating, unless the coating applicator agrees to their installation beforehand.

3.4 ANY PATCHING AND REPAIRING

Licensed applicator to perform any patching of coating.

3.5 PROTECTION

Provide measures for protection of workers and public, as required by the WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry. Provide protection for workers applying coating and for other workers in the vicinity of application and mixing operations. Obtain a Health and Safety data sheet from the supplier and follow these requirements.

3.6 PROTECT ADJOINING SURFACES

Protect adjoining surfaces and areas to prevent contamination from overspray or fallout of materials.

Application - preparatory work

3.7 PREPARING GALVANIZED SURFACES

Remove grease, oil and other solvent-soluble contaminants by wiping and/or brushing with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately

3.8 COMMENCEMENT OF APPLICATION

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Do not commence work until the surface to receive this work is of an acceptable standard to ensure the bond between coating and substrate. For cementitious coatings, apply a bonding coat to the primed surfaces to the manufacturer's requirements.

Application - coating work

3.9 SET REINFORCEMENT

Set in the middle third of the thickness and retain by welded pins and non-return washers at nominal 500mm centres. Include "in depth" reinforcement where web depth exceeds 650mm or flange depth exceeds 325mm. The use of reinforcement as a support medium for the coating does not obviate the need for "in-depth" reinforcement.

3.10 MIXES

Supply and mix with water to the coating supplier's requirements using their approved plant and procedures for the selected system.

3.11 APPLICATION

Apply only in a temperature range for substrate and air of 2°C minimum and rising, to a maximum of 45°C. Apply the coating in accordance with the latest requirements issued by the coating supplier. Use the approved mixing, pumping and spraying techniques to obtain the correct density and thickness of the material as scheduled by the coating supplier with a minimum of wastage. Use only plant and equipment approved by the coating supplier.

3.12 FINISH

Protected work:	No further surface treatment is required.
Exposed/semi exposed work:	Trowel finish the coating surface to the coating supplier's requirements.
	Paint to paint manufacturer's requirements
Locations:	Refer to SELECTIONS

3.13 CURING

Allow for setting between coats and curing the finished coating to the coating supplier's system requirements.

Completion

3.14 CLEAN UP

Clean up as the work proceeds.

3.15 LEAVE

Leave the whole of the work in a sound, coherent condition, free of any defects and to the standard required by following procedures.

3.16 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

4.1 FIRE RESISTANCE RATINGS

Columns:	external	~ / ~ / ~ minutes
	Internal	~ / ~ / ~ minutes
Beams:	external	~ / ~ / ~ minutes
	Internal	~ / ~ / ~ minutes
Floor system:		~ / ~ / ~ minutes
Roof system:		~ / ~ / ~ minutes
Trusses:		~ / ~ / ~ minutes

4.2 CEMENTITIOUS FIRE RATED COATING MATERIAL

Brand: ~

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Finish: ~
Paint/colour: ~
Location: ~

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6745R RESENE PROTECTIVE COATINGS - STEELWORK

1 GENERAL

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This section relates to the preparation and painting of structural and miscellaneous steelwork items using **Resene** coating systems.

This painting specification is written based on information available at the time of writing.

This painting specification assumes that the applicator has the necessary skill, experience and equipment to undertake the work. The applicator remains responsible for ensuring proper completion of the work.

If in the applicator's own expertise and judgement an amendment to this specification is required, or where a substrate preparation or required painting system is not covered in this specification, this shall be brought to the attention of the principal and any amendment agreed before work proceeds any further.

1.1 RELATED WORK

Refer to the **Resene** painting sections for general painting.

Documents

1.2 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 1-10
AS/NZS 2312.1	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 1: Paint coatings
AS/NZS 2312.2	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 2: Hot dip galvanizing
AS/NZS 5131	Structural Steelwork - Fabrication and Erection
AS/NZS ISO 9001	Quality management systems - requirements
MPNZA	Health and Safety Program

Health and Safety at Work Act 2015

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents related to this section are:

Resene	Surface Information & Preparation Data Sheets (SIPDS) and product data manual (hard copy or at www.resene.co.nz)
Resene	Putting Your Safety First

Copies of the above literature are available from Resene

Telephone:	0800 RESENE (0800 737 363)

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

Materials:	To 1(v) **Resene** Promise of quality - expected system life in the **Resene** Surface Information & Preparation Data Sheets (SIPDS) and product data manual

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of Practical Completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
3 years: For execution

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of Practical Completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS

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

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any specified **Resene** system, or associated components and products.

1.8 SAMPLES

Refer to the general section 1270 CONSTRUCTION for details of how samples will be reviewed and how instructions to proceed will be given. Provide the following samples for review:

	Sample A	Sample B	Sample C
Sample description:	~	~	~
Sample type:	~	~	~
Number:	~	~	~
Location:	~	~	~
Supporting documentation:	~	~	~
Reviewer:	Contract administrator ~	Contract administrator ~	Contract administrator ~
Time for review:	10 working days ~	10 working days ~	10 working days ~
Review criteria:	~	~	~

Performance

1.9 QUALITY ASSURANCE

Maintain quality assurance programs 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.

1.10 GENERAL INSPECTIONS

Inspection of the work to take place at each of the stages as scheduled. Refer to SELECTIONS. Confirm a written program to facilitate these inspections, including notification when each stage of the work is ready for inspection.

1.11 MANUFACTURER'S INSPECTIONS

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

1.12 HEALTH AND SAFETY

Refer to and comply with the requirements of the Health and Safety at Work Act 2015 including the obligation to:

- Eliminate hazards and if hazards cannot be eliminated or isolated, then minimize the hazards in this work by using the proper equipment and techniques as required by the MPNZA Health and Safety Program and **Resene Putting Your Safety First** handbook.
- Supply protective clothing and equipment.
- Inform the contractor as well as the employees and others on site of those hazards and put in place procedures for dealing with emergencies.

1.13 MATERIAL SAFETY DATA SHEETS

Obtain from **Resene** (phone 0800 RESENE, or www.resene.co.nz) the material safety data sheet(MSDS) for each product used and comply with the required safety procedures. Keep sheets on site.

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2 PRODUCTS

Materials

2.1 COATING SYSTEMS

Refer to SELECTIONS. Use only **Resene** product which is guaranteed for consistency and performance under AS/NZS ISO 9001 prepared, mixed and applied as directed in the **Resene Engineered Coatings Systems Manual**.

2.2 PRIMER

Refer to SELECTIONS for type.

2.3 THINNERS/ADDITIVES

Use only if and when expressly directed by **Resene** for their particular product in a particular application.

Accessories

2.4 ACCESSORIES

Contact your local **Resene ColorShop**, if required, for a full range of accessories and usage advice.

3 EXECUTION

Conditions

3.1 CONDITIONS FOR PAINTING

Coat steelwork in conditions approved for the application of the specified coatings. Carry out off-site preparation and coating application under cover, in a suitable environment, with adequate lighting and with the air temperature between 10°C and 25°C.

Ensure prepared and painted surfaces are clean and dry. Do not carry out preparation or painting when the ambient relative humidity exceeds 85%. The temperature of the substrate to be 3°C above Dew Point.

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 by their manufacturers for the particular surface and conditions of exposure, and that materials used within each painting system are compatible with each other and are from the same manufacturer.

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 a few days 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 and that ambient conditions are such that condensation does not occur before the paint reaches surface-dry condition.

Application - surface preparation

3.6 SURFACE PREPARATION

Refer to the **Resene Surface Information & Preparation Data Sheets** (SIPDS) and product data manual for surface preparation sheets (or obtain them by phoning 0800 RESENE, or at www.resene.co.nz) listed in the materials systems schedule clauses. Carry out the preparatory work required by them for each of the substrates.

3.7 LEAD-BASED PAINT, ASBESTOS

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Handle cautiously lead-based paint and asbestos, if present, as outlined in the preamble of the **Resene** SIPDS Surface Information & Preparation Data Sheet 3:4B/3 Cement and Roofing Claddings containing asbestos or SIPDS Surface Information & Preparation Data Sheet 2:1/3 Note V Lead containing paints and product data manual.

3.8 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 100mm maximum into and above the concrete encasement area.

3.9 BRUSHING AND POWER TOOL CLEANING

Remove oil and grease in accordance with AS 1627.1. Water blast to remove salt deposits. Scrape and power wire brush to a minimum class 2 finish to AS 1627.2. All sharp edges are to be removed by grinding to provide a 2mm radius edge. Clean to bright metal, but avoid producing a polished surface. Check that no burrs or sharp arrises remain which may prevent full coating thickness being attained.

3.10 ABRASIVE BLASTING

Remove oil and grease in accordance with AS 1627.1. Water blast to remove salt deposits. Abrasive blast clean to a class 2½ finish to AS 1627.4. 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. Check that no burrs or sharp arrises remain which may prevent the full coating thickness being attained.

3.11 PREPARING HOT DIP GALVANIZED SURFACES

Remove grease, oil in accordance with AS 1627.1. Water blast to remove salt deposits. Allow to dry and proceed with the next operation immediately. Carefully whip blast (sweep blast) the surface to provide a slightly roughened surface profile using clean new non-metallic blasting media. Care must be taken to ensure a minimum amount of zinc is removed during this process (no more than 10 microns). Any areas of white corrosion must be totally removed during this process before painting.

3.12 PREPARING "IN-LINE" GALVANIZED, ZINC AND ALUMINIUM/ZINC COATINGS

Remove grease, oil and other solvent-soluble contaminants in accordance with AS 1627.1. Water blast to remove salt deposits. Any areas of white corrosion must be removed by wet and dry sanding or high pressure water blasting before application of paint coatings. Allow to dry and proceed with the next operation immediately

3.13 SHOP PRIMING

Degrease in accordance with AS 1627.1. Water blast to remove salt deposits. Allow to dry and remove all loose corrosion products by any of the following; wire brushing, power tool cleaning, or abrasive blast cleaning. Dust off and apply a coat of primer within 4 hours of completing surface preparation.

3.14 PATCH PRIMING

Clean areas of damaged priming and areas left clear for site jointing to a standard comparable with the shop cleaning 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. Ensure an overlap of 20mm onto sound existing coating. Consult manufacturer if primer has been left exposed for more than 4 weeks before the final coating system is applied.

Supervision and Inspection

3.15 SUPERVISION FOR STRUCTURAL STEEL

To AS/NZS 5131 **Structural steelwork - Fabrication and Erection**, 9.9.20.
Provide an Inspection Test Plan (ITP) to AS/NZS 5131 13.9.1, prior to commencement. To be supervised by a competent person.

Application - general

3.16 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, specified dry film thicknesses of each coat are achieved.
- Free of defects such as pin-holing, alligatoring, blistering, staining, overspray, peeling, runs, sags, wrinkling and imbedded dirt or dust.

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3.17 PAINT FILM THICKNESS

The film thickness and dry film thicknesses quoted are the minimum to be achieved. Do not exceed these thicknesses by more than 20% of that specified. The specified film thickness for each coat / application shall be achieved prior to the application of the subsequent coat. Measurement shall be as per AS/NZS 3894.3 standard (SSPC-PA2) and agreed on before commencement of paint application.

Completion

3.18 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

For further details on selections go to www.resene.co.nz.
Substitutions are not permitted to the following, unless stated otherwise.

4.1 CONTROL SAMPLES

Manufacturer:	~
Coating system:	~
Nature of sample:	~

4.2 GENERAL INSPECTIONS

Coating system:	~
Inspection:	~

4.3 PRIMER

Brand/type:	~

4.4 SHOP PRIMING

Dry film build:	~ microns

Interior new mild steel, ferrous metals

4.5 RESENE INTERIOR NEW MILD STEEL, SOLID COLOUR - PUR2

System:	Resene equivalent to AS/NZS 2312.1 PUR2
Description:	Mild steel, interior non-encased, epoxy primer, acrylic polyurethane gloss
Surface prep:	AS 1627.4 (Sa 2½)
1st coat:	Resene Armourcote 220 RA34 @ 75 microns DFT
2nd coat:	Resene Uracryl 403 RA56 @ 50 microns DFT
3rd coat:	Resene Uracryl 403 RA56 @ 50 microns DFT
3rd coat finish:	Gloss, Semi-Gloss or Low Sheen
3rd coat colour:	TBC

7123 HOT & COLD WATER SYSTEM

1 GENERAL

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This section relates to piped potable water supply systems from the network utility supply authority water main to designated points and appliances, the installation of hot water heating appliances, distributing piped hot water to other appliances, and the installation of valves.

1.1 RELATED WORK

Refer to 7150 SANITARY FIXTURES, TAPWARE & ACCESSORIES for sanitary fixtures and tapware selections.

