

BRANZ NZS 4218:2009 CALCULATION METHOD TOOL

BUILDING ELEMENTS

Roofs/ceilings: Skylights are not included here. Enter them in the skylights table below.

Roof/ceiling element	Description	Area (m ²)	Construction R-value	Heat loss
1	Roof - Dimond Top Span-DHS Purlin-R3.2 Pink Batts	103.85	1.89	54.9
2				
3				
4				
5				

Total area 103.85 m²

Total roofs/ceilings heat loss 54.9

Skylights: Skylights are at an angle of 60° or less to the horizontal. If the skylight R-value is not known, use a value of 0.15.

Skylight	Description	Area (m ²)	Construction R-value	Heat loss
1	Velux VCS 3030 solar	0.801	0.15	5.3
2	Velux VCS 2222 solar	0.478	0.15	3.2
3				
4				
5				
	From Skylight Schedule	0		0.0

Total area 1.279 m²

Total skylight heat loss 8.5

Walls: Doors are not included here. Enter them in the door table.

Wall element	Description	Area (m ²)	Construction R-value	Heat loss
1	Wall - 90mm framed timber wall-R2.2batts	28.19	1.13	24.9
2	wall-140mm stack bond masonry block timber strap	48.36	1.13	42.8
3	Wall-140mm running bond masonry block timber str	44.57	1.13	39.4
4	Wall - 140mm stack bond masonry block timber str	12	1.13	10.6
5	Wall-140mm frame-Dimond Rib50-R2.2 batts	16.15	2.75	5.9
6				

Total area 149.27 m²

Total wall heat loss 123.7

Floors: Only include the ground or exterior floors. Intermediate floors not exposed to the exterior are excluded.

Floor element	Description	Area (m ²)	Construction R-value	Heat loss
1	Slab floor - 100mm thick conc.	100	1.53	65.4
2				
3				
4				
5				

Total area 100 m²

Floor heat loss 65.4

Vertical glazing: Vertical glazing only (steeper than 60°), including glazing in doors. Skylights are on the Skylight table.

If the glazing R-value is not known, use a value of 0.15

Glazing element	Description	Area (m ²)	Construction R-value	Heat loss
1	glazing	8.96	0.26	34.5
2				
3				
4				
5	glazing	8.6	0.26	33.1
6				
7				
8				
9				
10				
	From Glazing Schedule	0		0.0

Total area 17.56 m²

Total vertical glazing heat loss 67.5

Doors: Only the non-glazed area of doors is included. The glazed area of doors must be entered in the Glazing table.

The heat loss of doors is automatically set to 0 if the total door area is ≤ 6m² or 6% of the total wall area.

If the R-value of a door is not entered a default value of R 0.18 is automatically used.

Door element	Description	Area (m ²)	Construction R-value	Heat loss
1	Doors	11.62	0.18	64.6
2				0.0
3				0.0
4				0.0
5				
	From Door Schedule	0		0.0

Total area 11.62

Total door heat loss 64.6

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PROJECT SUMMARY

Project name	Proposed Industrial Building
Address	80 Byron St, Sydenham, Christchurch
Designer	ADG
Address	47 Second Ave
Phone	578 2899
Date	Feb-17
Reference number	5996

Climate zone	3: South Island, Taupo and Ruapehu Districts, northern part of Rangitikei District, Stewart Island						
Wall construction type	4: Mix of types 1, 2 or 3						
If mixed wall types	<table> <tr> <td></td><td>Percentage of wall area solid timber construction</td></tr> <tr> <td>0</td><td>Percentage of wall area high thermal mass construction</td></tr> <tr> <td>100</td><td>Percentage of wall area "Any wall type"</td></tr> </table>		Percentage of wall area solid timber construction	0	Percentage of wall area high thermal mass construction	100	Percentage of wall area "Any wall type"
	Percentage of wall area solid timber construction						
0	Percentage of wall area high thermal mass construction						
100	Percentage of wall area "Any wall type"						
If solid timber wall	1: External 75 mm thick solid timber and timber framed internal walls						

Summary of calculation method heat loss

Element	Area (m ²)	Proposed building heat loss (W/°C)	Reference building heat loss (W/°C)
Roofs/ceilings	103.9	54.9	31.9
Walls	149.3	123.7	80.4
Floors	100.0	65.4	76.9
Vertical glazing	17.6	67.5	205.9
Skylights	1.3	8.5	-
Doors	11.6	64.6	-
Total		384.6	395.1

Glazing percentage: 10%

Glazing <40%: Yes

Minimum R-values OK: Maybe Cannot be determined by this tool - apply Clause 4.2.1

Issues to check:

Check that the thermal mass is exposed to the interior.

Check that the high thermal mass walls have a surface density
 $\geq 215 \text{ kg/m}^2$

PASS/FAIL

PASS

Provisional - confirm all min R-values and all issues

DOCUMENT TRANSFER

FIRE SERVICES

PROJECT: Clip n Climb EQ Strengthening and Extension
 FILE No: 16175CC
 DATE: 04 November 2016
 SHEET: 1 of 1

Day	04	08				
Month	11	11				
Year	16	16				
Issued by	NC	NC				

Drawing	Sheet	Description	Revision					
16175CC	SK01	Fire Safety Sketch	A	B				

Other Documents Enclosed	Issue					
Fire Strategy Report	A	B				

Distribution	Attention	No of Copies Distributed					
Clip n Climb	John Targett	pdf	pdf				
Structex Harvard	Julius Long	pdf	pdf				

Reason for Issue							
P	Preliminary	R	Revision				
N	Consent	I	Information	I	N		
Q	As Requested	C	Construction				
T	Tender	S	Schedule				

CLIP'N CLIMB FACTORY
C/- SPAGHETTI JUNCTION LTD



Proposed EQ Strengthening
and Office Extension
80 Byron St
Fire Strategy Report

Issue B: Consent
November 2016
Reference: 16175CC

Summary – Clip’n Climb Factory

This report reviews compliance of the Fire Safety provisions of the NZ Building Code for Clip’n Climb factory at 80 Byron St. This is to be an alteration to an existing building involving earthquake strengthening and office extension. Below is an overview of the fire safety features proposed for NZ Building Code compliance:

Fire Safety System	Type Ref.	Comments
60 minute FRR	Life Rating	Not required due to the building forming a single firecell
120 minute FRR	Property Rating	Required to the western external wall of the new extension
Manual alarm system	2	Not required due to limited occupancy (<50 people) in a single level building
Fire hydrant system	18	Not required due to short hose run distance (<75m)

Building Act 2004 - NZFS DRU Involvement?	Yes	No
Evacuation Scheme Required, or would be required if no sprinklers are installed?	✓	
NZ Fire Service Engineering Unit Review Required?	✓	

This report is based on the meetings and documents as described in Section 1.3.

Please refer to the following documentation for detailed design information.

- Structural Engineering documentation for details of structural fire rating.
- Electrical Engineering documentation for details of the emergency lighting & illuminated exit signage in accordance with NZBC F6 & F8
- Architectural documentation for surface finishes & specific details of door schedule, door hardware, fire rating details.

This report is specific to this project and any material contained herein cannot be used for any other project.

Document Control

Document ID: G:\PROJECTS\16 - Projects\Christchurch\16175 CC -
Clip n Climb EQ Strengthening and Proposed
Office\Reports\2. Consent\16175CC Fire Strategy
Report ClipnClimb EQ Repair and Alterations dated
November.2016.docx



Rev No	Date	Revision Details	Author	Approver
A	3/11/2016	Draft	NC	DJ
B	7/11/2016	Consent	NC	BC

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TABLE OF CONTENTS

<u>1.</u>	<u>INTRODUCTION</u>	<u>1</u>
1.1	PROJECT DESCRIPTION	1
1.2	COMPLIANCE REQUIREMENT	1
1.3	STAKEHOLDER CONSULTATION	1
<u>2.</u>	<u>OCCUPANCY</u>	<u>2</u>
<u>3.</u>	<u>FIRE SAFETY PRECAUTIONS</u>	<u>2</u>
3.1	BUILDING CLASSIFICATION	2
3.2	FIRE SAFETY PRECAUTIONS	2
3.3	EXISTING FIRE SAFETY PRECAUTIONS	3
3.4	PROPOSED FIRE PROTECTION	3
3.5	NZ FIRE SERVICE REQUIREMENTS	4
<u>4.</u>	<u>MEANS OF ESCAPE</u>	<u>4</u>
4.1	EGRESS METHODOLOGY	4
4.2	WIDTH OF ESCAPE ROUTES	4
4.3	HEIGHT OF ESCAPE ROUTES	4
4.4	PATH LENGTHS	5
4.5	SINGLE ESCAPE ROUTE	5
4.6	DOORS	5
4.7	SIGNAGE	5
<u>5.</u>	<u>SPREAD OF FIRE</u>	<u>5</u>
5.1	PROPERTY RATING	5
5.2	FOAMED PLASTICS	6
5.3	SERVICE PENETRATIONS	6
5.4	SURFACE FINISHES	6
<u>6.</u>	<u>FIRE FIGHTING</u>	<u>7</u>
6.1	FIRE SERVICE VEHICULAR ACCESS	7
<u>7.</u>	<u>FIRE REPORT CONCLUSIONS</u>	<u>7</u>

APPENDIX

- A. GUIDANCE NOTES FOR ACHIEVING A CODE COMPLIANCE CERTIFICATE FOR FIRE SAFETY SYSTEMS
- B. SUMMARY OF PRECAUTIONS REQUIRED FOR SERVICE PENETRATIONS
- C. SITE PLAN
- D. KEY FIRE SAFETY REQUIREMENTS
- E. COMPLIANCE SCHEDULE
- F. INSPECTION SCHEDULE
- G. EXCERPT OF BRANZ STUDY REPORT No.181
- H. PROPERTY PROTECTION MEASURES

1. INTRODUCTION

This report is written for the Building Control Authority as required by the NZ Building Act 2004 to enable a review of the minimum performance requirements of NZ Building Code Part C "Protection From Fire". This report is not a contract document for the project but is to form part of the documentation used for a Building Consent application and used as guidance for the contract works only.