Documents

1.2 DOCUMENTS

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

NZBC G4/AS1	Ventilation
NZBC G11/AS1	Gas as an energy source
NZBC G12/AS1	Water supplies
NZBC G12/AS3	Water supplies
NZBC H1/AS1-AS2	Energy Efficiency
AS 1432	Copper tubes for plumbing, gas fittings and drainage applications
AS/NZS 1477	PVC pipes and fittings for pressure applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of polyethylene pipe systems
AS 2345	Dezincification resistance of copper alloys
AS/NZS 2492	Cross Linked Polyethylene (PE-X) pipe for pressure applications
AS/NZS 2537.1	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) General
AS/NZS 2537.2	Mechanical joining fittings for use with crosslinked Polyethylene (PE-X) for pressure applications - Plastics piping systems for hot and cold water installations - Crosslinked Polyethylene (PE-X) - Fittings
AS/NZS 2537.3	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) fitness for purpose of system
AS/NZS 2537.4	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) Guidance for the assessment of conformity
AS/NZS 2642.1	Polybutylene pipe systems - Polybutylene (PB) pipe extrusion compounds
AS/NZS 2642.2	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
AS/NZS 2642.3	Polybutylene pipe fittings - Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications
AS/NZS 2845.1	Water supply - Backflow prevention devices - Materials, design and performance requirements
AS 2845.3	Water supply - Backflow prevention devices - Field testing and maintenance
AS/NZS 3500.1	Plumbing and drainage - Water services
AS/NZS 3500.4	Plumbing and drainage - Heated water services
NZS 3501	Specification for copper tubes for water, gas and sanitation
AS 3688	Water supply and gas systems - metallic fittings and end connectors
AS/NZS 3879	Solvent cements and priming fluids for PVC (PVC-U and PVC-M and ABS and ASA pipes and fittings

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AS 4032.2	Water supply - Valves for the control of heated water supply temperatures - Tempering valves and end-of-line temperature actuated devices
AS/NZS 4129	Fittings for polyethylene (PE) pipes for pressure applications.
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
NZS 4305	Energy efficiency domestic type hot water systems
NZS 4602	Low pressure copper thermal storage electric water heaters
NZS 4606.1	Storage water heaters. General requirements
NZS 4606.2	Storage water heaters. Specific requirements for water heaters with single shells.
NZS 4606.3	Storage water heaters. Specific requirements for water heaters with composite shells.
NZS 4607	Installation of thermal storage electric water heaters: valve vented Systems
NZS 4617	Tempering (3-port mixing) valves
AS 4809	Copper pipe and fittings. Installation and commissioning
AS 5200 part 053	Plumbing and drainage products, Stainless steel pipes and tubes for pressure applications.
AS/NZS 5601.1	Gas installations - general installations
AS/NZS 60335.2.35	Household and similar electrical appliances. Safety - Pat 2.35 Particular requirements for instantaneous water heaters

Gas (Safety and Measurement) Regulations 2010
Plumbers, Gasfitters and Drainlayers Act 2006

NZ Backflow Testing Standard:	NZ Backflow Testing Standard 2019, Field testing of backflow prevention devices and verification of air gaps

1.3 MANUFACTURER DOCUMENTS

Manufacturer and supplier documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~
Facsimile:	~

Warranties

1.4 WARRANTY

Provide warranty for:

2 years:	For the supply and installation of the plumbing system and fixtures

- Provide the warranty in the standard form in the general section 1237WA WARRANTY AGREEMENT.
- Commence the warranty from the date of practical completion of the contract works.

Requirements

1.5 QUALIFICATIONS

Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a certifying plumber under the Plumbers, Gasfitters and Drainlayers Act 2006.

1.6 PIPEWORK LAYOUTS

~

1.7 INFORMATION FOR OPERATION AND MAINTENANCE

Supply maintenance information to requirements set out in the 1239 OPERATION & MAINTENANCE section.

1.8 HOT WATER TEMPERATURES

To NZBC G12/AS1, 6.14

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Storage water heaters to store water at not less than 60ºC.

Hot water piping system, with temperature controls where necessary (tempering valve etc), to provide water at the outlet at the following temperatures:

For personal hygiene fixtures (showers, baths, wash hand basins etc) temperatures to be close to but not to exceed:

- 45ºC - for early child hood centres, schools, elderly facilities, hospitals, psychiatric or disabled institutions.
- 50ºC - for personal hygiene fixtures in all other buildings.

For non-personal hygiene fixtures (kitchen sinks and equipment, laundry tubs, cleaners sinks, industrial fixtures etc) temperatures are:

- Unrestricted - direct from water heater, approx. 60°C, must be less than 65°C (for kitchen sinks and equipment, laundry tubs, cleaners sinks etc) - in all buildings.
- Unrestricted - direct from water heater not tempered (for industrial fixtures and specific items etc) - in all buildings.

This clause excludes boiling units.

Performance

1.9 TESTING - TO NZBC G12/AS1

Test to NZBC G12/AS1, 7.6, Watertightness, for hot and cold water.

- Test to a pressure of 1500 kpa for period not less than 15 minutes.

Confirm the timing before carrying out any tests. Supply potable water and the apparatus needed. Slowly fill service pipes with water to exclude air. Test and ensure there is no measurable loss of pressure for the minimum period. Slowly fill distribution pipes with water to exclude air. Ensure that with draw-off taps closed the system must remain water-tight.

2 PRODUCTS

Materials

2.1 POLYBUTYLENE PIPE

To NZBC G12/AS1, 2 Materials. Polybutylene tubing to AS/NZS 2642.1, AS/NZS 2642.2 and AS/NZS 2642.3 complete with fittings and accessories brand-matched. Protect from sunlight.

2.2 POLYETHYLENE PIPE

To NZBC G12/AS1, 2 Materials. Polyethylene pipes to AS/NZS 4130 and fittings to AS/NZS 4129. Except for solid black PE, protect from sunlight. For cold water applications only.

2.3 DE-ZINCIFICATION RESISTANT WATER SUPPLY SYSTEM COMPONENTS

All copper alloy components to comply with G12/AS1 clause 2.2.3 and AS 2345.

2.4 WATER METER

To the requirements of the network utility operator.

2.5 VALVES

Pressure reducing or limiting valve, filter, non-return valve, cold water expansion valve, pressure relief or temperature valve, pressure relief valve and isolating valves to NZBC G12/AS1.

2.6 BACKFLOW PREVENTION DEVICES

Provide backflow prevention devices to AS/NZS 2845.1 where it is possible for water or contaminants to backflow into the potable water supply. Refer to NZBC G12/ AS1 3.4 Backflow protection, 3.5 Containment Backflow protection, table 2, Selection of Backflow Protection and table 2A Containment Backflow Protection.

2.7 TEMPERING VALVE

Tempering valve to NZS 4617 or AS 4032.2 to NZBC G12/AS1.

Materials - Hot water heating appliances

2.8 ELECTRIC HOT WATER CYLINDER, MAINS PRESSURE

To NZS 4305, NZS 4606.1, NZS 4606.2 and NZS 4606.3,electric storage cylinder, insulated and complete with required fittings.

Components

2.9 PROTECTIVE TAPE

Plasticised PVC tape system with primer, mastic fixing and outer coating.

3 EXECUTION

3.1 EXECUTION GENERALLY

Generally carry out the whole of this work and tests to NZBC G12/AS1 or AS/NZS 3500.1 and AS/NZS 3500.4 as modified by NZBC G12/AS3.

3.2 HANDLE AND STORE

Handle and store pipes, fittings and accessories to avoid damage. Store on site, under cover on a clean level area, stacked to eliminate movement and away from work in progress.

Store tapware in a shelved, dry and securely locked area. Retain tapware in the manufacturer's original packaging, complete with all fixings and installation instructions. Label each unit separately with its space/fixture number to match.

3.3 CORE HOLES AND SLEEVES

Review location and fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Strip core holes and make good after installation of pipework.

3.4 CONCEAL

Conceal pipework within the fabric of the building unless detailed otherwise. Satin finish chrome plate exposed work, complete with matching ferrule at the surface penetration.

3.5 CORROSION

Separate all metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.

3.6 THERMAL MOVEMENT

Accommodate movement in pipes resulting from temperature change by the layout of the pipe runs, by expansion joints and by sleeving through penetrations.

3.7 PIPE SIZE

Flow rates to each outlet to be no less than those given in AS/NZS 3500.1 and AS/NZS 3500.4 as modified by NZBC G12/AS3 or NZBC G12/AS1, table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in NZBC G12/AS1, table 4, Tempering valve and nominal pipe diameters.

3.8 ELECTROLYTIC ACTION

Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.

3.9 EXCAVATE

Excavate for the water main to a firm, even trench base in straight runs. Allow to backfill.

Application - Jointing

3.10 JOINTING POLYBUTYLENE PIPE

Aluminium clamped, seal ring compression or push fit "O" ring seal jointing to pipe system manufacturer's requirements.

3.11 JOINTING POLYETHYLENE PIPE

Seal ring compression joints and electrofusion to NZBC G12/AS1 and AS/NZS 2033.

Application - Pipework installation

3.12 WATER SUPPLY CONNECTION

Arrange with the network utility operator for a connection to the water main and from there through a water meter and gate valve. Provide back flow prevention to NZBC G12/AS1.

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3.13 POTABLE WATER SUPPLY PIPEWORK INSTALLATION

From connection point, run pipes complete with all fittings, support and fixing, joins and install to manufacturers specifications. Size the pipes and branches in straight runs to deliver the acceptable flow rate to AS/NZS 3500.1 and AS/NZS 3500.4 as modified by NZBC G12/AS3 or NZBC G12/AS1, table 3, Acceptable flow rates to sanitary fixtures at each outlet. Allow for the expected concurrent use of adjoining fixtures and size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Pipework support spacing to be firmly fixed and buffered to eliminate noise and hammer, with preformed tee-connection take-offs and branches, with machine made 3 diameter bends, complete with necessary valves and fittings. Conceal pipework and pressure test before the wall linings are fixed.

3.14 HOT WATER PIPEWORK

Use a take-off spigot to give separate branches to each fitting, lay out pipes with support spacing to AS/NZS 3500.4 as modified by NZBC G12/AS3 or NZBC G12/AS1, table 9 Water supply pipework support spacing. Fix firmly and buffer to eliminate noise and hammer, with preformed tee-connection take-offs and branches, and preformed 3 diameter bends, complete with all necessary valves and fittings.

Lag all pipes with rigid insulation to the manufacturer's requirements and AS/NZS 3500.4 as modified by NZBC G12/AS3 or NZBC G12/AS1.

3.15 EQUIPOTENTIAL BONDING METALLIC WATER SUPPLY PIPES

If it is an electrical requirement, before enclosing, ensure metallic water supply pipes and metallic sanitary fixtures are equipotential bonded (or at least conductor cable attached) to NZBC G12/AS1, 9.0.

3.16 IN-LINE FILTER

Install an in-line filter immediately adjacent to the main isolating valve at the point of entry to the building, in an accessible position to allow for easy cleaning.

3.17 PENETRATIONS

Provide and fit collars and escutcheon plates to match the pipework at all penetrations through constructions.

Application - Hot water systems

3.18 HOT WATER CYLINDER INSTALLATION GENERALLY

Install hot water cylinders complete to the manufacturer's requirements and to NZBC G12/AS1, 6. 11, Water heater installation or NZS 4606 for Valve-vented systems.

3.19 SEISMIC RESTRAINTS - NON-GAS WATER HEATING APPLIANCES

Non-gas (electric, wet-back, solar etc) water heating appliances (storage water heaters) to be restrained to manufacturer's requirements and NZBC G12/AS1, 6.11, Water Heater Installation or AS/NZS 3500.4, 5.5.4 Seismic restraints.

3.20 INSTALL ELECTRIC HOT WATER CYLINDERS AND BOILING CYLINDERS

Install where shown complete with all the necessary fittings to the cylinder manufacturer's requirements and in accordance with NZBC G12/AS1: 6.11 or NZS 4607 for Valve-vented systems.

3.21 INSTALL STORAGE HOT WATER CYLINDER OVERFLOW TRAY

Install drained overflow tray to storage hot water cylinder to NZBC G12/AS1.

3.22 INSTALL TEMPERING VALVE

Install 1 metre minimum from outlet of hot water cylinder and to manufacturer's instructions. Install copper pipework for 1 metre minimum downstream of tempering valve prior to connection of non-metallic pipework.

Installation - valves

3.23 INSTALLING BELOW GROUND ISOLATING VALVE

Install all below ground items such as main isolating valves and water meters in preformed concrete pits or approved equivalent.

3.24 INSTALLING APPLIANCE ISOLATING VALVES - CONCEALED

Install isolating valves for appliances in accessible positions. Locate in adjacent cupboards and position to allow for easy connection and operation.

3.25 INSTALLING BACKFLOW PREVENTION DEVICE

Provide and install backflow prevention device as near as practicable to the potential source of contamination, and in an accessible position for maintenance and testing to AS 2845.3 or NZ Backflow Testing Standard.

Completion

3.26 LABEL

Label all pipework with permanent adhesive markers at 3 metre minimum intervals.

3.27 CLEAN IN-LINE FILTER

Clean all in-line filters on completion of works.

3.28 REPLACE

Replace damaged or marked elements.

3.29 LEAVE

Leave work to the standard required by following procedures.

3.30 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

Water main

4.1 POLYETHYLENE WATER MAIN

Size: 25mm outside diameter (i.e. DN 25 in AS/NZS 4130)

Pipework

4.2 POLYBUTYLENE PIPE

Manufacturer: ~
Brand: ~

4.3 POLYETHYLENE PIPE

Manufacturer: ~
Brand: ~
Size: ~ Nominal Bore / OD Size (mm)

4.4 EXPOSED PIPES

Type: ~
Accessories: ~
Manufacturer: ~
Brand: ~

Hot water systems

4.5 ELECTRIC HOT WATER CYLINDER, MAINS PRESSURE

Brand: ~
Model size: ~

Valves and accessories

4.6 MAIN ISOLATING VALVE

Location: ~
Brand/type: ~

4.7 FLOOR/ZONE ISOLATING VALVES

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Location: ~
Brand/type: ~

4.8 APPLIANCE ISOLATING VALVES - CONCEALED

Appliance: ~
Brand/type: ~

4.9 APPLIANCE ISOLATING VALVES - EXPOSED

Appliance: Washing machine
Brand/type: Refer to tapware selections

4.10 TEMPERING VALVE

Location: ~
Brand/type: ~

4.11 BACKFLOW PREVENTION DEVICE

Location: ~
Brand/type: ~

4.12 IN-LINE FILTER

Location: ~
Brand/type: ~

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7351 MANUAL FIRE ALARM SYSTEM

1 GENERAL

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This section relates to the design, installation and commissioning of manual fire alarm systems type 2 and type 6, as described in the NZBC C/AS2 Appendix A.

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

FRR	Fire Resistance Rating

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from Fire
NZBC F8/AS1	Signs
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
NZS 4512	Fire detection and alarm systems in buildings
AS/NZS 5000.2	Electric cables - polymeric insulated - For working voltages up to and including 450/750V

Fire Protection Association register of approved equipment
Building Regulations 1992

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.4 MANUFACTURER DOCUMENTS

Manufacturer and supplier documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

Requirements

1.5 QUALIFICATION

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.
Fire alarm installers to be a Fire Protection Association of New Zealand certified fire alarm contractor, employing experienced competent workers, familiar with the materials and the techniques specified.

1.6 AS BUILT DOCUMENTS

Refer to the general section 1238 AS BUILT DOCUMENTATION for the requirements for submission and review of as built documents and records.

Provide as built documents and records in accordance with NZS 4512, part 8 System Documentation and Records.

- Provide draft as built information prior to practical completion
- Provide final as built information prior to the end of the defects liability period

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1.7 OPERATION AND MAINTENANCE MANUALS

Supply maintenance manual information to requirements set out in the general section 1239 OPERATION & MAINTENANCE and including the following:

The manual is to set out the monthly and annual checking and testing of the system as required by NZS 4512, part 6: "Maintaining systems in compliance and good working order", for the compliance schedule required by the second schedule of the Building Regulations 1992 and a copy of the certificate of compliance.

1.8 MAINTENANCE CONTRACT PROPOSAL

Provide a priced proposed maintenance contract for the ongoing servicing of the fire alarm system specified to NZS 4512, part 6 "Maintaining systems in compliance and good working order". Refer to SELECTIONS for required maintenance.

1.9 APPROVED EQUIPMENT

Select equipment from the Fire Protection Association register of approved equipment.

Performance

1.10 FIRE AND EMERGENCY NEW ZEALAND APPROVAL

Submit to the Fire and Emergency NZ details of the proposed location of the fire detection indicator and the layout of the fire indicating panel and any mimic panels for their approval. Advise any required variation from the installation detailed.

1.11 COMMISSIONING

The completed system to be fully tested and commissioned in accordance with NZS 4512 part 5 "Commissioning" and as necessary to ensure the system is complete. Testing to include:

- visual examination
- testing the electrical equipment and
- testing to verify correct operation and function.

Carry out in the same manner as an annual survey. Installer to complete NZS 4512, appendix M "Installer's Declaration of Completion for Alarm System."

An accredited inspection body shall carry out inspection and testing and provide an inspection report in accordance to NZS 4512 section 5.5 Inspection, testing and compliance certification.

1.12 CERTIFICATE

An accredited inspection body shall provide a certificate of compliance for the fire alarm system to NZS 4512, appendix N "Certificate of Compliance for Fire Alarm System."

2 PRODUCTS

Manufactured units

2.1 MANUAL FIRE ALARM SYSTEM, TYPE 2 FIRE SAFETY PRECAUTION

Single or multiple zone, manual alarm system to comply with NZBC C/AS2 appendix A Fire safety systems and NZS 4512 with manual call points. It may/may not connect to a remote receiving centre. Refer to SELECTIONS for connection arrangements and means of alerting Fire and Emergency NZ.

Materials

2.2 CABLE

To AS/NZS 5000.2.

Accessories

2.3 FIRE RESISTANT SEALER

Gunnable inorganic or silicone elastomer sealant, packed to maintain the specified fire resistance rating of the ceiling or wall to NZBC C/AS2, 4.4 Fire Stopping.

3 EXECUTION

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Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 COMPLY

Comply with the requirements of NZS 4512, part 4 "Installation", and the following.

Multizone systems:	To NZS 4512 part 2 Design and construction - Multizone fire alarm systems
Single zone systems:	To NZS 4512 part 3 Single zone fire alarm systems

3.4 PROVIDE FOR

Provide for the system by way of conduit, chases, penetrations, spaces for equipment and trimming out for same.

3.5 CONFIRM LOCATION

Confirm location of equipment and their visual impact relative to surrounding materials and finishes.

Application

3.6 RUN CABLE

Run cabling concealed, using conduit, chases and penetrations, located and provided previously to AS/NZ 3000, and NZS 4512.

3.7 INSTALL INDICATING PANEL

Set rigidly in place plumb and true to line and face in the space provided. Fit neatly and without damage to the surrounding finish.

3.8 INSTALL MANUAL CALL POINTS

Set rigidly in place plumb and true to line and face. Fit neatly and without damage to the surrounding finish.

3.9 INSTALL ALERTING DEVICES

Install devices to the device manufacturer requirements rigid plumb and true to line and face, and without damage to the surrounding finish. Wire back to the control panel to AS/NZS 3000, and NZS 4512.

3.10 SIGNS

Install signs as required by NZBC F8/AS1: Signs, where required information is not already on the call point.

3.11 DC SUPPLY

Supply and fix the primary and secondary batteries and battery charger to the requirements of NZS 4512 and the fire alarm system offered. Indelibly mark batteries with the date of installation.

Application - fire resistant work

3.12 FIRE RESISTANT SEALER TO PENETRATIONS

Thoroughly clean the penetration of the ceiling or wall. Pack if necessary to support the sealant. Implant the sealant to the manufacturer's requirements to ensure full penetration and to obtain the required fire resistance rating. Tool the surface flush and smooth and allow to cure. Refer to SELECTION for details.
Service penetrations through fire rated construction to NZBC C/AS2, 4.4 and the project-specific Fire Resistance Rating (FRR).

Completion

3.13 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

4.1 MANUAL FIRE ALARM SYSTEM

System type: Type ~

4.2 MAINTENANCE CONTRACT PROPOSAL

The maintenance contract is to commence from: ~

The period for this maintenance contract to be: 1 Year

4.3 MANUAL FIRE ALARM SYSTEM, ALERTING FIRE AND EMERGENCY NZ

Brigade connected: Yes

Means of alerting Fire and Emergency NZ: ~

4.4 MANUAL FIRE ALARM SYSTEM CONTROL PANEL

Brand/type: ~

4.5 MANUAL CALL POINTS

Brand/type: ~

4.6 MANUAL FIRE ALARM SYSTEM ALERTING DEVICES

Brand/type: ~

4.7 FIRE RESISTANT SEALER

Location: ~

FRR: ~

Manufacture/type: ~

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7382 FIRE STOPPING SYSTEMS

1 GENERAL

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This section relates to fire rated service penetration systems and control joint fire stopping systems and includes:

- fire resistant barrier for seismic and other movement gaps
- formulated compound of incombustible fibres
- fire-stop composite sheets
- fire-stop collars, grilles and dampers
- fire-stop wraps and pillows
- fire-stop sealants and foams
- fire-stop mortars
- cavity construction intumescent barriers

1.1 RELATED WORK

Refer to ~ for ~

Documents

1.2 DOCUMENTS

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

NZBC C/AS2	Protection from fire
BSEN 1366.4	Fire resistance tests for service installations. Linear joint seals
NZS/AS 1530.1	Methods for fire tests on building materials, components and structures - Combustibility test for materials
AS 1530.4:2005	Methods for fire tests on building materials, components and structures - Fire resistance test of elements of construction
AS 1668.1	The use of ventilation and airconditioning in buildings - Fire and smoke control in buildings
AS 4072.1	Components for the protection of openings in fire-resistant separating elements - Service penetrations and control joints
AS 1682.1	Fire dampers Specification
AS 1682.2	Fire dampers Installation
NZS 4520	Fire resistant doorsets
ASTM C1519 - 10	Standard Test Method for Evaluating Durability of Building Construction Sealants by Laboratory Accelerated Weathering Procedures

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:
~

Manufacturer/supplier contact details

Company:	~
Web:	~
Email:	~
Telephone:	~

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years:	For manufacture/supply of fire stopping systems

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.5 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:
~ years: For installation of fire stopping systems

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.6 QUALIFICATIONS

Installers to be experienced, competent trades people familiar with the materials and techniques specified.

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

1.8 MANUFACTURERS INFORMATION

Submit type test certificates for each combination of fire stopping system, application, type of service, and substrate and penetration orientation. Include drawings of tested details.

- Submit report to AS 4072.1 appendix C.
- Submit evidence that systems specified without reference to brand conform to specified requirements.
- Submit copies of relevant manufacturers' instructions, for systems specified without reference to brand.
- Material data sheets (MSDS): Submit MSDS for systems specified without references to brand.
- Give notice if substrate or penetrations or both are not suitable for fire stopping.

1.9 LABELLING OF FIRE RATED SERVICES PENETRATIONS

All service penetrations to fire cells and fire separation systems are required to comply with all the designed fire integrity of the specified systems. Label all fire rated service penetrations to AS 4072.1 using the Certified Identification System provided by CID International Ltd.
Each fire stopping installation to have a permanently fixed tag or label containing the following information:

- Manufacturer's name
- Name and address of installer
- Date of installation

Refer to CID International Ltd at www.cidcert.com to record all service penetrations.

1.10 INSPECTIONS

Give sufficient notice so that inspections may be made of the following:

- Service penetrations completed and ready for fire stopping.
- Finish fire stopping, before being concealed.

Compliance information

1.11 FIRE STOPPING SYSTEM COMPLIANCE

To NZBC C/AS2, 2.3 **Fire resistance ratings**, NZBC C/AS2, 4.4 **Fire stopping**, and NZBC C/AS2, 4.5 **Fire cell construction** for interior elements, and NZBC C/AS2, 5.7.14 for exterior wall cavities.

1.12 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Manufacturer's, and or supplier's warranty
- Installer's warranty
- Producer Statement - Construction from the installer
- Other information required by the BCA in the Building Consent Approval documents.

1.13 CERTIFICATION

Submit evidence of compliance, to the recommendations of AS 4072.1 Appendix B.
Submit a certification document for installed fire stopping penetration and control joints.

- Form: To figure B1 of AS 4072.1

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Schedule: Submit a schedule of installed fire stopped penetrations and control joints.
- Form: To figure B2 of AS 4072.1

2 PRODUCTS

Materials

2.1 FIRE AND ACOUSTIC SEALANT

One part sealant to AS 1530.4, AS 4072.1 and BSEN 1366.4 to provide up to 4 hours fire integrity and up to 3 hours insulation. Tested to ASTM C1519 - 10 for Dynamic movement and artificial age test. Refer to SELECTIONS for type.

3 EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

Take delivery of materials and goods and store on site and protect from damage.
Protect finished surfaces, edges and corners from damage.
Move/handle goods in accordance with manufactures requirements.
Reject and replace goods that are damaged or will not provide the required finish.

3.2 GENERAL PREPARATION

Fire stopping after services have been installed through penetrations and properly spaced and supported, after sleeving where appropriate, and after removal of temporary lines, but before restricting access to the penetrations, including before dry lining.

Supply ventilation for non-aqueous solvent-cured materials. Apply fire stopping material to uniform density. Finish surfaces to a uniform and level condition. Maintain cable separation. Protect adjacent surfaces from damage arising through installation of fire stopping.

Allow for thermal movement for the pipes and ducts. Reinforce or support fire stopping materials with non combustible materials when:
- The unsupported span of the fire stopping materials > 100mm.
- The fire stopping materials are non-rigid.

To large openings provide fire stopping capable of supporting the same loads as the surrounding element or provide similar structural support around the opening.

Installation of penetrations through fire walls

3.3 INSTALLATION OF MULTI-CABLE TRANSITS

Encase and separate cables with fire rated sleeve system. Fill remaining space with the sleeves and seal with water repellent UV resistant fire sealant to a depth of 20mm each face. Hollow structures to have a metal cavity constraint system to constrain sealing product.

3.4 INSTALLATION OF CABLE TRAY PENETRATIONS

Separate cables from each other with appropriate size flame retardant rubber sheets. Fill remaining space with flame retardant rubber sheets. If gas and water tightness is required, seal with water repellent UV resistant fire sealant to a depth of 10mm to each exposed face of the sheets. Hollow structures to have a metal cavity constraint system to constrain sealing product.

3.5 INSTALLATION OF MULTI-MIX TRANSITS FOR CABLES AND PIPES

Sleeve cables and pipes with fitting intumescent sleeves Plastic pipes to be sleeved with crushing material. Fill remaining space with filler sleeves and seal with water repellent UV resistant fire sealant to a depth of 20mm each face. Hollow structures to have a metal cavity constraint system to constrain sealing product.

3.6 INSTALLATION OF CABLE, STEEL, COPPER AND PLASTIC PIPE PENETRATIONS

Fit fire resistant plugs to each end of the penetration. Plug to form a tight fit to pipes and cables and to wall of penetration.
Oversized holes or out of line conduit or pipes to be wrapped with intumescent (crushing for plastic pipe) material with excess space filled with fire retardant rubber and sealed with water repellent UV resistant fire sealant to a depth of 20mm.

Fire rated sealants/foams

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3.7 INSTALLATION OF FIRE AND ACOUSTIC SEALANTS/FOAMS

Clean all surfaces from dust , dirt or other contaminants. Mask adjacent areas and remove immediately after tooling. Prime edges if required by sealant manufacturer. Fill all joints to required depth with a backing rod or bond breaker tape prior to sealant application.
Fire rated expandable polyurethane foam to 15mm wide joints maximum in fire walls.

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Completion

3.8 ROUTINE CLEANING

Carry out routine trade cleaning of this part of the work including periodic removal all debris, unused materials and elements from the site.