Note: This Fire Strategy Report addresses minimum fire safety requirements only, as determined by the NZ Building Code. It does not consider loss control for the building and contents, unless specifically referenced. Refer to the Appendices for further advice in this regard.

1.1 PROJECT DESCRIPTION

This report covers the proposed earthquake strengthening and office extension for Clip'n Climb factory at 80 Byron St, Christchurch. The proposed work does not change the building fabric except for the proposed extension at north-western corner (facing Byron St) and removing of the existing mezzanine floors. This single level extension contains offices, meeting room, staff room, stores and toilets. The western external wall of the extension is to be constructed from 150 series masonry blocks to achieve the required 120 minute FRR – refer Structural Engineer's documentation for design details. The existing building is predominantly constructed from concrete walls with steel portal frames and metal roofing. The entire building (including the extension) has a footprint of 770m² with an apex height of 5m. The storage height within the building is to be limited to <3m for the life of the building (50 years). Signage is to be installed throughout the storage area to recognise this 3m limit in accordance with NZBC Part F8, and is proposed to be included as part of the Compliance Schedule. The building is not undergoing a "Change of Use" and will continue to be used as workshop and office with limited storage.

The existing building sits on a single site title with street frontage to the North (Byron St) and property boundaries to the remaining external walls. The building will continued to be used as a workshop/office with limited storage up to 3 m high.

1.2 COMPLIANCE REQUIREMENT

Due to the proposed extension, the building is required to comply with the NZ Building Act **S112 "Alterations to Existing Buildings"** for Means of Escape from Fire from the existing section and Spread of Fire and Means of Escape from Fire for the new extension. The criterion used for assessing compliance is the NZ Building Code Acceptable Solutions C/AS5 2012 (with Amendment 3, 2014).

1.3 STAKEHOLDER CONSULTATION

The following documents were referred to in preparation of this report:

- i) Architectural drawings, "Proposed Additions – 80 Byron St", File Ref 5996, Sheets A1 – A12, Issue B, dated November 2016, Issued by Architectural Design Group.

The following meetings were held with stakeholders groups:

- i) Site visit (including meeting with John Targett), 26/10/2016, key aspects reviewed including existing construction of the building, boundary exposures, storage height, mezzanine floor and means of escape.

2. OCCUPANCY

The following table summarises the design occupancy for this building using the values given in Table 1.2 of C/AS5 (2014) of the NZ Building Code.

Level	Description	Risk Group	Floor Area (m ²)	Occupant Density (m ² /user)	Occupant Load	
					Design	Actual
G	Workshop	WB	680	100	7	7
G	New offices	WB	27	10	3	3
G	New meeting room	WB	16	2.5	6	6
G	New store, staff and toilets	WB	52	-	-	- ¹
Total					16	16

Notes: ¹ Spaces occupied intermittently are not included in the occupant load calculation as allowed under paragraph 1.4.3 of C/AS5 (2014)

3. FIRE SAFETY PRECAUTIONS

3.1 BUILDING CLASSIFICATION

Offices, workshop with storage of less than 3 m height are listed in Table 1.1 of C/AS5 (2014) as being WB Risk Group.

C/AS5/Table 1.1

3.2 FIRE SAFETY PRECAUTIONS

C/AS5 specifies the required fire safety precautions for a WB Risk Group building with <100 people, <3m storage height and <4m escape height as:

C/AS5/2.2.1 &
C/AS5/2.3.1

- Life safety rating = 60 minutes. This applies to fire rating requirements in Part 3: Means of escape and Part 4: Control of internal fire and smoke spread.
- Property rating = 120 minutes. This applies to fire rating requirements in Part 5: Control of external fire spread.
- Type 2 manual alarm system. A direct connection to the Fire Service is not required where a phone is available at all times for 111 calls. This system is not required where the escape routes serve no more than 50 people and the building is a single level building with less than 3m storage.
- Type 18 building fire hydrant system required unless the Fire Service hose run distance to Fire Service vehicular access to any point on any floor is less than 75 m.

3.3 EXISTING FIRE SAFETY PRECAUTIONS

Fire Alarm System:

There is no active fire alarm system in the existing building.

Door Hardware & Exits:

The existing final exit in the northern external wall has sufficient exit width but a key lock on the inside.

Mezzanine and Stairs:

All existing mezzanine floors and stairs are to be removed as part of the proposed work.

Extinguishers:

The building is equipped throughout with fire extinguishers.

Emergency Lighting:

There is no emergency lighting coverage in the existing building.

Exit Signs:

A limited number of non-illuminated exit signs are provided in some areas.

Surface Finishes:

The existing wall lining is concrete and MDF in the workshop, and painted plasterboard in offices. The existing ceiling lining is timber sarking in the workshop and painted plasterboard in offices. The floor covering is a mixture of concrete, carpet and vinyl throughout.

3.4 PROPOSED FIRE PROTECTION

3.4.1 Alarm Systems

No active fire alarm system is required due to limited storage (<3m) in a single level building serving less than 50 people.

3.4.2 Hand-held Fire Fighting Equipment

Existing fire extinguishers are to be retained and the coverage is expected to meet the requirements of NZS 4503:2005.

3.4.3 Ancillary Devices

Since fire hose runs from the point of NZFS vehicular access will not exceed 75 m, a fire hydrant within the building is not required.

3.4.4 Emergency Lighting

Compliance Document F6, NZ Building Code requires the installation of emergency lighting in the following areas:

F6/AS1/1.2

- a) in an escape route from the point where the initial open path travel distance exceeds 20 m,

Refer to Appendix D for guidance on the extent of coverage. The emergency lighting is to last for a minimum duration of 30 minutes and be installed in accordance with AS/NZS 2293 Part 1 and 3 as amended by Appendix B NZBC F6 and NZBC G9. Refer to the Electrical Engineer's documentation for details of the emergency lighting.

3.5 NZ FIRE SERVICE REQUIREMENTS

The NZ Fire Service has specific requirements with respect to the Fire Safety and Evacuation of Buildings Regulations. This building requires a registered evacuation scheme. The proposed fire protection systems are expected to meet the requirements of the Fire Service.

4. MEANS OF ESCAPE

4.1 EGRESS METHODOLOGY

With reference to the Architect's plans, the egress of the occupants is as follows (refer to Appendix D):

- Existing workshop egress – exit via existing final exit at the north-eastern corner or via new fire exit through the new office extension.
- New office extension egress – exit directly to outside via main entrance.

4.2 WIDTH OF ESCAPE ROUTES

The following table compares the allowable and actual exit widths from each area.

C/AS5/3.3.2

Description	Total exit width less one largest exit (mm)		C/AS5 (2014) Compliance?
	Required	Actual	
Workshop	700	1000	Yes
Individual door	600	700	Yes

Note: a = based on occupant load
b = based on minimum width

The minimum allowable widths do not account for disabled access requirements. Refer to NZBC Part D1.

The above table shows that all escape widths meet the requirements of C/AS5 (2014).

4.3 HEIGHT OF ESCAPE ROUTES

Within escape routes, the clear height is required to be no less than 2100 mm across the full width. Isolated ceiling fittings not exceeding 200 mm in diameter may project downwards to reduce this clearance by no more than 100 mm.

C/AS5/3.3.1

Doors on escape routes are required to have a clear height of no less than 1955 mm for the required width of the opening. The dimension of the escape routes meet with these requirements.

4.4 PATH LENGTHS

The following table compares the allowable versus actual travel distances.

C/AS5/Table 3.2

Level	Description	Risk Group	Path Lengths				OK?
			Allowable		Actual		
			DOP	TOP	DOP	TOP	
G	Workshop	WB	25	60	16	58	Yes
G	New extension	WB	25	60	7	52	Yes

Note: DOP = Dead end open path length (m)
TOP = Total open path length (m)

The open path travel distances and exit door locations allow for diversion of open paths to a distance of 8m apart, as acceptable under C/AS5 (2014).

C/AS5/3.6.2

The table shows that all escape route travel distances are within the requirements of C/AS5 (2014).

4.5 SINGLE ESCAPE ROUTE

A single escape route is allowed for the new extension as it will contain less than 50 people and the travel distance meets the minimum code requirements.

C/AS5/3.13

4.6 DOORS

Given the low occupancy, the egress doors can open in either direction.