3.9 DEFECTIVE OR DAMAGED WORK

Repair damaged elements. Replace damaged where repair is not possible or will not be acceptable. Leave fire stopping system to the standard required for following trades.

4 SELECTIONS

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

Fire stop mortars, sealants and foams

4.1 FIRE AND ACOUSTIC SEALANT

Location: ~
Type/Brand: ~

7411D DIMOND RAINWATER SPOUTING SYSTEMS

1 GENERAL

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This section relates to Dimond rainwater disposal systems including spouting and downpipes, in metal.

1.1 RELATED WORK

Refer to ~ for ~

1.2 ABBREVIATIONS AND DEFINITIONS

The following abbreviations apply specifically to this section:

BMT	Base metal thickness
NZMRM	New Zealand Metal Roofing Manufacturers Inc

Documents

1.3 DOCUMENTS

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

NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:
Dimond, Roofing and Cladding Systems Design Manual, (web based Manual with dated update pages)

Manufacturer/supplier contact details

Company:	Fletcher Steel Ltd
Trading as:	Dimond Roofing
Web:	www.dimond.co.nz
Email:	roofspec@dimond.co.nz
Telephone:	0800 346 663 (0800 DIMOND)

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

~ years:	For perforation
~ years:	For coatings

- Provide the warranty in accordance with published supplier's guidance on materials, environments and building types.
- Commence the warranty from the date of installation.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

3 years:	For workmanship

- Provide this warranty on the installer/applicator standard form.
- Commence the warranty from the date of installation.

Include a copy of the maintenance requirements with the warranty.
Refer to the general section 1237 WARRANTIES - INSTALLER/APPLICATOR for additional requirements.

Requirements

1.7 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

1.8 QUALIFICATIONS

Installers to be experienced competent gutter installers, familiar with the **Dimond** materials and the techniques specified.

1.9 INFORMATION FOR OPERATION AND MAINTENANCE

Provide one copy of all relevant **Dimond** maintenance information on completion of the roofing work.

Performance

1.10 TEST

Test the completed rainwater disposal system with water to ensure spoutings are laid to correct falls, that both spouting and downpipes are unobstructed and that no ponding occurs in spoutings.

2 PRODUCTS

Materials

2.1 SPOUTING

Complete with matching brackets to suit the spouting and screws. Refer to SELECTIONS for type.

2.2 DOWNPIPES

Complete with stand-off brackets, galvanized screw fixed. Refer to SELECTIONS for type.

Components

2.3 DROPPERS

Steel or plastic droppers, sized to fit inside the downpipe.

3 EXECUTION

Conditions

3.1 HANDLE AND STORE

Handle and store downpipes, spouting and accessories to avoid damage. Store on site under cover, on a clean level area, stacked to eliminate movement and away from work in progress. Avoid exposure to sunlight if strippable film is still on the product.

3.2 SUBSTRATE

Check that fascia, barges or cladding are level and true to line and face and will allow work of the required standard without distortion to the product alignment. Do not proceed until they are suitable to fix to standard.

3.3 THERMAL MOVEMENT

Make adequate provision in the fixing and jointing of the spouting for thermal movement in the length of the spouting. Provide an expansion joint in spouting over 12 metres in length for steel gutter.

3.4 CORROSION

Separate metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.

Check compatibility of metals used for rainwater goods, against the materials being used for roofing and flashings.

Application - metal

3.5 INSTALL METAL SPOUTING

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Establish minimum falls necessary (minimum 1:500) to outlets to prevent ponding and screw fix brackets true-to-line at 900mm centres maximum or 600mm centres maximum when using profile option Box 300. In areas where snow fall is possible and or high wind areas, the centres should be reduced to 450mm. Lap spouting joints in direction of flow, a minimum of 40mm to seal between and over the top of joint and seal with silicone sealant and fix with rivets. Ensure the joint is fixed over its full girth. Cut out neatly for and fit the pre-formed downpipe dropper and rivet and seal around the joint. All installation to **Dimond** details and NZMRM CoP recommendations.

3.6 INSTALL METAL DOWNPIPES

Form downpipes complete with cast zinc 115 degree angle bends as needed with all joints lapped and silicone sealed and fixed with 2-4mm diameter aluminium blind rivets. Galvanize screw fix with galvanized steel pipe clips to rigidly stand 40mm off the wall plumb and discharging into stormwater gully or inlet pipe. All installation to **Dimond** details and NZMRM CoP recommendations.

Completion

3.7 REPLACE

Replace damaged or marked elements.

3.8 LEAVE

Leave the whole of this work discharging completely and freely into the stormwater system and free of all debris. Leave work to the standard required by following procedures.

3.9 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

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

4.1 DIMOND SPOUTING

Profile:	~
Size:	~ effective cross sectional area
Base material:	~
BMT:	~mm
Coating system:	~
Dimondcolour:	~

4.2 DIMOND DOWNPIPES

Profile:	~
Base material:	~
BMT:	0.55mm
Coating system:	~
Dimondcolour:	~

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7421 SANITARY SYSTEMS

1 GENERAL

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This section relates to above ground gravity flow sanitary systems;

- for foul water
- from sanitary fixtures to first underground drain connection
- including system wastes, floor wastes, floor waste gullies, traps, vents and valves
- with associated components and accessories to make the system work

1.1 RELATED SECTIONS

Refer to 7150 SANITARY FIXTURES, TAPWARE & ACCESSORIES for sanitary fixtures.
Refer to 7123 HOT AND COLD WATER SYSTEM for potable water systems.
Refer to 7431 DRAINAGE COMMON REQUIREMENTS for underground drains.
Refer to 7142 GREYWATER SYSTEMS for greywater systems.

Documents

1.2 DOCUMENTS

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

NZBC G1/AS1	Personal hygiene
NZBC G12/AS1	Water supplies
NZBC G13/AS1	Foul water - Sanitary plumbing
NZBC G13/AS3	Foul water - Sanitary plumbing and drainage
AS 1589	Copper and copper alloy waste fittings
AS 2887	Plastic waste fittings
AS/NZS 1260	PVC-U pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 3500.2	Plumbing and drainage - Sanitary plumbing and drainage
AS/NZS 4401	Plastic piping systems for soil and waste discharge (low and high temperature) inside buildings - polyethylene (PE)
AS/NZS 7671	Plastic piping systems for soil and waste discharge (low and high temperature) inside buildings - Polypropylene (PP)
BS EN 1124 .1	Pipes and fitting of longitudinally welded stainless steel pipes with spigot and socket for waste water systems. Requirements, testing, quality control.
BS EN 1124 .2	Pipes and fitting of longitudinally welded stainless steel pipes with spigot and socket for waste water systems. System S, forms and dimensions.

Plumbers, Gasfitters and Drainlayers Act 2006

1.3 MANUFACTURER DOCUMENTS

Manufacturer and supplier documents relating to work in this section are:
~

Copies of the above literature are available from ~

Web:	~
Email:	~
Telephone:	~
Facsimile:	~

Requirements

1.4 QUALIFICATIONS

Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a certifying plumber under the Plumbers, Gasfitters and Drainlayers Act 2006.

1.5 PIPEWORK LAYOUTS

~

1.6 OPERATION AND MAINTENANCE MANUALS

Supply maintenance manual information to requirements set out in the 1239 OPERATION & MAINTENANCE section.

Performance

1.7 TESTING

Confirm timing before carrying out any tests. Supply potable water and apparatus needed. Test to NZBC G13/AS1, 7.1 Test Methods or AS/NZS 3500.2, section 15 Testing of Sanitary Plumbing and Sanitary Drainage Installations, as required. Carry out and record a visual inspection that each joint showed no evidence of leaks.

2 PRODUCTS

Materials

2.1 PVC-U WASTE PIPES AND TRAPS

To AS/NZS 1260, complete with fittings and accessories to the pipe manufacturer's requirements, all brand matched.

2.2 PVC-U VENT PIPE

To AS/NZS 1260, complete with fittings and accessories to the pipe manufacturer's requirements and all brand matched.

2.3 FLOOR WASTES

Floor wastes and floor waste gullies to AS/NZS 3500.2, complete with chrome grates to suit flooring.

Components

2.4 PROTECTIVE TAPE

Plasticised PVC tape system with primer, mastic fixing and outer coating.

3 EXECUTION

Conditions

3.1 EXECUTION GENERALLY - NZBC G13/AS1

Carry out this work to NZBC G13/AS1 and NZBC G1/AS1 and complete all tests to G13/AS1, 7.1 Test Methods.

3.2 ELECTROLYTIC ACTION

Avoid electrolytic action by eliminating actual contact or continuity of water between dissimilar metals.

3.3 EQUIPOTENTIAL BONDING METALLIC WASTE PIPES

If it is an electrical requirement, before enclosing, ensure metallic waste pipes connected to metallic drains and attached metallic sanitary fixtures are equipotential bonded (or at least conductor cable attached) similar to NZBC G12/AS1, 9.0.

3.4 HANDLE AND STORE

Handle and store pipes, fittings and accessories to avoid damage. Store on site under cover on a clean level area, stacked to eliminate movement and away from work in progress.

3.5 SETTING OUT

Set out location of all stacks, discharge pipes, fittings and vent pipes and the completeness of their discharge into the drainage system.

3.6 CORE HOLES AND SLEEVES

Fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Sleeve diameter to be 25mm larger than outside diameter of pipe accommodated. Strip core holes and make good after installation of pipework.

3.7 PIPE ACCESS

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Fit and fix stacks, wastes and pipes in ducts independent of all other services so they are easily replaceable for their full length. Wrap or tape pipes buried in concrete.

3.8 FITTINGS ACCESS

Fit and fix traps and wastes to enable access for cleaning and for maintaining the total system.

3.9 CONFIRM LOCATIONS

Unless the location and height are clearly delineated on the drawings, confirm installation height and plan locations of sanitary fittings before commencing the piping installation.

3.10 TRAPS AND WASTES

Conceal traps and wastes in the fabric of the building unless detailed otherwise. Fit and fix satin chrome plated exposed pipes, traps and wastes unless detailed otherwise.
Refer to 7150 SANITARY FIXTURES, TAPWARE & ACCESSORIES for locations and types of traps.

3.11 CORROSION

Separate metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.

Application - jointing

3.12 JOINTING PVC-U PIPE

Prime and solvent weld joints using spigots and sockets, flanged joints and seal ring compression joints to AS/NZS 2032.

Application - fixing

3.13 THERMAL MOVEMENT

Accommodate longitudinal movement in pipes resulting from temperature changes. Incorporate expansion joints in copper and PVC-U pipes. Install PVC pipes to AS/NZS 2032. Take particular care to allow for movement at horizontal take-off locations from stacks.

3.14 TRAPS AND FIXTURE DISCHARGE PIPES - NZBC G13/AS1

Size traps and pipes as required for each fixture or appliance. Establish the developed length of waste pipes. Vent and allow access for cleaning as required. Follow the most direct line with the least number of bends to NZBC G13/AS1: Foul water sanitary plumbing, table 4, Discharge unit loading for stacks and graded discharge pipes and NZBC G13/AS1, table 7, Distance between supports.

3.15 DISCHARGE STACKS AND VENTS - NZBC G13/AS1

Size stacks and vents to NZBC G13/AS1, table 2, Fixture discharge pipe sizes and discharge units and NZBC G13/AS1, table 6, Vent pipe sizes. Extend up past the highest branch to form a discharge stack vent terminating to NZBC G13/AS1, figure 12 and finishing at the base with a 45 degree bend. Support system to NZBC G13/AS1, table 7, Distances between supports.

3.16 FLASH ROOF PENETRATIONS

Flash or arrange for roofer to flash all penetrations to NZBC E2/AS1.
For profiled metal roofs, fit proprietary EPDM pipe collar flashings to NZBC E2/AS1, 8.4.17 Roof Penetrations, and manufacturer's requirements.

Completion

3.17 REPLACE

Replace damaged or marked elements.

3.18 LEAVE

Leave the whole of this work free of blemishes, undamaged and to the standard of finish required for following procedures.

3.19 REMOVE

Remove debris, unused materials and elements from site.

4 SELECTIONS

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4.1 SANITARY SYSTEMS - PVC-U WASTE PIPES AND TRAPS

Location: ~
Manufacturer/Brand: ~

4.2 SANITARY SYSTEMS - PVC-U VENT PIPE

Manufacturer: ~
Brand: ~

4.3 SANITARY SYSTEMS - FLOOR WASTES

Manufacturer: ~
Brand/type: ~
Grate/finish: ~

4.4 SANITARY SYSTEMS - PROTECTIVE TAPE

Brand: ~
Width: ~mm

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7701 ELECTRICAL BASIC

1 GENERAL

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This section relates to the wiring for domestic and small scale commercial installations, including:

- power
- lighting
- electrical automation
- security system
- complete with componentry
- electrically-powered fittings
- fire rated sealers, liners and accessories

1.1 RELATED WORK

Refer to ~ for ~.