C/AS5/3.15.3

Egress doors are to have locks that can be easily opened from the inside in an emergency without the use of a key. The existing key lock in the final exit at north-eastern corner is to be replaced with a snib lock.

C/AS5/3.15.2

4.7 SIGNAGE

Illuminated fire exit signage is to be provided throughout the building in compliance with NZBC Part F8. Refer to the Electrical Engineer's documentation for details of the emergency lighting.

F8/AS1

5. SPREAD OF FIRE

5.1 PROPERTY RATING

The western external wall of the new extension is to be constructed from 150 series masonry block. The wall is required to be designed to achieve a 120 minute FRR, and detailed to meet with the post-fire structural stability requirements of NZBC Part B1. **Refer design documentation prepared by the Structural Engineer for detailed information.**

As per comment of C/AS5 Clause 1.3, only parts 1, 2, 3 and 4 of the Acceptable Solution need to be used for an assessment of the means of escape from fire of an existing building that is being altered, to meet the requirements of Section 112 of the Building Act. Furthermore, Section 112.1 of the Building Act requires that the building must continue to comply with other provisions of the Building Code to at least the same

extent as before the alterations.

The external facade of the existing building is not being altered (except for the street facing northern facade where the extension occurs) and the storage height within the building will be limited to 3m by signage throughout the workshop. The signage is to be installed in accordance with NZBC Clause F8, and is proposed to be included as part of the Compliance Schedule. Therefore, the existing external wall does not need to be addressed for spread of fire.

5.2 FOAMED PLASTICS

The use of foamed plastic / EPS panels requires compliance with paragraph 4.17.2 of C/AS5 (2014). This means that the complete system has to achieve a Group Number as specified in Section 5.4 and the foamed plastic has to meet the flame propagation criteria as specified in AS 1366.

C/AS5/4.17.2

Any penetrations through these foamed plastic / EPS panels shall be protected as per manufacturer's instruction to meet the NZBC flame propagation and surface finish requirements. There cannot be any exposed foamed plastic / EPS. This also applies to building insulations.

5.3 SERVICE PENETRATIONS

Where services pass through fire separations or are installed in fire separations, the continuity and effectiveness of the fire separation shall be maintained as required by NZBC C/AS5/4.4 (this will include services through walls and floors as applicable). Fire resistant materials are to be approved as per NZS/AS 1530 Part 4.

5.4 SURFACE FINISHES

Wall sections that are less than 1m from the boundary need to meet specific surface finish requirements of the NZ Building Code. This applies to the western external wall of the extension. Paragraph 5.8.1 of C/AS5 (2014) requires the wall cladding system to meet the following requirements,

C/AS5/5.8.1

- Peak Heat Release Rate of 100kW/m² and
- Total Heat Release Rate less than 25MJ/m².

The proposed masonry block is non-combustible and meets this requirement.

C/AS5 Table 4.1 requires the following surface finish properties in the listed area:

Building Elements	Maximum Permitted Group Number	Flammability Index
All occupied spaces wall and ceiling linings	3	
Flooring (All other occupied spaces)	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 1.2 kW/m ²	
Ducts for HVAC systems: internal surfaces	1S	-

Ducts for HVAC systems: external surfaces	3	-
Underlay to roofing or external cladding when exposed to view	-	not > 5
All occupied spaces including exitways: Suspended flexible fabrics	-	not > 12

These surface finish requirements are to apply throughout the building and should apply to other existing areas during future refurbishments.

The existing wall lining is concrete and MDF in the workshop, and painted plasterboard in offices. The existing ceiling lining is timber sarking in the workshop and painted plasterboard in offices. Painted plasterboard achieves a Group Number of at least 2S. MDF and solid wood product ($\geq 9\text{mm}$ thick and $\geq 400 \text{ kg/m}^3$) is deemed acceptable in achieving a Group Number of 3. The floor covering is a mixture concrete, carpet and vinyl throughout. Existing carpet and vinyl is considered acceptable in meeting the required Critical Radiant Flux as per BRANZ Study Report No.181 [2007] – refer Appendix G for detailed information.

The proposed office extension is to have painted plasterboard to walls and ceiling, and carpet ($\geq 1.2 \text{ kW/m}^2$) on the floor.

6. FIRE FIGHTING

6.1 FIRE SERVICE VEHICULAR ACCESS

Where buildings are located remote from the street boundaries of a property, pavements situated on the property and likely to be used for vehicular access by fire appliances shall:

C/AS5/6.1

- 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,
- b) Be trafficable in all weathers,
- c) Have a minimum width of 4.0 m,
- 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,
- e) Provide access to a hard-standing within 20m of
 - i) An entrance to the building, and
 - ii) Any inlets to fire sprinkler or building fire hydrant systems

Since the building is readily accessible from Byron St, the fire service vehicular access is expected to comply.

7. FIRE REPORT CONCLUSIONS

For the building to comply with the NZBC Fire Safety objectives, the following fire safety features will be required:

1. Emergency lighting (to AS/NZS 2293 Part 1 and 3 as amended by Appendix B NZBC Clause F6 and NZBC G9) is to be installed in those parts of egress routes that exceed the initial 20 meters of

travel. They are to last for a minimum duration of 30 minutes. Refer Appendix D for guidance on the extent of coverage.

2. All egress doors are to have locks that can be easily opened from the inside without the use of a key. The existing key lock in the final exit at north-eastern corner is to be replaced with a snib lock.
3. Illuminated exit signage is to be provided throughout the building in compliance with NZBC Clause F8. Refer to the Electrical Engineer's documentation for details of the emergency lighting.
4. The western external wall of the new extension is to be designed to achieve a 120 minute FRR, and detailed to meet with the post-fire structural stability requirements of NZBC Part B1. **Refer design documentation prepared by the Structural Engineer for detailed information.**
5. The storage height within the building will be limited to 3m by signage throughout the workshop. The signage is to be installed in accordance with NZBC Clause F8, and is proposed to be included as part of the Compliance Schedule.
6. The use of foamed plastic / EPS panels requires compliance with Table 4.1 of C/AS5 (2014). This means that the foamed plastic / EPS in-fill has to meet the flame propagation criteria as specified in AS 1366. Any penetrations through these foamed plastic / EPS panels shall be protected as per manufacturer's instruction to meet the NZBC flame propagation and flame barrier requirements. There cannot be any exposed foamed plastic / EPS panels. This also applies to building insulations.
7. Where services pass through fire separations or are installed in fire separations, the continuity and effectiveness of the fire separation shall be maintained as required by NZBC (this will include services through walls and floors as applicable). Fire resistant materials are to be approved as per AS 1530 Part 4.
8. The Code requires the following surface finish properties in the listed areas:

Building Elements	Maximum Permitted Group Number	Flammability Index
All occupied spaces wall and ceiling linings	3	
Flooring (All other occupied spaces)	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 1.2 kW/m ²	
Ducts for HVAC systems: internal surfaces	1S	-
Ducts for HVAC systems: external surfaces	3	-
Underlay to roofing or external cladding when exposed to view	-	not > 5
All occupied spaces including exitways: Suspended flexible fabrics	-	not > 12

These surface finish requirements are to apply throughout the building and should apply to other existing areas during future

refurbishments. The proposed office extension is to have painted plasterboard to walls and ceiling, and carpet ($\geq 1.2 \text{ kW/m}^2$) on the floor.

Given that the above features are included, the proposed earthquake strengthening and office extension for the Clip'n Climb factory is considered adequate to meet the requirements of the NZBC C/AS5 (2014) part 1 - part 5, F6-F8.

APPENDIX A: GUIDANCE NOTES FOR ACHIEVING A CODE COMPLIANCE CERTIFICATE FOR FIRE SAFETY SYSTEMS

The emergency lighting installer shall provide written confirmation that the emergency lights meet minimum illumination levels to the required areas and the minimum duration time as required by the Building Code. The contractor may be asked to demonstrate the emergency lighting system with a mains failure simulation. Also required is the test and commissioning certificates for the emergency lighting, including test results.

Where services pass through fire and smoke separations or are installed in fire and smoke separations, the continuity and effectiveness of the separation shall be maintained as required by NZBC C/AS5 2014/4.4 (this will include services through walls and floors as applicable). Certification is required from the installer(s) that all penetrations through fire and smoke separations have been installed in full accordance with manufacturer's requirements.

Door locks to comply with NZBC C/AS5 2014/3.15.2

Signs to comply with NZBC C/AS5 2014/3.16.1

APPENDIX B: SUMMARY OF PRECAUTIONS REQUIRED FOR SERVICE PENETRATIONS

Abstract: Attached is a summary sheet for fire rating of service penetrations. The following listed items should be adhered to during construction for achieving appropriate fire rating integrity of services penetrations:

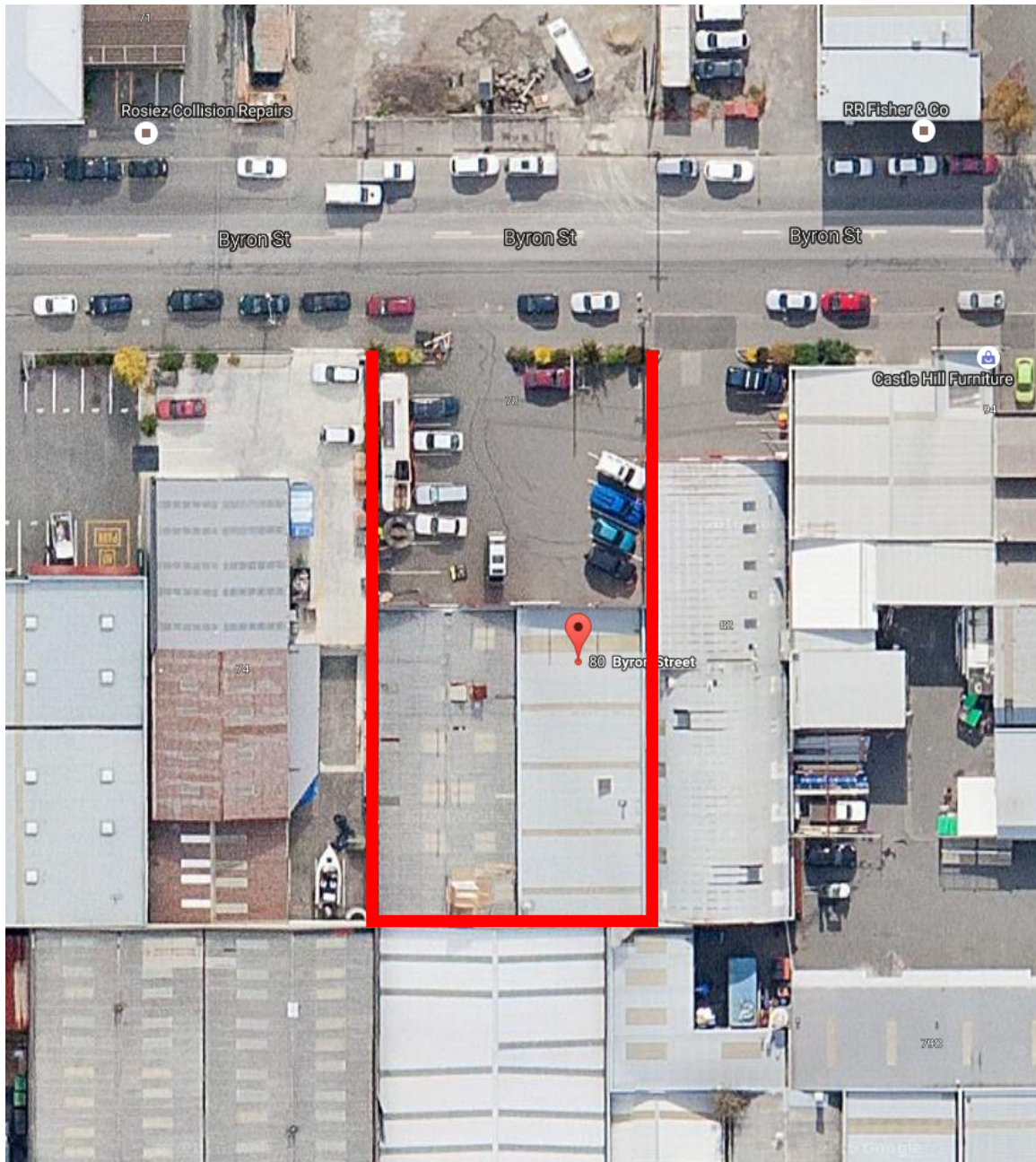
1. Test certificates are required for all service penetration fire rating products used. Non-certified products will be deemed non-compliant.
2. Fire rating products must be installed in strict compliance with the manufacturer's requirements for the application and for the specified tested / assessed system.
3. Service penetrations shall be made available for inspection to competent qualified persons (i.e. council inspector, consultant engineer, or Licensed Building Practitioner) to sample selections of penetrations.
4. It is recommended that components of fire-stopping systems not be 'mixed and matched' from different manufacturers.
5. Proposal of all fire stopping systems should be provided for the fire engineer's approval prior to commencement of installation.
6. Fire stopping systems are required to be installed by competent trained persons.

FIRE RATING OF SERVICE PENETRATIONS – SUMMARY SHEET

SERVICE	CONCRETE SEPARATION	DRY WALL SEPARATION
Plastic Pipe	Fix fire collar against masonry surface and around pipe. Ensure any gaps between pipe and concrete are fitted with fire rated mastic sealant. <i>Firepro B310FG Fyre Collars</i> are suitable. For sprinkled buildings fire collars are to be fitted for pipes equal to or greater than 25mm, fire rated mastic sealant is to be located around pipes less than 25mm.	Fixed block of laminated Gib® Fyreline, solid timber or similar in wall cavity through which the pipe passes. Install fire collar around pipe and against block surface. <i>Promat Promaseal Fire Collar</i> kits are suitable products. Ensure gaps between fire collar and adjoining surfaces are filled with fire rated mastic sealant. For sprinkled buildings fire collars are to be fitted for pipes equal to or greater than 25mm, fire rated mastic sealant is to be located around pipes less than 25mm.
Metal Pipe	Ensure full grout or fire retardant compound between metal pipe and concrete surface. Fill any cavities with fire rated mastic sealant or mortar seal. For insulated pipe, replace insulation with <i>Kaowool</i> or <i>Fyrefibre</i> for a set distance as described in <i>Winstones Gib®</i> catalogue 'Penetrations in GIB Fire Rated Systems', August 2012 (suitable up to 60 min. FRR).	Wrap fire strip seal, such as <i>Firepro IBS</i> , around pipe across dry wall thickness, and encase strip seal sleeve, such as <i>Firepro B340</i> steel sleeve. Seal gaps with fire rated mastic sealant (i.e. <i>Flamex</i>). For insulated pipe, replace insulation with <i>Superwool</i> or <i>Fyrefibre</i> for a set distance as described in <i>Winstones Gib®</i> catalogue 'Penetrations in GIB Fire Rated Systems', August 2012 (suitable up to 60 min. FRR).
Ductwork	Fit proprietary fire damper into opening, including a suitable sleeve or frame to allow fixing to the wall structure as per suppliers instructions. Connecting ducting is to be slip fixed only to damper to ensure that the damper is not physically damaged through failure of the connecting ductwork. Any cavities filled with fire mortar or similar. Small gaps filled with fire rated mastic sealant. Allow for access panel and test latches. <i>Holyoakes</i> or <i>Halton</i> damper units are suitable	
Electrical Services	Install bulkhead and coating system for cable tray penetrations, such as the <i>Promat Promaseal</i> system. Otherwise, use suitable fire rated mastic sealant around singular penetrations. Where ladders or trays pass through fire rated elements, terminate the ladders or trays at both sides of the openings and provide holes for the cables only. All holes are to be fire stopped with a proprietary product that is equal to or greater than the fire resistance of the materials being filled and is installed to the manufacture's specifications.	
Recessed Fittings: Lights, Cabinets, Flush Boxes	Usually not applicable for lights. Ensure full grout or fire mortar seal around recessed features.	<i>Lights & Cabinets:</i> Form fire rated recess constructed from same thickness wall lining (i.e. <i>Gib®</i>) as per the ceiling or wall, except extra layer for top section of recess. Refer <i>Winstones Gib®</i> Catalogue 'Penetrations in GIB Fire Rated Systems', October 2012. <i>Flush Boxes:</i> Install proprietary intumescent blocks into flush boxes. Apply fire rated mastic sealant around outer edges/gaps.