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.
The following abbreviations apply specifically to this section:

AFDD	Arc Fault Detection Device
ELV	Extra Low Voltage
GLS	general lighting service
IP	international (ingress) protection classification
NUO	Network Utility Operator
PCB	printed circuit board
PIR	passive infrared
SIA	security integration architecture
TPS	tough plastic sheathed
TCF	Telecommunications Carriers' Forum

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC F6/AS1	Visibility in escape routes
NZBC G4/AS1	Ventilation
NZBC G9/AS1	Electricity
AS/NZS 1125	Conductors in insulated electric cables and flexible cord
AS/NZS 1768	Lightning protection
AS/NZS 2201.1	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
AS 2293.1:2005	Emergency escape lighting and exit signs for buildings - System design, installation and operation
AS 2293.3:2005	Emergency escape lighting and exit signs for buildings - Emergency escape luminaires and exit signs
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008.1.2	Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical New Zealand installation conditions
AS/NZS 3100	Approval and test specification-general requirements for electrical equipment
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS 3113	Approval and test specification - Ceiling roses
AS/NZS 3190	Approval and test specification - Residual current devices (current-operated earth-leakage devices)

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AS/NZS 3439.3	Low-voltage switchgear and controlgear assemblies - Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
NZS 4514	Interconnected smoke alarms for houses
NZS 4246	Energy Efficiency - Installing bulking thermal insulation in residential buildings
AS/NZS 5000.2	Electric cables - Polymeric insulated - for working voltages up to and including 450/750v
AS/NZS 60335.1	Household and similar electrical appliances - Safety - General requirements
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance.
AS/NZS 61439.3	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO).
IEC 61643	Components for low voltage surge protection devices

Electricity (Safety) Regulations 2010 (Reprint as at 21 January 2019).
TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.4 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer and supplier documents related to this section are:
~

Manufacturer/supplier contact details:

Company:	~
Web:	~
Email:	~
Telephone:	~

Warranties

1.5 WARRANTY

Warrant the complete electrical installation under normal environmental and use conditions against failure of materials and execution.

1 year:	Warranty period

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

Requirements

1.6 COMPLY

Comply with the Electricity (Safety) Regulations 2010, AS/NZS 3000, AS/NZS 3008.1.2, and TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services for listed and prescribed work and with the utility network operator's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

1.7 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.8 QUALIFICATIONS WORKERS – LICENSED UNDER STATUTE

Workers and supervisors to be appropriately qualified to applicable legislative requirements. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

1.9 QUALIFICATIONS - SECURITY SYSTEM

Installation by an installer licensed under the Private Investigators and Security Guards Act. Installation of all security equipment to comply with AS/NZS 2201.1 Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance.

1.10 CONFIRM SELECTIONS

Confirm selections of all outlet fittings and hardware with the owner in writing before ordering.

1.11 ELECTRICAL CERTIFICATE OF COMPLIANCE

Supply a certificate of compliance (CoC) to the owner, and if required the NUO, as required by the Electricity (Safety) Regulations 2010, prior to connection.

- Arrange for the NUO to inspect before the meter installation, listed work inspection, polarity check and supply becoming live.
- Arrange for an inspector to inspect high risk electrical work as required by regulation 70.

1.12 ELECTRICAL SAFETY CERTIFICATE

Provide an Electrical Safety Certificate (ESC), as required by the Electricity (Safety) Regulations 2010, Reg 74A, to the owner and when required the BCA. To be provided no later than 20 working days after connection and prior to Practical Completion.

Quality control and assurance

1.13 INSPECTIONS

~	~

2 PRODUCTS

2.1 MAINS SUPPLY

Tough plastic sheathed neutral screened cable to AS/NZS 5000.2 and AS/NZS 3008.1.2, with a minimum rating of 60 amps per phase. Include pilot cable where required by network utility company.

2.2 CABLES

Tough plastic sheathed copper conductors to AS/NZS 5000.2, stranded above 1.0mm², and to AS/NZS 3008.1.2. Minimum sizes as below. Increase sizes if the method of installation, thermal insulation, cable length or load will reduce the cable rating below that of the MCB rating, or produce an excessive voltage drop.

Lighting circuits:	Domestic: 1.5mm² on 10 amp MCBs
Lighting circuits:	Commercial: 1.5mm² on 16 amp MCBs
Power circuits:	2.5mm² on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction
	2.5mm² on 16 amp MCBs for domestic insulated construction, or filled cavity
	2.5mm² on 20 amp MCBs for unenclosed or unfilled cavity construction
	2.5mm² on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres
Hot water cylinder circuits:	Single phase: 2.5mm² on 20 amp MCBs
Range/oven/hob circuits:	Single phase: 6mm² high temperature cable on 32 amp MCBs

Heat resistant cable for final connections to all heated appliances, and high temperature cable in ambient conditions that may be above 35°C (roof spaces above insulation etc).

2.3 METER BOX

Proprietary manufactured, zinc plated powder coated metal case, or ABS plastic, with glazed panel door, weatherproof where mounted outdoors, and complete with meter mounting, main switch and fuse.

2.4 DISTRIBUTION BOARD

Flush surface mount boards manufactured to AS/NZS 3439.3 , or AS/NZS 61439.3, and installed in accordance with AS/NZS 3000. Manufactured from engineering grade resin with a glow wire rating of 850°C, complete with neutral and earth busbars, and insulated comb phase bar. Distribution boards to have 20% spare capacity for future additions and alterations.

2.5 CIRCUIT PROTECTION

General requirements including main switch 63A or 100A. Residual current protection 30mA, ensure RCCBs' meet Type A and comply with AS/NZS 3190. MCBs to 4.5kA or 6kA rated.

2.6 SURGE PROTECTION

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Protection for the homes appliances with IEC 61643 Class ll surge protection devices fitted to the switchboard. For variable electronic equipment fit IEC 61643 Class lll surge protection to switched socket outlets.

2.7 WALL BOXES

Standard grid size or equivalent to be manufactured from plastic or metal, with 2 or more gang size to be metal with steel inserts for accessory securing screws. Screw fixed.

2.8 SWITCH UNITS

Single pole switches to be 16 amp minimum rated, double pole or intermediate to be 16 amp minimum rated. All switches to be 230 volt a.c. polycarbonate flushplate units.
Label all switch units that control electrical equipment or special lighting circuits by proprietary engraved switch mechanisms where applicable.
Refer to drawings/schedules for number of switches per unit, dimmer units, neon (indicator or toggle) units and 2 way units.
Refer to SELECTIONS.

2.9 SWITCHED SOCKET UNITS

10 amp, 230 volt flat 3 pin socket outlets fitted with safety shutters and manufactured to AS/NZS 3100, AS/NZS 3112 and AS/NZS 3113, single or multi gang as detailed.

2.10 SWITCH UNITS - PERSON WITH DISABILITIES

In addition to clause SWITCH UNITS above, units shall comply with NZBC G9/AS1, 2.0.1.b) and d).
Refer to SELECTIONS.

2.11 CEILING ROSES

White plastic mounting base with screwed cover, manufactured to AS/NZS 3113. Terminal type. Suspended fittings to have sheathed round flexible cord to AS/NZS 3008.1.2. Refer to SELECTIONS.

2.12 HOT WATER SYSTEM SWITCH

One way 20 amp switch complete with cable clamp for flexible PVC conduit to element enclosure.

2.13 BATTEN HOLDERS

Standard white plastic bayonet cap, with cap angled where wall mounted. Brass liners.

2.14 FIRE & SMOKE ALARM SYSYEM

Refer to SELECTIONS.

2.15 LIGHT FITTINGS

Fluorescent and High Intensity Discharge fittings with low loss control gear and power factor corrected to 0.95 minimum. Control gear suitable for dimming if this is required. All fittings complete with lamps; Incandescent GLS lamps pearl, coiled-coil 230v rated, bayonet cap; Fluorescent triphosphor 2700K; CFL; halogen ELV 12v dichroic reflector with cover glass unless detailed otherwise; integral/non-integral LEDs, reflectors, lenses, heatsinks and drivers - 3,000K to 4,000K, CRI >80, L70.

2.16 RECESSED LIGHT FITTINGS - NON-RESIDENTIAL

Non-residential recessed light fittings to AS/NZS 3000, 4.5.2.3.5:

- Existing fittings or retrofit situations, fittings maybe unmarked.
- New fittings can only be labelled - NON-IC, Do-not Cover, CA 80, CA 90, CA 135, IC, IC-4, and IC-F.

Refer to clause INSULATION & GENERAL CLEARANCES for clearances from insulation and other elements.

2.17 EMERGENCY LIGHT FITTINGS

Emergency escape lighting and exit signs for buildings to AS 2293.3. Exit, recessed, ceiling or wall mounted. Refer to SELECTIONS.

2.18 EXHAUST FANS

Ceiling, wall or duct mounted exhaust fans for ventilation to NZBC G4/AS1, and compliant with AS/NZS 60335.1.

2.19 EXTERIOR LIGHT FITTINGS

Using materials with superior UV protection, impact strength, and addition chemical resistance.
Weather protection minimums:

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- IP54 for protected areas under eaves or verandahs etc.
- IP55 for exposed areas not subject to pressurised water (hoses).
- IP66 for areas subject to pressurised water or major splashing.
- IP67 for inground lights
- IP68 for submerged pool fittings

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Security system

2.20 CONTROL PANEL

Control panel system with a minimum of one installer code, one master code, 6 zones minimum and 6 user codes. The installer to select codes to suit installation.

2.21 DETECTORS

There are two main types of detectors:

- Standard passive infrared sensors: Install in stable environments with no wind flow and no direct bright sunlight.
- Passive infrared/ microwave sensors: Install in area where environmental stability is an issue.

2.22 AUDIBLE DEVICES

Internal sirens can be either a 12V Piezo Siren or a Horn speaker with a sound pressure level of no less than 95dB.
External siren can be either a stainless steel design or have hardened plastic casing. Both designs to be fully weatherproof but not limited to IP66 Rating. The siren box to contain a strobe diffuser in either blue or red. The siren shall contain a horn speaker, 12v speaker or an electronic siren. The external siren box to have both a cover and rear wall tamper mechanism.

2.23 CABLING

Security alarm wiring to NZS/AS 1125 for cables.
Security alarm wiring to be multi stranded and not single stranded, minimum 0.5mm².

2.24 PERIPHERALS

Fit anti-tamper devices to detectors, control panels and equipment housings, programmed to give a tamper indication when the system is unset and a tamper alarm when the system is set.
Standard keypad manufactured of moulded hardened plastic with either a LED or LCD screen, to match the style of the wiring accessories in diameter, colour and aesthetics.

2.25 COMMUNICATIONS

Digital dialler to be built into the PCB of all control panels, with the options for both monitoring and remote dial in windows based software. Digital dialler to comply with all the industry standard communication formats including contact I.D and SIA, and NZ Telepermit certification.
Remote software able to upload / download programming changes and or history events and change status of the security alarm with the ability to be turned off if required.

Fire rated sealers and liners

2.26 FIRE RATED SEALERS AND LINERS

Sealants, collars, wraps, expanding foam, mortars and liners, used to seal around pipe, conduit and sleeve penetrations through fire and acoustic walls and floors. Refer to SELECTIONS for type.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

Installation

3.3 MAIN SUPPLY

Lay underground mains to the NUO requirements. Excavate trench, install cable and marker tape and backfill.

3.4 METER BOX

Fit to meter box manufacturer and Electricity Retailer requirements. Recess into external wall in sheltered area and flash to weatherproof to NZBC E2/AS1 fig 69. Arrange for meter installation and connection.

3.5 DISTRIBUTION BOARD

Fit to AS/NZS 3000 and board manufacturer requirements. Recess into wall or surface mount and ensure fire containment properties of the enclosure are maintained.

3.6 CIRCUIT PROTECTION

Install MCBs at distribution board to AS/NZS 3000 to protect each final sub circuit.

3.7 EARTHING CONDUCTIVE STRUCTURE & MATERIALS

Earth all at risk structural metalwork and conductive building materials to AS/NZS 3000, 5.4.6, and the Electricity (Safety) Regulations 2010.
If they form part of the building, this includes:

- Structural steel frames or members
- Light steel framing
- Exposed conductive materials, like metal sink/tub or vanity benches etc, with attached electrical units or equipment

3.8 EQUIPOTENTIAL BONDING

Equipotential Bond extraneous conductive parts together and to the electrical installation earthing system to AS/NZS 3000, 5.6, and the Electricity (Safety) Regulations 2010 and the fitting manufacturer requirements.
If they form part of the building, this includes:

- Conductive water piping (including tap etc) and exposed related connected conductive surfaces (like metal sink benches or metal cladding etc). Not required where isolated by non-conductors (plastic pipe etc) from the mass of earth.
- Other conductive piping (not earthed by other means) and exposed related connected conductive surfaces.
- Concrete reinforcing - for floor or wall forming part of a room with a shower or bath, or the shell and surround of a swimming/spa pool
- Built-in Swimming pool and spa pool - exposed conductive parts of electrical equipment, as well as exposed conductive, fixtures, fittings and pool structures within 1.25m of pool edge

3.9 MAIN EARTH

Provide a plastic toby box to contain and protect the earth electrode. Fix the connecting earth wiring closely and securely against wall surfaces.

3.10 ARC FAULT DETECTION DEVICE (AFDD)

To AS/NZS 3000 clause 2.9, AFDD on all final sub-circuits not exceeding 20A.

3.11 EARTH LEAKAGE PROTECTION

Install RCD protection to AS/NZS 3000.

3.12 SURGE PROTECTION

Install surge protection devices to manufacturer requirements and in accordance with AS/NZS 3000 and AS/NZS 1768. When fitting IEC 61643 Class ll protection at the switchboard, protect the device by a dedicated MCB.

3.13 RCD - NON-RESIDENTIAL INSTALLATIONS

Install 30mA RCD Type II protection at the switchboard to suit location and use, to AS/NZS 3000.

3.14 RCD - AFDD COMBINED - NON-RESIDENTIAL INSTALLATIONS

Install a 30mA RCD - AFDD combined device (RCD Type II) at the switchboard for all final sub-circuits not exceeding 20A, to suit location and use, to AS/NZS 3000, (2018, 2.6 & 2.9). Protect over 20A to 32A final sub-circuits with separate RCD and to AS/NZS 3000.

3.15 RCD - SPECIFIC INSTALLATIONS

Install fixed wired RCD protected outlets (SRCD) in the following higher risk areas:

- Wet areas: bathrooms, laundries, kitchens.
- Near pools and water features.

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- Where intended for use with cleaning equipment.
- Hand-held tools subject to movement in use, i.e. work-shops, garages.

3.16 SET-OUT

The position of outlets and equipment shown on drawings is indicative of requirements. Confirm documents and site conditions are not in conflict with other services or features. Resolve conflicts and discrepancies before proceeding with work affected. Confirm on site the exact location, disposition and mounting heights of all outlets, fittings, equipment, penetrations, and use of exposed wiring. Fix outlet items level, plumb and in line.

3.17 CABLING

Install wiring systems to AS/NZS 3000. All cabling run concealed. No TPS cable laid directly in concrete. Locate holes in timber framing for the passage of cables at the centre line of the timber member. Install cable in conduits where required to pass through concrete or underground. In walls run cabling horizontally and vertically in straight lines. In ceilings either run cabling along ceiling framing or attached to catenary wires. Clip cabling to ceiling framing/catenary wires.

3.18 CABLING CIRCUITS

Install all circuits with the appropriately rated cable and circuit protection. Install with a maximum of 8 light switch units or 4 double or single switched socket units on any circuit. Minimum 2 lighting circuits per floor. Separate circuits for all electric heating appliances. Kitchen sockets to be on at least two different circuits.

3.19 WALL BOXES

Mount flush in cavity construction size to fit products selected. Fix vertically mounted wall boxes to studs. Screw fix horizontally mounted switched socket outlet wall boxes to solid blocking or nogs. Fix switch panel wall boxes to solid blocking.

3.20 SWITCHES AND SWITCHED SOCKET UNITS

Fit all switch units and socket units to the manufacturers requirements with heights and mounting directions as indicated in SELECTIONS.

3.21 SWITCHES AND SWITCHED SOCKET UNITS - FOR PERSON WITH DISABILITIES

Fit all switch units and socket units to the manufacturers requirements with heights (& mounting direction) and location to NZBC G9/AS1 and SELECTIONS.

3.22 LIGHT FITTINGS

Install light fittings in locations and at heights specified and confirmed by the owner, in accordance with the fitting manufacturer requirements.

3.23 EXTRA LOW VOLTAGE LIGHTING

Use electronic, transformers (halogen) or drivers (LED) for ELV lamps, one transformer/driver per lamp. Locate to manufacturer requirements and as close as practicable to the lamp. Ensure transformers/drivers and rear of light fittings are adequately ventilated and appropriately clear of any building elements, to AS/NZS 3000.

3.24 INSULATION & GENERAL CLEARANCES

Some electrical and mechanical services, and equipment may need to have a gap to insulation and some building elements. The gaps should be to the NZS 4246 based tables below or to the equipment manufacturers requirements if they require larger gaps. Smaller gaps to manufacturers requirements can be used for equipment specifically manufactured with heat shielding or similar (excludes light fittings).

Installed gap not to be more than 50mm bigger than the required gap.
The following tables are subject to:

- The requirements of NZS 4246 for insulation.
- The insulation is exposed to the source of heat or equipment etc.
- Insulation, has passed the needle flame test to AS/NZS 60695.11.5 and/or is non-combustible.
- Gaps to hot surfaces may have to be increased with non-compliant insulation and plastic/polymeric type insulation (EPS, XPS, PIR, etc), check with insulation manufacturer.
- Gaps to hot surfaces may be able to be reduced with non-combustible insulation, check with equipment manufacturer.
- "Secure insulation" if required means, glue, mechanical fix, or provide fixed barriers at gap edge of insulation to hold in place. Rigid or semi rigid insulation may only need a firm friction fit (secure loose pieces).

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- Loose fill insulation will require fixed barriers to NZS 4246 to maintain gaps.

3.25 LIGHT FITTINGS TO INSULATION

Type of fitting	Minimum insulation clearance	Comments
Recessed, marked NON-IC, or unmarked	100mm (increase if over 100W)	To NZS 4246. NON-IC fittings and new or old unmarked & unknown fittings, and/or insulation. Insulation to be secured.
Recessed, CA 80, CA 90, or CA 135.	Abut fittings	To NZS 4246. Do not cover the fittings.
Recessed, IC, IC-F, or IC-4.	Abut & cover fittings.	To NZS 4246. Ensure insulation complies.
Recessed, marked Do-Not-Cover	Manufacturer clearances	To NZS 4246. Do not cover the fittings.
Independent control gear	Place on top of insulation & 50mm from fittings	To NZS 4246. If not on top allow 50mm clearance to insulation, do not cover. Includes, transformers, ballasts & drivers etc.
Surface fittings not exposed to insulation	Nil	To NZS 4246. Where surface fittings are isolated from insulation by appropriate linings. Excludes high heat fittings.
Surface fittings & exposed insulation	200mm	To NZS 4246. This is exposed insulation to any part of the exposed fitting & bulb/tube (e.g. exposed light in an unlined basement). Insulation to be secured.

3.26 RECESSED LIGHT FITTINGS TO COMBUSTIBLE BUILDING ELEMENTS

Type of recessed fitting	Minimum building element clearance **	Comments
Marked NON-IC, or unmarked, ≤100W	100mm, vertical & horizontal	To AS/NZS 3000:2018
Marked NON-IC, or unmarked, >100W	200mm, vertical & horizontal	To AS/NZS 3000:2007
CA 80, CA 90 or CA 135	100mm, vertical & horizontal	To AS/NZS 3000:2018
IC, IC-F or IC-4	100mm, horizontal NA, vertical	To AS/NZS 3000:2018 To be NA vertical, fitting must be covered by insulation. If not covered use 100mm clearance.
Marked Do-Not-Cover	100mm, vertical & horizontal	To AS/NZS 3000:2018. Manufacturer clearances if greater than 100mm

****** Combustible building elements exclude metal elements, but include timber framing or other timber based elements, and normal linings etc. Highly flammable materials & those likely to melt will need more clearance.

3.27 INBUILT RECESSED HOT APPLIANCES TO INSULATION

Appliance	Minimum insulation clearance	Comments
Electrical heaters	Manufacturer clearances	To NZS 4246.
Electrical heaters	100mm	Manufacturer clearances not known. To NZS 4246. Clearance may be able to be reduced with non-combustible insulation. Insulation to be secured.

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Heat producing appliances & equipment	Manufacturer clearances	To NZS 4246.
Heat producing appliances & equipment	50mm	Manufacturer clearances not known. To NZS 4246. Clearance may be able to be reduced with non-combustible insulation. Insulation to be secured.

Note - Appliances and equipment excludes cables, junction boxes, light switches & power sockets etc

3.28 EXTRACTS, VENTS & ROOF UNDERLAY TO INSULATION

Appliance	Minimum insulation clearance	Comments
Ducted fan motors	50mm	To NZS 4246. Includes ducted rangehoods, extractors etc. Applies to the motor unit and electrical enclosures (not the ducts).
Ducted fan ducts	Abut	To NZS 4246. Excludes motor unit and electrical enclosures.
Unducted fan motors usually discharging to ceiling space	200mm	To NZS 4246. Includes unducted, rangehoods, extractors etc, discharging into roof space. To prevent debris falling into motor. Clearance may be able to be reduced, by providing a fixed barrier around the vent.
Roofing material/underlay	25mm	To NZS 4246. Maintain clearance from underside of roofing or flexible roofing underlay, to prevent wicking.

3.29 EMERGENCY LIGHTING

Emergency escape lighting and exit signs for buildings to AS 2293.1 and NZBC F6/AS1. Fit emergency light fittings to manufacturer specifications. Refer to plans for position of fittings.

3.30 ELECTRIC HOT WATER SYSTEM

For storage heaters, wire as a separate circuit through a wall-mounted isolating switch, with the cable from switch to element encased in flexible PVC conduit, clamp fixed at each end. Hot water cylinders, thermostats and 3000 watt element supplied and fitted under the hot and cold water system section.

3.31 ELECTRIC POWERED FITTINGS AND EQUIPMENT

Install and wire fittings and equipment to individual fittings and equipment manufacturer requirements. Refer to the drawings for required layouts and locations for equipment. Refer to SELECTIONS for schedules of fittings.

3.32 BATHROOM ELECTRICAL FIXTURES

Install all electrical fixtures. Connect the following bathroom and toilet electrical items:

- Heated towel rails: Install to manufacturers requirements and installed in accordance with AS/NZS 3000
- Mirror demisters: Locate centrally above the wash hand basin(s). Connect wiring to room lighting unless specified otherwise.
- Exhaust fans: Install exhaust fans to manufacturer requirements. Installed in accordance with AS/NZS 3000 and NZBC G4/AS1.

3.33 OUTDOOR/EXTERIOR SERVICES

Install all wiring systems in accordance with AS/NZS 3000 and in accordance with the manufacturer recommendations:
Provide circuits and connections for exterior installations, including ELV 12/24 Volt path lighting and electronic irrigation systems. Refer to drawings for connection points. Where underground, ensure appropriate protection, such as thickness of sheathing, conduit, depth of cabling, and proximity to other services.

Use the appropriate rated fittings for power control and power supply. Weather protected switches and sockets to IP56. Install to manufacturer specifications using recommended fittings and sealants to maintain the products integrity.

Earth leakage protection to be provided for in areas where there is increased risk to human safety in the form of either RCDs at the distribution board, or socket outlet. RCDs are recommended for visible awareness of protection.

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3.34 LABELLING

Include label under each controller, switch and circuit breaker on distribution boards. Include a warning notice if light dimmers are used in the installation. List the rating of each circuit.

Security system

3.35 SECURITY SYSTEM

Install to the system manufacturer requirements, control panel, detectors and associated equipment fitted neatly and without damage to surrounding finishes. Installation of security equipment to AS/NZS 2201.1 Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance. All 230v mains power connections to the security panel are to be in accordance with AS/NZS 3000. The 230V power is to be switched using a dedicated single gang Isolator switch or similar.

Fire rated sealers and liners

3.36 SEAL ALL PENETRATIONS

Seal all penetrations, including in and around conduits and sleeves, in accordance with manufacturer instructions. For fire and/or acoustic rated elements, maintain the rating with the seal systems.

3.37 PROVIDE CABLE SLEEVES

Provide PVC sleeves formed from pipe sections, unless fire and/or acoustic systems require sleeves for other building elements and/or different material for the sleeve.

Completion & Commissioning

3.38 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

3.39 COMPLETION - TESTS & CERTIFICATION

Refer to 1270 CONSTRUCTION for general test and certification requirements at completion.

~	~

3.40 COMMISSIONING - TESTS & CERTIFICATION

Refer to 1270 CONSTRUCTION for general test and certification requirements for commissioning.

~	~

4 SELECTIONS

Materials

4.1 METER BOX

Location:	~
Brand / type:	~

4.2 DISTRIBUTION BOARD

Location:	~
Brand / type:	~
MCB:	~
RCCB:	~
RCBO:	~
Surge protectors:	~
Modular contactors:	~
Main switch:	~
Timers	~

4.3 FIRE & SMOKE ALARM SYSTEM

Refer to appropriate fire and smoke alarm section:
~

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4.4 SECURITY SYSTEM

Location	Brand / type	Detector
~	~	~

Fire rated sealers and liners

4.5 FIRE RATED SEALERS AND LINERS

Location: ~
Manufacturer: ~
Brand/type: ~

Outlets - fittings

4.6 INTERIOR SWITCHES AND SWITCHED SOCKET UNITS

Item	Brand / type
Switch / socket outlets:	~
Coverplate colour:	~
Switch module colour:	~

Item	Brand / type
Light dimmers:	~
Timer switch:	~
Push button switch:	~
Symbol switch:	~
PIR sensor switch:	~
Toggle switch:	~
Waterproof switches:	~

Item - RCD	Brand / type
Socket outlet:	~
Shaver outlet:	~
Safety switch:	~

4.7 INTERIOR SWITCHES AND SWITCHED SOCKET UNITS - PERSONS WITH DISABILITIES

In addition to clause INTERIOR OUTLETS, unit set out shall comply with NZBC G9/AS1, 2.0.1.

Item	Height to centre of unit	Orientation	Location
Switch	1000mm above FFL	vertical	Refer to drawings
Switch narrow	1000mm above FFL	vertical	Refer to drawings
Socket outlet	600mm above FFL	horizontal	Refer to drawings
Socket outlet	150mm above FFL	horizontal	Refer to drawings

Item:	Brand / Type
Switch / socket outlets:	~
Coverplate colour:	~
Switch module colour:	~

Note:

- Light switches to be horizontally aligned with door handles.
- Bedrooms to have at least one light switched from bedside.
- Socket outlets shall be at least 500mm from internal corners.

4.8 INTERIOR LIGHT FITTINGS

Fitting	Brand / type
Pendant lights:	~
Pendant cord:	~
Ceiling lights:	~
Recessed ceiling lights:	~
Recessed wall lights:	~

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Recessed floor lights:	~
Wall lights:	~
Spotlights:	~
Fluorescent lights:	~
Strip lights:	~
Emergency lights:	~
Transformers:	~
LED Drivers:	~

4 9 EXTERIOR LIGHT FITTINGS

Fitting	**Brand / type**
Wall lights:	~
Bulkhead lights:	~
Spotlights:	~
Recessed lights:	~
Strip lights:	~
Floodlights:	~
Pole lights:	~
Security lights:	~
Security light sensors:	~
Transformers:	~
LED Drivers:	~

4 10 MISCELLANEOUS ELECTRICAL ITEMS

Item	**Brand / type**
Door bell system:	~
Extractor fan:	~
Water heater:	~

4 11 BATHROOM FANS AND HEATERS

Location	**Brand / type**
Bathroom / ensuite-Heating:	~
Bathroom / ensuite-Extract:	~

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PRODUCER STATEMENT – PS1
DESIGN

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BUILDING CODE CLAUSE(S): H1/VM2
ISSUED BY: Reshape Consulting
(Engineering Design Firm)
TO: Strata Studio LTD
(Owner/Developer)
TO BE SUPPLIED TO: Kaipara District Council
(Building Consent Authority)
IN RESPECT OF: H1 VM2 Report
(Description of Building Work)
AT: 7 Eagle Ray Road, Mangawhai
(Address, Town/City)
LEGAL DESCRIPTION: **N/A** ☑

We have been engaged by the owner/developer referred to above to provide *(Extent of Engagement)*:
7 Eagle Ray Road, Mangawhai - H1 VM2 Report
In respect of the requirements of the Clause(s) of the Building Code specified above for All , as specified in the Schedule, 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 *(Verification method/acceptable solution)* H1/VM2 and/or;
- ☐ Alternative solution as per the attached Schedule.