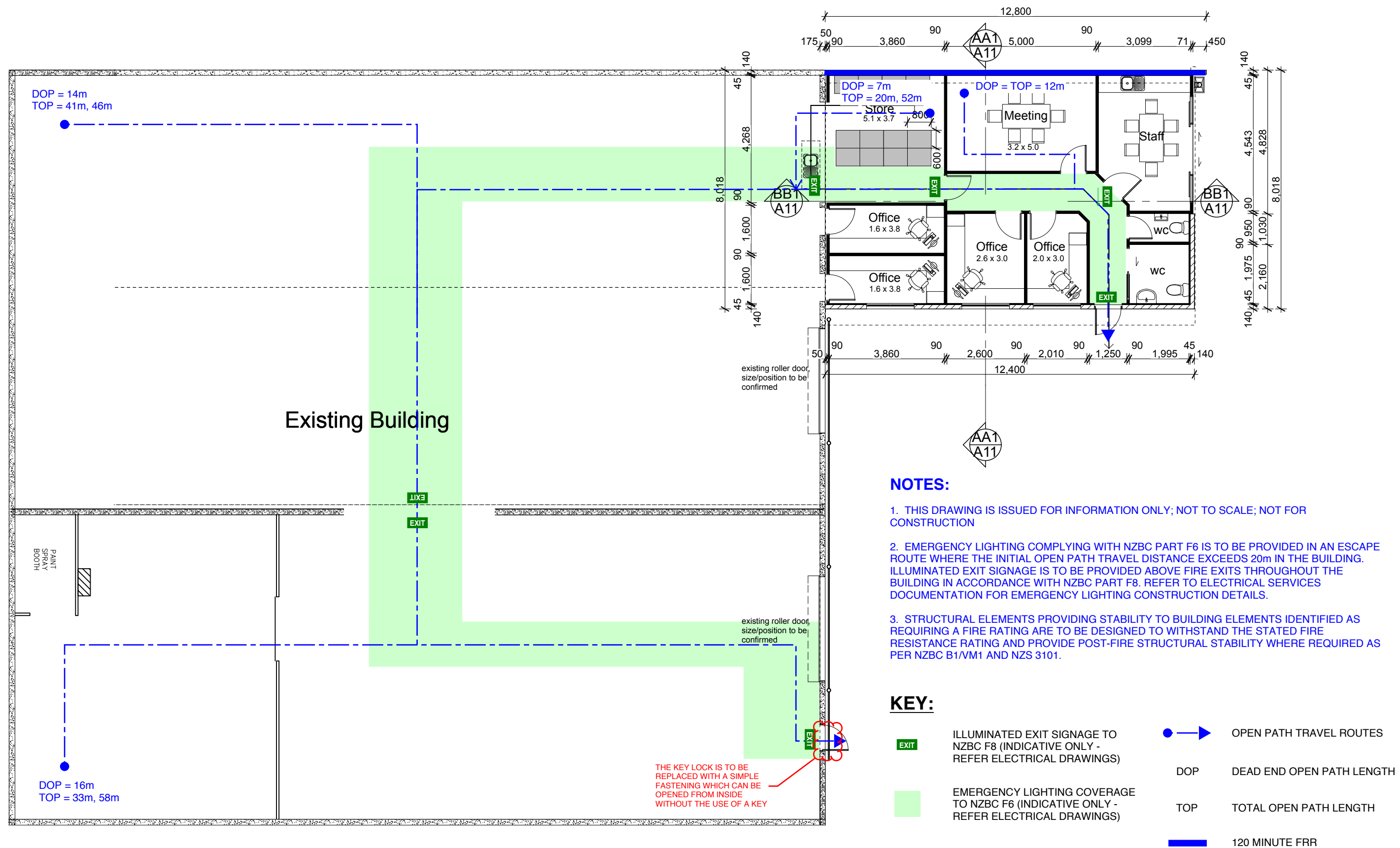
APPENDIX C: SITE PLAN

Abstract: Attached is a copy of the site plan for the Clip'n Climb factory, showing the general layout of the existing building and extension.



APPENDIX D: KEY FIRE SAFETY REQUIREMENTS

Abstract: Attached are copies of the floor plans showing the required fire safety features that are to be incorporated into the building design.



NOTES:

- 1. THIS DRAWING IS ISSUED FOR INFORMATION ONLY; NOT TO SCALE; NOT FOR CONSTRUCTION
- 2. EMERGENCY LIGHTING COMPLYING WITH NZBC PART F6 IS TO BE PROVIDED IN AN ESCAPE ROUTE WHERE THE INITIAL OPEN PATH TRAVEL DISTANCE EXCEEDS 20m IN THE BUILDING. ILLUMINATED EXIT SIGNAGE IS TO BE PROVIDED ABOVE FIRE EXITS THROUGHOUT THE BUILDING IN ACCORDANCE WITH NZBC PART F8. REFER TO ELECTRICAL SERVICES DOCUMENTATION FOR EMERGENCY LIGHTING CONSTRUCTION DETAILS.
- 3. STRUCTURAL ELEMENTS PROVIDING STABILITY TO BUILDING ELEMENTS IDENTIFIED AS REQUIRING A FIRE RATING ARE TO BE DESIGNED TO WITHSTAND THE STATED FIRE RESISTANCE RATING AND PROVIDE POST-FIRE STRUCTURAL STABILITY WHERE REQUIRED AS PER NZBC B1/VM1 AND NZS 3101.

KEY:

- ILLUMINATED EXIT SIGNAGE TO NZBC F8 (INDICATIVE ONLY - REFER ELECTRICAL DRAWINGS)
- OPEN PATH TRAVEL ROUTES
- DOP DEAD END OPEN PATH LENGTH
- TOP TOTAL OPEN PATH LENGTH
- 120 MINUTE FRR

CHECK ALL INFORMATION ON SITE PRIOR TO COMMENCING WORK. READ IN CONJUNCTION WITH THE SPECIFICATION AND OTHER RELEVANT DRAWINGS AND DOCUMENTS			 PO Box 842 Christchurch, New Zealand. Ph. (03) 377 8600 Email: admin@cosgroves.com		PROJECT: CLIP N CLIMB FACTORY 80 BYRON ST CHRISTCHURCH		SHEET TITLE: KEY FIRE SAFETY PROVISIONS		BUILDING CONSENT		
									DESIGNED: NC	DATE: 07/11/16	ISSUE: B
B	BUILDING CONSENT	07/11/16							DRAWN: NC	SCALE: NTS	
A	DRAFT	04/11/16							SHEET No: 16175CC-SK01		
ISSUE	AMENDMENT	DATE									

APPENDIX E: COMPLIANCE SCHEDULE

	Specified System <i>Description: Location:</i>	Maintenance Procedure / Performance Standards	Frequency of Inspections	Maintained By	Specified System Modified By
4	Emergency Lighting System Systems from 1995 <i>Location: As per Electrical Design Documentation</i>	AS/NZS 2293 Part 2:1995	As specified by the Standard	Independent Qualified Person	New
15/2	Final Exit Doors and Other Exit Doors <i>Location: As per Fire Report</i>	Visual inspection to ensure all the means of escape are in good repair and in accordance with Compliance document C/AS5 or NZS 1900 for buildings built and as altered prior to the introduction of the Building Act.	Monthly (other occupancies) Annually	Owner Independent Qualified Person	New Existing
15/4	Signs for communicating information intended to Facilitate Evacuation <i>Location: As per Electrical Design Documentation</i>	All signs are to be clearly visible and unobstructed. Signs shall be refurbished before they become illegible, and shall be replaced immediately should they be missing. Defects in illuminated signs shall be replaced immediately they are apparent. And in accordance with Compliance document F8/AS1.	Monthly Annually	Owner Independent Qualified Person	New
-	Signs for limiting the storage height to 3m <i>Location: Throughout the workshop/storage area</i>	All signs are to be clearly visible and unobstructed. Signs shall be refurbished before they become illegible, and shall be replaced immediately should they be missing. Defects in illuminated signs shall be replaced immediately they are apparent. And in accordance with Compliance document F8/AS1.	Monthly Annually	Owner Independent Qualified Person	New

APPENDIX F: INSPECTION SCHEDULE FIRE SAFETY SYSTEMS

PROJECT: Clip'n Climb

LEVEL OF CONSTRUCTION MONITORING: CM2 (refer IPENZ Guidance Note)

CM2	<i>"Review, preferably at the earliest opportunity, a sample of <u>each</u> important work procedure, material of construction and component for compliance with the requirements of the plans and specifications and review a representative sample of <u>each</u> important completed work prior to enclosure or completion as appropriate. Be available to provide the constructor with technical interpretation of the plans and specification."</i>
-----	--

ITEM #	ELEMENT	INSPECTION REQUIREMENT
1.	Fire Rated Construction <i>[Structural Engineer to inspect + verify structural performance]</i> <i>[PS3 to be provided by Contractor for all work aligned to fire ratings, including Trade penetration]</i>	Western external wall for the new extension.
2.	Means of Escape <i>[Electrical Engineer to inspect + verify the emergency lighting and exit signage system – this will be covered by the Contractor's PS3 and Electrical Engineer's PS4]</i>	The following systems need to be inspected: • Egress paths – unobstructed, door opening direction, hardware, widths • Emergency Lighting – as per Electrical Design (PS3 & PS4 by others), visual inspection by Cosgroves • Doors – fail safe unlock mechanism and door opening forces

The Contractor is to advise our office when the installation of each of these systems is advanced to a level to enable inspection. Any technical enquiries or notification for inspections can be directed to Nick Chen, Fire Engineer, Cosgroves (Ph 377 8600)

APPENDIX G: EXCERPT OF BRANZ STUDY REPORT NO.181



STUDY REPORT

No. 181 (2007)

Fire Properties of Floor Coverings: New Fire Test Methods and Acceptable Solutions

PCR Collier



The work reported here was jointly funded by Building Research Levy whose logo is shown above.

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ISSN: 0113-3675

3. EXPERIMENTAL TRIALS AND ANALYSIS

The approach of this study is to compare the results obtained in the CC, FRPT and HMN test apparatus of a selection of typical New Zealand available flooring products. Table 3 lists the physical properties of the tested flooring products and Figure 23 and Figure 24 (in the Appendices) show photographs of the samples. The materials were selected based on covering the range from low to high hazard. Materials obviously at the extreme low hazard end of the scale were omitted, as it was considered that the evidence gathered would be of limited use in demonstrating that the test methods are capable of discriminating levels of performance when there is obviously no hazard. The types of materials omitted were ceramic and stone flooring tiles as they are essentially non-combustible.

Table 3: Selection of flooring types and testing

#	Flooring product type	Thickness, mm (nominal including backing)	Density, kg/m ²	Cone	FRP	HMN
A	Flooring laminate (0.25 mm) on MDF	7 mm	879	x	x	x
B	Carpet tile (polyester)	4 mm	347	x	x	x
C	Cork tile	6 mm	460	x	x	x
D	Flooring laminate (0.25 mm) (formica) on HDF	12 mm	978	x	x	x
E	Flooring laminate 0.25 mm (formica) on HDF	8 mm	896	x	-	-
F	Vinyl tiles	1.5 mm	898	x	x	x
G	Polyester, overlay	12 mm	148	x	x	x
H	Plywood flooring	20 mm	511	x	x	x
I	Rubber floor covering	2.4 mm	2073	x	x	x
J	Polypropylene carpet with latex backing	6 mm	142	x	*	*
K	Polypropylene carpet bonded to polyolefin backing	6.2 mm	337	x	*	*

x tested for this project

*Data supplied by manufacturer

3.1 Test results

3.1.1 Flooring Radiant Panel Test

The results from the FRPT ISO 9239-1:2002 (2002) for the CRF and smoke measurements are shown in Table 4. The results are derived from the average of three samples.

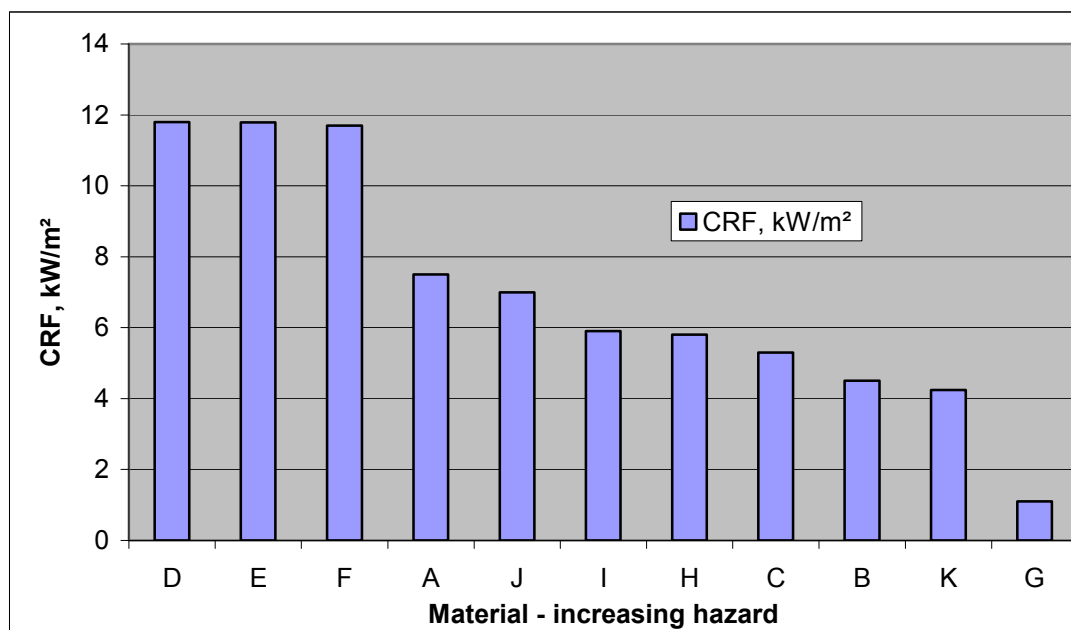
Table 4: Summary of FRP results (heat and smoke)

#	Flooring product type	CRF, kW/m ²	Smoke, %.min
A	Flooring laminate on MDF, 7 mm	7.5	131
B	Carpet tile (Autex)	4.6	542
C	Cork tile, 6 mm	5.3	106
D	Flooring laminate (formica), 12 mm	11.8	234
E	Flooring laminate (formica), 8 mm	11.8*	234*
F	Vinyl tiles, 1.5 mm	11.7	158
G	Polyester, overlay	<1.1	629
H	Plywood flooring	5.8	185
I	Rubber floor covering	5.9	813
J	Polypropylene on latex	7.0	124
K	Polypropylene on polyolefin backing	4.24	660

*Not tested – estimated from material D

The materials A to K are ranked in order of reducing CRF and plotted in Figure 2. Subsequent analysis using bar charts has retained the same order to determine whether the trend of increasing hazard is maintained for the different assessment parameters of the other test methods.

While the measurement of CRF may not be truly representative of the actual hazard, which is the ability of floor coverings to aid transport of fire/flame from one area/compartment to another, it is the test method adopted in Australia, Europe and USA in conjunction with the smoke measurement in Figure 3 from the same test.

**Figure 2: FRP – CRF, kW/m² results to ISO 9239-1:2002(E)**

APPENDIX H: PROPERTY PROTECTION MEASURES

Abstract: The following describes additional property protection measures that the building owner may wish to consider incorporating into the building design.

Property Protection Measures

As has already been mentioned, the Fire Report has been written for the purposes of complying with minimum Code requirements. No property protection measures have specifically been addressed. However, there are various property protection measures the building owner may wish to consider, which may serve to mitigate the loss of stock, property, or continued business in the event of a fire, and additionally offer incentives for reduced insurance premiums.

There are various options of passive and active fire protection available, and further combinations of these can be derived to assess the most cost effective solution. The three general options are described as follows are for guideline purposes only to assist the building owners in their assessment of property protection measures.

Further evaluation of the feasibility and cost benefits of each of the options would need to be undertaken by the building owner.

Automatic Heat and/or Smoke Detection

The installation of an automatic heat or smoke detection system, to NZS4512, would activate an alarm and can be direct connected to the Fire Service for a prompt response to a fire situation. This can provide a level of Fire Service intervention even when the building is unoccupied. In an occupied situation, the alarm system will notify occupants, of whom a suitably qualified occupant may be in a position to extinguish any fire in its' early stage of development. Hence, an automatic detection system can provide a level of property protection.

Sprinkler Protection

Installation of a sprinkler system to NZS4541 will provide both detection and suppression in the early stages fire and is recognised as the most effective fire protection measure, when used within buildings. A NZS4541 compliant sprinkler system will call the Fire Service out on sprinkler activation and commence suppression of the fire. Suppression by the NZS4541 sprinkler system would be expected to be to an extent whereby, if the fire is not actually extinguished by the time of NZFS arrival, the fire size would be expected to be controlled within the small area of sprinkler operation. The small controlled fire size would be expected to be easily extinguished by the Fire Service.

Installation of a sprinkler system also offers construction savings by allowing reductions in fire rating requirements of the Code. As an example, the Property Rating requirement is halved.

Multiple Firecells

Subdivision of the building into firecells offers property protection by limiting the extent of fire damage to within the confines of the firecell of fire origin. Additional firecell separation will be expected to reduce both loss of stock (due to fire or smoke damage) and business operations (after the fire event).

The firecell separation between the two firecells could vary between the full Property Rating separation, which would protect against a full burn out, down to a lesser extent (say 30 minutes FRR) which may be adequate to ensure that Fire Service intervention would prevent further spread of fire to another firecell. The smaller (or more numerous) the firecells, the easier it will be for the NZFS to contain and suppress a fire within that firecell.

Various practicalities of achieving the firecell separation and the associated costs will have to be weighed up against the expected benefits (from insurance premium reduction, or business continuance estimates etc.) of the extent of firecell protection. Firecell separations, in conjunction with a fire alarm system, and/or sprinkler system offer a high level of property protection.

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance on use of Producer Statements (formerly page 2) is available at www.ipenz.nz)

ISSUED BY: Structex Harvard Ltd.
(Design Firm)

TO: Clip 'n' Climb
(Owner/Developer)

TO BE SUPPLIED TO: Christchurch City Council
(Building Consent Authority)

IN RESPECT OF: Proposed New Office Addition
(Description of Building Work)

AT: 80 Bryon Street
(Address)

Town/City: Christchurch LOT 1 DP 449853 SO
(Address)

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

(Extent of Engagement)

services in respect of the requirements of Clause(s) B1 (structure) of the Building Code for:

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

The design carried out by us has been prepared in accordance with:

☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment B1/VM1 (NZS1170 set) or
(verification method/acceptable solution)

☐ Alternative solution as per the attached schedule NZS3404:1997, NZS4230:2004, NZS3101:2006, NZS3603:1993

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

Proposed Additions, 80 Byron St, Christchurch and numbered A9, A12 - A15, A17-A18;
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions - safe bearing pressure of 50kPa or more
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, William Julius Long am: ☒ CPEng 231242 # ☐ Reg Arch #
(Name of Design Professional)

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: B.E.(Hons) (Civil)

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACENZ: ☒

SIGNED BY: William Julius Long (Signature) Julius Long
(Name of Design Professional)

ON BEHALF OF Structex Harvard Ltd. Date: 01/02/17
(Design Firm)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.
THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

GUIDANCE ON USE OF 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, Institution of Professional engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design Intended for use by a suitably qualified independent 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 design 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 2011²

PS4 Construction Review Intended for use by a suitably qualified independent design professional who undertakes 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 ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design 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 designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

*Professional Indemnity Insurance

As part of membership requirements, ACENZ 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, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers³). The Building Consent Authority is encouraged to require that the service to be provided by the Design 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.