The proposed building work covered by this producer statement is described on the drawings specified in the Schedule, together with the specification, and other documents set out in the Schedule.

On behalf of the Engineering Design Firm, and subject to:

- Site verification of the following design assumptions: The services and building are built as per the design documents .
- All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that:

- the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the Schedule, will comply with the relevant provisions of the Building Code and that;
- the persons who have undertaken the design have the necessary competency to do so.

I recommend the CM 1 level of **construction monitoring**.

I, *(Name of Engineering Design Professional)* Anthony James Broatch , am:

- ☑ Auckland Council Author Register No. 122872, CIBSE Chartered Building services engineer. Membership no. 059682

and hold the following qualifications BE (Mech) Is a member of engineering New Zealand

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than $200,000
The Engineering Design Firm is not a member of ACE New Zealand.

SIGNED BY *(Name of Engineering Design Professional)*: Anthony James Broatch
(Signature below):

ON BEHALF OF *(Engineering Design Firm)*: Reshape Consulting Date: 10/06/2025

Note: This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Engineering Design Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, 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.

SCHEDULE to PS1

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

H1 Modelling Method Eagle Ray Road 09062025.pdf

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GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website
https://www.engineeringnz.org/engineer-tools/engineering-documents/producer-statements/

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with part of the reasonable grounds necessary for the issue of a Building Consent or a Code Compliance Certificate, without necessarily having to duplicate review of design or construction monitoring undertaken by others.

PS1 DESIGN Intended for use by a suitably qualified independent engineering design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 DESIGN REVIEW Intended for use by a suitably qualified independent engineering design review professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 CONSTRUCTION Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011[2]

PS4 CONSTRUCTION REVIEW Intended for use by a suitably qualified independent engineering construction monitoring professional who either undertakes or supervises construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Engineering Professional

This statement is made by an engineering firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent engineering professional".

Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard practice for the relationship between the BCA and the engineering firm.

Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers[3]). The building Consent Authority is encouraged to require that the service to be provided by the engineering firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Refer Also:

1 Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
2 NZIA Standard Conditions of Contract SCC 2011
3 Guideline on the Briefing & Engagement for Consulting Engineering Services (ACE New Zealand/Engineering New Zealand 2004)
4 PN01 Guidelines on Producer Statements

www.acenz.org.nz
www.engineeringnz.org

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7 Eagle Ray Road, Mangawhai

H1 Compliance Report

Revision: 2
Issued Date: 02/07/2025
Created By: Kate Martin

Revision	Issue Date	Issued to	Reviewed By
0	05/06/2025	Strata Studio Ltd	Anthony Broatch
1	09/06/2025	Strata Studio Ltd	Anthony Broatch
2	02/07/2025	Strata Studio Ltd	Anthony Broatch

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H1 Compliance Report

Executive Summary

As part of this report, the proposed building constructions have been reviewed and the required changes stated to achieve compliance with the New Zealand Building Code (NZBC) Clause H1 (thermal envelope) for the commercial property at 7 Eagle Ray Road, Mangawhai.

The below guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required however retain material thicknesses, thermal breaks, and thermal resistances.

With the R values stated below, the proposed design for the building will comply with H1/VM1, modelling method of the New Zealand Building code for thermal efficiency.

For the reference building the minimum construction R-values, in H1/VM1 Table 2.1.2.2B, have been used for climate zone 1. The reference model excludes all solar shading.

Modelling Software and Version

The modelling software used for this H1/VM2 report was Design Builder version 7.0.2.00.2006. The Design Builder software has been documented according to the ANSI/ ASHRAE Standard 140 procedure, and the software has passed the ANSI/ASHRAE Standard 140 test. Design Builder has also been tested against the BESTEST and pass the BESTEST.

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H1 Compliance Details

Thermal Envelope Boundary

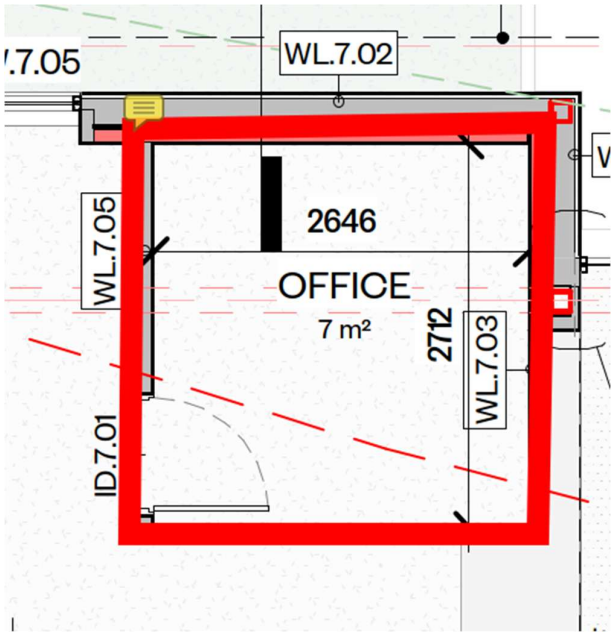

Figure 1: Ground floor plans highlighting the edge of the thermal envelope in red.

Building Area Summary Tables

Walls, Windows, and Doors

Orientation	Total Wall Area (m2)	Proposed Building Glazed Area (m2)	Proposed Building wall Area (m2)	Proposed Building WWR	Reference Building Glazed Area (m2)	Reference Building wall Area (m2)	Reference Building WWR
East	8.07	8.07	0.00	0.00	0.00%	2.70	5.37
North	7.89	7.89	0.00	0.00	0.00%	3.24	4.65
South	7.89	4.65	3.24	0.00	41.04%	3.24	4.65
West	8.07	6.30	0.00	1.77	0.00%	0.00	8.07
Total	31.92	26.91	3.24	1.77	10.15%	9.18	22.74
	SHGC	**0.59**			**SHGC**	**0.80**	

Roof Area

Type	Total Area (m^2) enclosing thermal envelope
Total Roof Area	**7.00**

Floor Area

Type	Floor Type Area (m^2)
Total Floor Area	**7.00**

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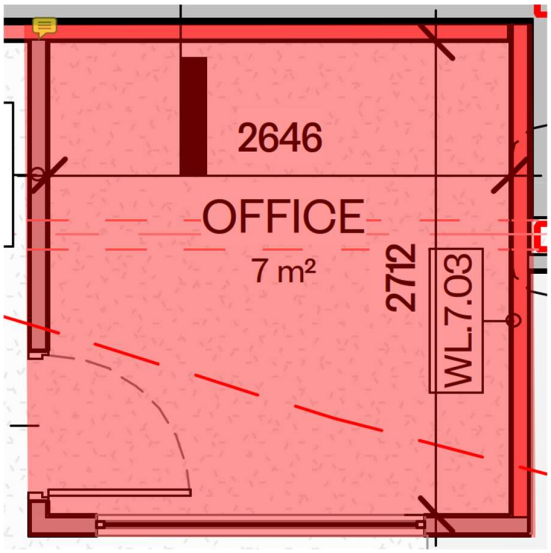

Figure 4: Slab floor area highlighted in red

Overview and Building Details

The New Zealand Building code H1/VM1 modelling method has been used as flexibility in the building constructions is desired.

Reference Building Heat Loss

The sum of the calculated annual heating load and annual cooling load of the proposed building shall not exceed that of the reference building. The reference building shall have construction R-values complying with the below values from the NZBC H1/VM1 document.

TABLE 2.1.2.2B: Reference building construction R-values for building elements not containing embedded heating systems

Paragraph 2.1.2.2 b)

Building element	Construction R-values (m²·K/W) [1]					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Roof[2]	R6.6	R6.6	R6.6	R6.6	R6.6	R6.6
Wall	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0
Floor *Slab-on-ground* floors	R1.5	R1.5	R1.5	R1.5	R1.6	R1.7
Floors other than *slab-on-ground*	R2.5	R2.5	R2.5	R2.8	R3.0	R3.0
Windows and doors[3]	R0.46[3]	R0.46[3]	R0.46	R0.46	R0.50	R0.50
Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62

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In accordance with NZBC H1/VM1 the following building modifications shall be made for the reference building:

1. The glazing area of the reference building shall be either 30% of the total wall area or, if the glazing of the proposed is less than 30%, the same as the proposed building.
2. In accordance with section D.2.3, if there are any skylights, the skylight area in the reference building shall be set to zero.
3. In accordance with section D.2.4, The opaque door area that is no more than either 6 m2 or 6% of the total wall area (whichever is greater) shall have the same construction R-value as the reference building windows (or higher at the designer's discretion); and any remaining opaque door area shall have the same construction R-value as the reference building wall.

All space conditioning and internal load data are in accordance with NZBC H1/VM1.

Given the information stated above the **reference building heating and cooling energy use must not exceed 1276 kWh.**

Proposed Building R Values and Construction Details

The following building thermal construction must be used in the proposed building. The below guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required however retain material thicknesses, thermal breaks, and thermal resistances.

The below R values have been obtained from manufacturers' product data sheets, NZS 4214: 2006 (Methods of determining the total thermal resistance of parts of the building, and H1/AS1.

Roof

Element	R-Value ($m^2 \cdot K/W$)
External surface resistance	0.03
20mm Eco Ply	0.15
290x45mm timber floor joists @ 400mm crs with R2.60 insulation 110mm between joists with airgap	2.57
13mm Plasterboard	0.06
Internal surface resistance	0.09
Total Construction R-value	**2.90**

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Wall

Wall Type 1 – WL.7.02

Element	R-Value (m²·K/W)
External surface	0.03
9mm James Harie AXON panel with plaster over top	0.04
200/18 DHS purlins @ 1m crs max	0.00
Vapour barrier	0.01
20mm cavity battens @ 400mm crs	0.16
92x34 steel framing system @ 400mm crs with R 2.8 90mm insulation between framing	1.03
13mm plasterboard	0.06
Internal surface	0.09
Total Construction R-value	**1.42**

Wall Type 2 -WL.7.03

Element	R-Value (m²·K/W)
External surface	0.03
13mm plasterboard	0.06
90x45mm timber framing @ 600mm crs, nogs @ 800mm crs with R2.80 insulation between framing	2.01
13mm plasterboard (into still air)	0.11
Internal surface	0.09
Total Construction R-value	**2.30**

Wall Type 3 -WL.7.05

Element	R-Value (m²·K/W)
External surface	0.03
13mm plasterboard	0.06
92x34mm steel framing @ 600mm crs, nogs @ 800mm crs with R2.80 insulation between framing	0.91
13mm plasterboard (into still air)	0.11
Internal surface	0.09
Total Construction R-value	**1.20**

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Windows

Element	Minimum overall system (Frame + Glass) R-Value ($m^2 \cdot K/W$)
The windows have the minimum requirements: • Aluminium Frame • Medium Low E Double glazing Minimum overall system (Frame + Glass) R value of 0.33	0.33
Total Window R value ($m^2 \cdot K/W$)	**0.33**
Solar Heat Gain Coefficient	**0.59**
Visible Light Transmittance	**0.80**

Floor

Floor – Slab on grade

When calculating the floor, the full building perimeter is considered in the calculations as it effects the boundary heat loss at the slab junction.
Total Floor Area= 567.00m²
Perimeter Length for other walls=97.00m
Wall thickness: 435mm
No under slab insulation

Total Construction R-value	**2.00**

Proposed building notes

1. The above guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required for buildability however retain material thicknesses, thermal breaks, and thermal resistances.
2. The drawings must be updated with the above details.
3. Insulation in cavities must be fixed to prevent sagging.

Proposed Building Heat Loss

Give the information stated above the **proposed building heating and cooling energy use is 428 kWh.**

Mechanical Ventilation Systems

Although NZBC G4, E2, and E3 are not reviewed as part of this report, as a general note, continuous ventilation (exhaust or outdoor air fans) will reduce the risk of condensation occurring. Especially where roofing or walls have non breathable cladding and no vented cavity/roof space. Condensation risk of the buildups above should be reviewed at the designers discretion and any requirements from the designer should be sent back to Reshape to be included in this report.

Venting of cavities and compliance with NZBC E2 and E3

Although E2 and E3 are not reviewed as part of this report, the building designer should review construction to ensure there are no closed-in construction spaces where the accumulation of moisture could occur. Constructions should be provided with adequate ventilation at the designers discretion and any requirements from the designer should be sent back to Reshape to be included in this report.

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Use of Alternative Products

Alternative products may be used provided they have the same thermal resistance values as those stated and for glazing have the same solar heat gain coefficients.

Where systems are changed, the total system thermal resistance must be the same as the total thermal resistance as stated above. Alternative details must be submitted to Reshape Consulting for approval.

Note: Although condensation is not reviewed as part of this report, when modifying constructions details, care should be taken not to cause thermal bridging or creating systems that might cause condensation.