Attached Particulars

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

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 (ACENZ/IPENZ 2004)
- 4 PN Guidelines on Producer Statements

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



ARCHITECTS



Structural Engineering Design Features Report

**80 BYRON STREET NEW OFFICE ADDITION
FOR SPAGHETTI JUNCTION LTD.**

Project: HV5604
14th December 2016



Latest issue prepared by

Reviewed by



Michael Barnes
BE(Hons), GIPENZ



Julia Clendon
Structural Engineer
BE(Hons), GIPENZ

Revision No.	Date	Engineer	Description
A	14/12/2016	MB	Concept Issue

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CONTENTS

1. General	4
2. Design Philosophy	7
3. Health, Safety and Environment	12
4. Durability	13
5. Fire	14



1. General

1.1 OBJECTIVE

This Design Features Report is intended to give an overview of the project and structural design.

The purpose of the report is to:

- Communicate key aspects of the structural design to the Client
- Provide an overview of the structural design to other members of the design team to assist with co-ordination
- Provide a summary of structural design philosophy and key parameters used to assist in peer review of the design by internal and external reviewers, and the Territorial Authority
- Communicate the assumptions, loads and structural system for future users or if alternations are made

Acknowledging that building design is an iterative process with a number of stages in the design process, we aim to update this Design Features Report at key milestones during the project, to reflect latest decisions and additional detail as appropriate, or if there is a major change in design brief.

1.2 PROJECT DESCRIPTION

This project involves a new office building adjacent to the existing warehouse and workshop located at 80 Byron Street, Christchurch. In general, this includes:

- 100m² office extension as shown in Figure 1. The location of this on the site is indicated in Figure 2.

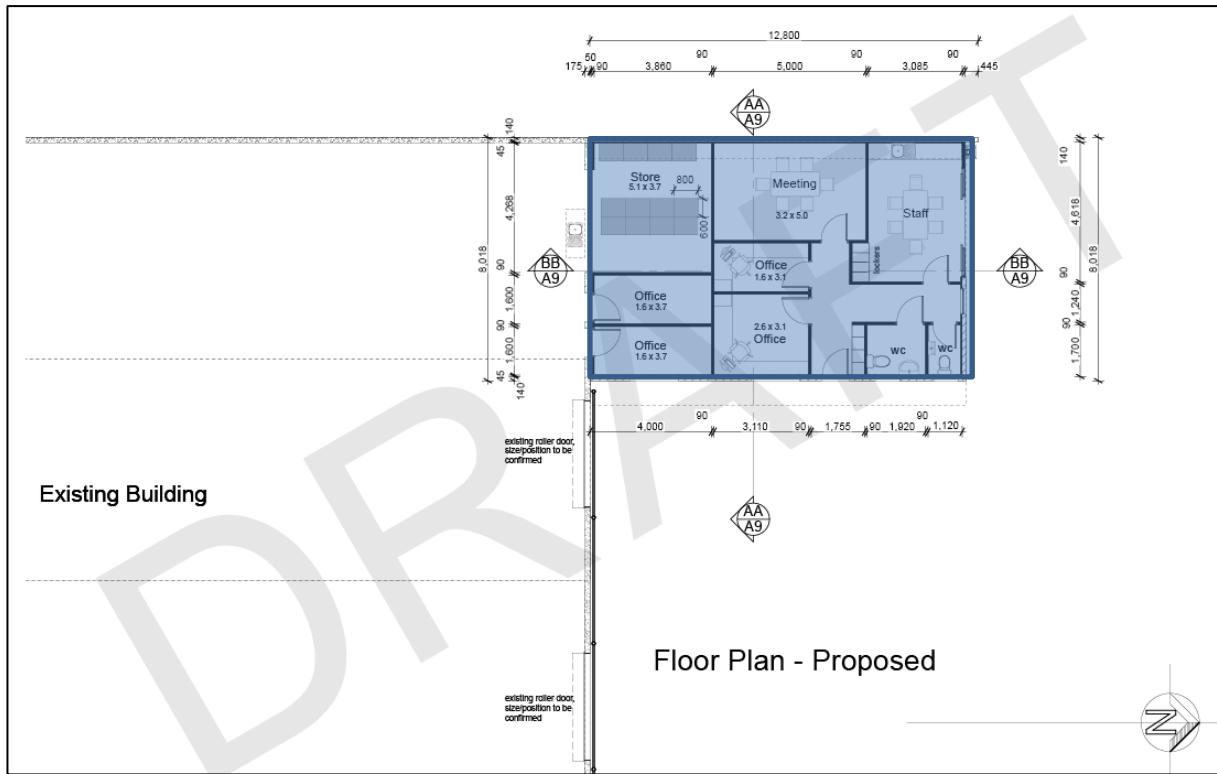


Figure 1. Proposed New Office Building

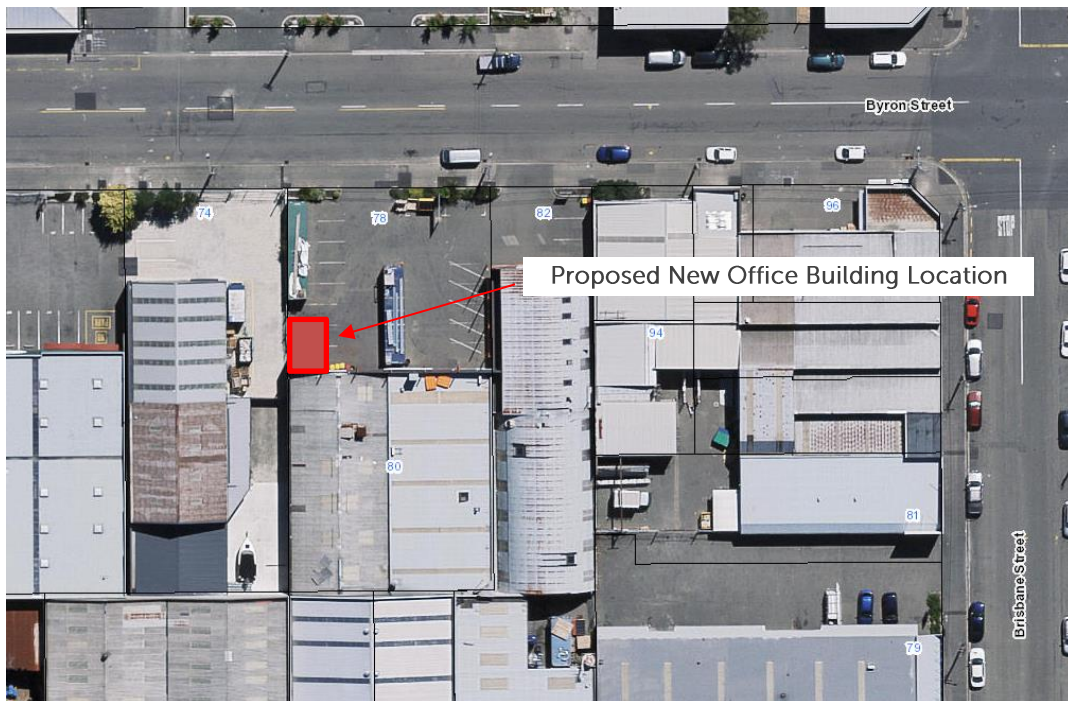


Figure 2. Aerial view of new office location

1.3 PARTIES

Client:	Spaghetti Junction Ltd.
Architect & Project Manager:	Architectural Design Group
Structural Engineer:	Structex Harvard Ltd
Fire Engineer:	Cosgroves

1.4 STRUCTEX DESIGN TEAM

Project Director and Lead Engineer:	Julius Long
Design Engineer:	Michael Barnes
Draughting:	To be coordinated with Architect

1.5 SCOPE

This Design Feature Report describes the overall structural design for the project as a means of coordination and documentation. The design roles and responsibilities of Structex Harvard Ltd. include:

- Structural engineering design of the proposed new office building located at 80 Byron Street

1.6 CONSENTING

Consenting works required for the construction works are out of our scope and are to be arranged by others.

2. Design Philosophy

2.1 OVERVIEW

The proposed new office building consists of concrete block walls on three sides and the south side opening into the existing warehouse/workshop. Cold formed DHS purlins form the roof structure of the new office building and span between load bearing walls and end walls. The new office has been designed to be seismically separate from the existing structure. Figure 3 shows a floor plan of the new office with gridlines and earthquake directions used in design.