Conclusion

The proposed building heating and cooling energy use is 428 kWh and the reference building heating and cooling energy is 1276 kWh.

As the proposed building's heating and cooling energy is less than the reference building the building complies with the building code.

With the R values stated above the current design complies with H1/VM1, of the New Zealand Building code for thermal efficiency. The minimum R values should be stated on the drawings.

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7 Eagle Ray Road, Mangawhai

H1 Compliance Report

Revision: 1
Issued Date: 09/06/2025
Created By: Kate Martin

Revision	Issue Date	Issued to	Reviewed By
0	05/06/2025	Strata Studio Ltd	Anthony Broatch
1	09/06/2025	Strata Studio Ltd	Anthony Broatch

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H1 Compliance Report

Executive Summary

As part of this report, the proposed building constructions have been reviewed and the required changes stated to achieve compliance with the New Zealand Building Code (NZBC) Clause H1 (thermal envelope) for the commercial property at 7 Eagle Ray Road, Mangawhai.

The below guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required however retain material thicknesses, thermal breaks, and thermal resistances.

With the R values stated below, the proposed design for the dwelling will comply with H1/VM2, modelling method of the New Zealand Building code for thermal efficiency.

For the reference building the minimum construction R-values, in H1/VM2 Table 2.1.2.2B, have been used for climate zone 1. The reference model excludes all solar shading.

Modelling Software and Version

The modelling software used for this H1/VM2 report was Design Builder version 7.0.2.00.2006. The Design Builder software has been documented according to the ANSI/ ASHRAE Standard 140 procedure, and the software has passed the ANSI/ASHRAE Standard 140 test. Design Builder has also been tested against the BESTEST and pass the BESTEST.

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H1 Compliance Details

Thermal Envelope Boundary

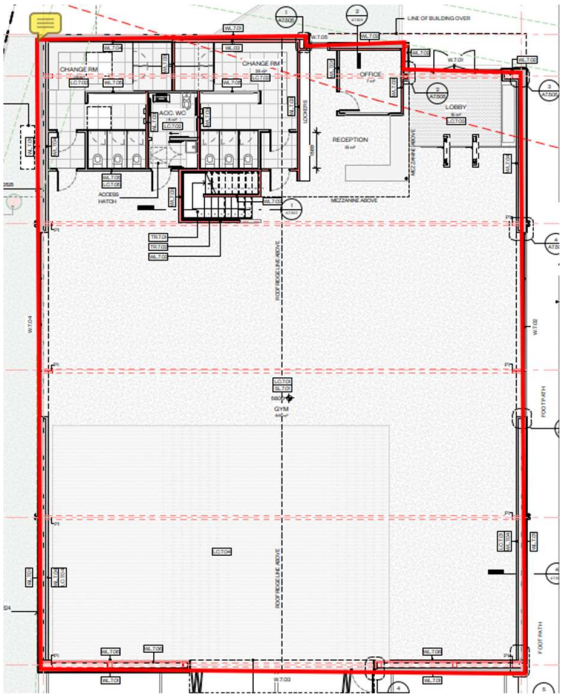

Figure 1: Ground floor plans highlighting the edge of the thermal envelope in red.

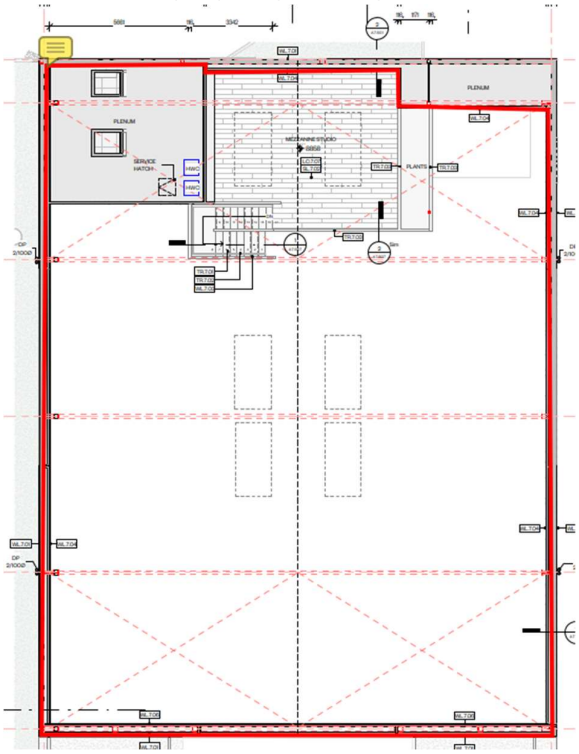

Figure 2: First floor floor plans highlighting the edge of the thermal envelope in red.

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Building Area Summary Tables

Walls, Windows, and Doors

Orientation	Total Wall Area (m2)	Proposed Building Glazed Area (m2)	Proposed Building wall Area (m2)	Proposed Building WWR	Reference Building Glazed Area (m2)	Reference Building wall Area (m2)	Reference Building WWR
East	115.00	22.8	92.20	19.83%	22.80	92.20	19.83%
North	110.06	14.02	96.04	12.74%	14.02	96.04	12.74%
South	109.84	24.00	85.84	21.85%	24.00	85.84	21.85%
West	112.42	22.80	89.62	20.28%	22.80	89.62	20.28%
Total	447.32	83.62	363.70	18.69%	83.62	363.70	18.69%
	SHGC	**0.77**			**SHGC**	**0.80**	

Roof Area

Type	Total Area (m^2) enclosing thermal envelope
Total Roof Area	591.00

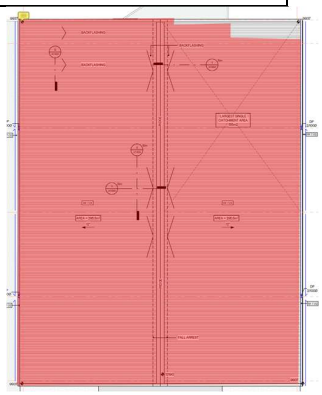

Figure 3: Total Roof area highlighted in red

Floor Area

Type	Floor Type Area (m^2)
Total Floor Area	**567.00**

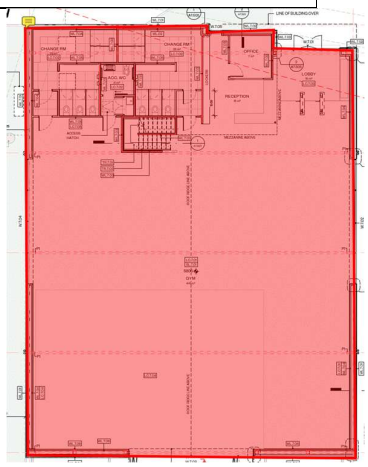

Figure 4: Slab floor area highlighted in red

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Overview and Building Details

The New Zealand Building code H1/VM2 modelling method must be used as flexibility in the building constructions is desired and the glazing area is over 50%.

Reference Building Heat Loss

The sum of the calculated annual heating load and annual cooling load of the proposed building shall not exceed that of the reference building. The reference building shall have construction R-values complying with the below values from the NZBC H1/VM2 document.

TABLE 2.1.2.2B: Minimum construction R-values for building elements not containing embedded heating systems

Paragraph 2.1.2.2 a)

Building element	Construction R-values (m²·K/W) [1]					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Roof [2]	R3.5	R4.0	R5.0	R5.4	R6.0	R7.0
Wall	R2.2	R2.4	R2.7	R3.0	R3.0	R3.2
Floor	R2.2	R2.2	R2.2	R2.4	R2.5	R2.6
Windows and doors	R0.33	R0.33	R0.37	R0.37	R0.40	R0.42
Skylights	R0.42	R0.42	R0.46	R0.46	R0.49	R0.51

In accordance with NZBC H1/VM2 the following building modifications shall be made for the reference building:

1. The glazing area of the reference building shall equal that of the proposed building unless the proposed building has glazing area which exceeds 50% of the total wall area, in which case the reference building shall use a glazing area of 50% of the total wall area.
2. Skylights and roofs for the reference building shall be modelled such that the total R-value of the roof is equivalent to a roof meeting the requirements specified in Table 2.1.2.2.B
3. In accordance with section D.2.6, the reference building, windows and doors that are part of the thermal envelope shall be modelled with construction R-values as specified in Table 2.1.2.2B.

All space conditioning and internal load data are in accordance with NZBC H1/VM2.

Given the information stated above the **reference building heating and cooling energy use must not exceed 15,410 kWh.**

Proposed Building R Values and Construction Details

The following building thermal construction must be used in the proposed building. The below guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required however retain material thicknesses, thermal breaks, and thermal resistances.

The below data has been obtained from manufacturers' product data sheets and from NZS 4214: 2006 (Methods of determining the total thermal resistance of parts of the building.

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Roof

Element	R-Value (m²·K/W)
External surface resistance	0.03
Longrun roofing with safety mesh and building paper	0.01
40mm timber thermal break above steel purlins with airgap in between timber thermal break 200/18 DHS purlins @ 1m crs max with 230mm R 6.00 insulation between purlins and a 10mm airgap above. Insulation held up with safety mesh	3.82
Internal surface resistance	0.09
Total Construction R-value	**3.95**

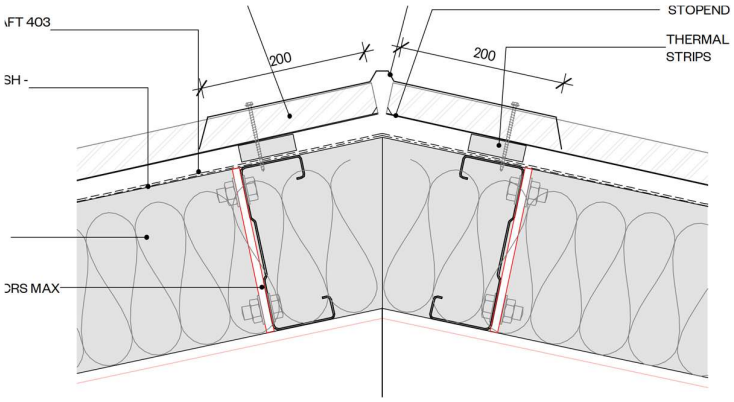

Figure 5: Roof build up

Wall

Wall Type 1

Element	R-Value (m²·K/W)
External surface	0.03
Longrun steel	0.00
200/18 DHS purlins @ 1m crs max	0.00
130mm airgap	0.16
92x34 steel framing system @ 600mm crs with R 2.8 90mm insulation between framing	1.09
13mm plasterboard	0.06
Internal surface	0.09
Total Construction R-value	**1.43**

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Wall Type 2

Element	R-Value (m²·K/W)
External surface	0.03
9mm James Hardie Axon Panel with plaster	0.04
20mm Cavity battens with vented cavity @ 400mm crs	0.08
Building paper	0.09
200/18 DHS GIRTS @ 1m crs max	0.00
92x34 steel framing system @ 600mm crs with R 2.8 90mm insulation between framing	1.09
13mm plasterboard	0.06
Internal surface	0.09
Total Construction R-value	**1.48**

Windows

Element	Minimum overall system (Frame + Glass) R-Value (m²·K/W)
The windows have the minimum requirements: • Aluminium Frame • Medium Low E Double glazing Minimum overall system (Frame + Glass) R value of 0.33	0.33
Total Window R value (m²·K/W)	**0.33**
Solar Heat Gain Coefficient	**0.59**
Visible Light Transmittance	**0.80**

Floor

Floor – Slab on grade

Total Floor Area= 567.00m²
Perimeter Length for other walls=97.00m
Wall thickness: 435mm
No under slab insulation

Total Construction R-value	**2.00**

Proposed building notes

1. The above guidance is based on thermal insulating value and not on durability, water tightness, condensation, or constructability. The proposed construction should be reviewed and modified as required for buildability however retain material thicknesses, thermal breaks, and thermal resistances.
2. The drawings must be updated with the above details.
3. Insulation in cavities must be fixed to prevent sagging.

Proposed Building Heat Loss

Give the information stated above the **proposed building heating and cooling energy use is 15,178 kWh.**

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Summary

The proposed building heating and cooling energy use is 15,178 kWh and the reference building heating and cooling energy is 15,410 kWh.

As the proposed building's heating and cooling energy is less than the reference building the building complies with the building code.

H1 Compliance Details - HVAC System

The HVAC system must comply with H1/VM3

TABLE 5.2.1.1: Ductwork and fittings – Minimum insulation R-value

Paragraph 5.2.1.1

Location of ductwork and fittings	Minimum insulation R-value (m²·K/W)
Within an *air conditioned space*	1.2
Where exposed to direct sunlight	3.0
All other locations	2.0

As a guide, the outdoor air ductwork inside the building must be 40mm externally or internally lined the system must be able to be controlled by the occupants as a general.
Continuous ventilation (exhaust or outdoor air) will reduce the risk of condensation occurring.

Ventilation

Although not reviewed as part of this report, as a general note, continuous ventilation (exhaust or outdoor air) will reduce the risk of condensation occurring. Especially where roofing or walls have non breathable cladding and no vented cavity/roof space.

Use of Alternative Products

Alternative products may be used provided they have the same thermal resistance values as those stated and for glazing have the same solar heat gain coefficients.

Where systems are changed, the total system thermal resistance must be the same as the total thermal resistance as stated above. Alternative details must be submitted to Reshape Consulting for approval.

Note: Although condensation is not reviewed as part of this scope when modifying constructions details, care should be taken not to cause thermal bridging or creating systems that might cause condensation.

Conclusion

With the R values stated above the current design complies with H1/VM2, and H1/VM3, of the New Zealand Building code for thermal efficiency. The minimum R values should be stated on the drawings.