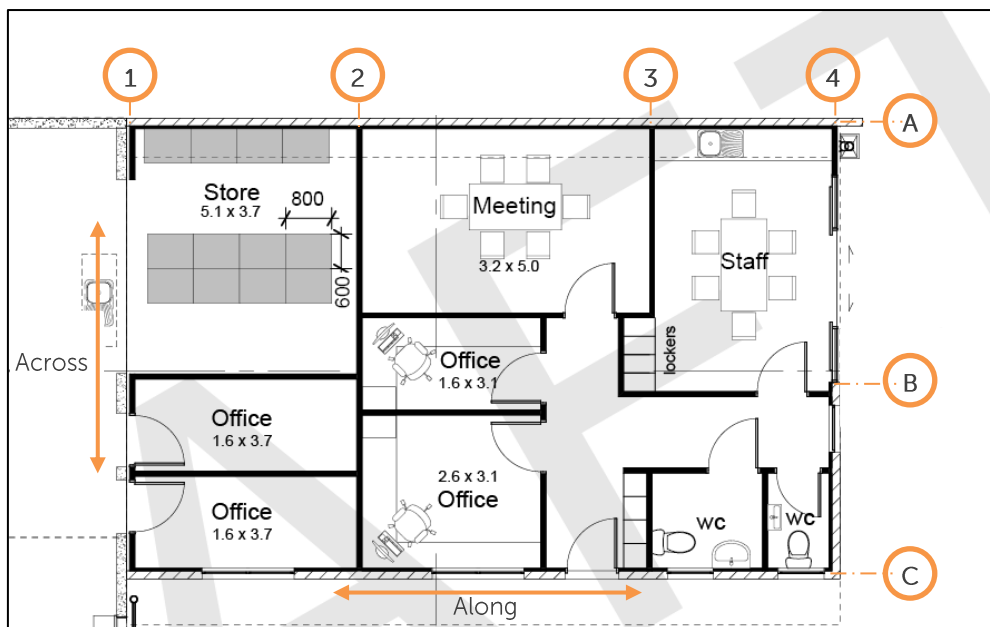


Figure 3. Gridlines and EQ Directions

2.2 GRAVITY LOAD STRUCTURE

- Lightweight steel roof cladding over Dimond DHS purlins
- DHS purlins spanning along building between load bearing internal walls and external walls
- A steel PFC beam supports the purlins along Grid 1, which is supported by 3 No. SHS posts.
- Floor is 100mm thick mesh reinforced concrete slab on compacted hardfill
- Perimeter concrete thickenings support the concrete block work walls

2.3 LATERAL LOAD STRUCTURE

Lateral loads in the new extension are described below and shown in Figure 4.

- In the along direction, lateral loads are resisted by the concrete block walls on Grids A & C which transfer loads to the foundations. Steel strap bracing distributes the roof inertial load to these walls.
- In the across direction lateral loads are resisted by timber framed shear walls on Grids 2 & 3 and a concrete block wall on Grid 4. Steel strap bracing takes the Grid 1 loads to the Grid 2 shear wall.
- Face load on concrete block walls is resisted by propped cantilever action in the along direction, and in the across direction the block walls are designed to span horizontally between the bracing lines. After fire stability of the block walls is achieved by the design and detailing of the walls to cantilever from the foundations.

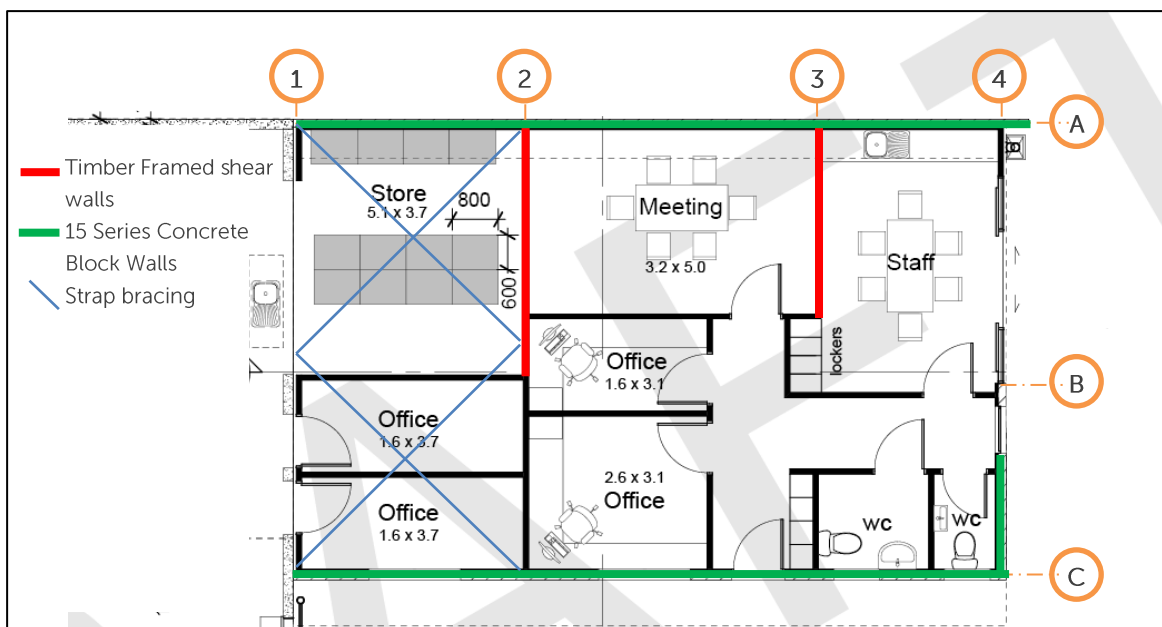


Figure 4. Lateral Load Resisting Systems

2.4 SEISMIC MODELLING

Hand calculations have been used for the load distribution based on tributary areas. Consideration has been given as to the relative stiffness's of the concrete block walls and the timber framed bracing walls. Because there is no rigid ceiling diaphragm the walls are considered to attract the loads based on their tributary area as opposed to their stiffness.

The equivalent static method of seismic load application has been used in accordance with NZS1170.5.

2.5 MEANS OF COMPLIANCE

Compliance with the New Zealand Building Code is generally via MBIE cited compliance documents. The design of the buildings has been undertaken in accordance with what we consider 'current engineering best practice'. Specifically, as follows:

- All relevant cited Standards (including amendments) within B1/VM1
- Draft updates to cited standards where more onerous than official codes, unless good engineering judgement is provided as to why we would not follow draft updates (in this case we would revert back to the cited standards)
 - NZSEE Red Book (2016 draft) for assessment of existing structures
 - NZS3101:2006 Draft Amendment 3

2.6 LOAD SUMMARY

As a minimum, design loads are generally in accordance with the loadings standard AS/NZS 1170 set.

Design Return Periods:

The proposed building importance level for the building is IL2. This is typical for 'normal use' commercial and industrial buildings that aren't used for post-disaster functions, and have an occupancy less than 300 people. This determines the return period for respective environmental loads as summarised below:

	Ultimate Limit State (ULS)	Serviceability Limit State (SLS)
Wind	1/500 year	1/25 year
Snow	1/150 year	1/25 year
Earthquake	1/500 year	1/25 year

Superimposed Dead Load Summary:

The table below summarises the proposed superimposed design loads based on the architectural drawings, building use, and requirements of AS/NZS1170.1.

Element	Description	SDL (G_{SDL})
Roof	Suspended Ceiling	0.2kPa

Roof Live Loading Summary:

Roofs do not generally have readily available access, so the design typically has been based on maintenance loads (which generally doesn't govern over wind and snow). A summary of the roof loads is provided in the table below:

Roof	Roof Use	Live Load (Q)
All Roofs	Maintenance, occasional access from ground level	0.25kPa, 1.1kN

Wind Loading Summary:

The building is very exposed to wind in all directions due to the lack of nearby obstructions and terrain. In particular, the north-west direction wind would be very strong. Accordingly, refer the summary table below for the extensions (wind capacity of the existing structure has not specifically been checked) :

Factor	Description	
Wind region	Christchurch	A7
Regional wind speed	V_{500} and V_{25}	45m/s, 37m/s
Terrain category	$M_{z,cat}$ (terrain cat 3 – Numerous closely spaced obstructions ranging from 3m-10m, $z=4m$)	0.83
Directional multiplier	M_d (any direction)	1.0
Shielding factor	M_s	1.0
Topographic multiplier	M_t	1.0
Basic wind pressure	P_u , and P_s	0.839kPa, 0.567kPa
Wind zone	Equivalent NZS3604 zone	Medium



Snow Loading Summary:

As the altitude of site is less than 100m above sea level, the design snow load is as typical for Christchurch. The table below summarises the design loads:

Factor	Description	
Snow region	Sub-alpine	N4
Ground snow	S_g	0.9kPa
Exposure reduction coefficient	C_e	1.0
Roof slope	μ_{ij} (<10 degrees typical)	0.7
Roof snow	S_u , and S_s	0.63kPa, 0.43kPa

Earthquake Loading Summary:

The design earthquake loads are based on sub-soil class D as a conservative upper limit – deep or soft soil. The table below summarises the earthquake loads:

Factor	Description	
Seismic hazard zone factor	Z	0.3
Risk factor	R_{500} , and R_{25}	1.0, 0.25
Near fault factor	$N(T,D)$	1.0
Fundamental period	T_1	0.4sec
Base seismic coefficient	$C_h(T_1)$ (sub-soil class D)	3.0
Seismic coefficient	$C(T_1)$	0.9
Displacement ductility	μ	1.25 Concrete block walls and strap bracing 3.0 Timber framed bracing walls
Seismic design coefficient	$C_d(T_1)_u$	0.728 ($\mu = 1.25$), 0.294 ($\mu = 3.0$)

3. Health, Safety and Environment

3.1 SAFETY IN DESIGN

Safety in design will continue to be considered as the design progresses, and coordinated with the other consultants as needed. Key features considered in the structural engineering design include:

- Conventional structural materials utilised
- Site welding limited

3.2 SAFETY IN CONSTRUCTION

The new office extension elements have been detailed based on conventional construction techniques, accordingly it is expected the contractor would be familiar with all construction safety requirements including fall restraint at height, mobile plant, and scaffolding.

4. Durability

4.1 COMPLIANCE

Durability issues with regard to the structural elements, and within our scope of work are implicitly covered by our design using the referenced standards for B1 (Structure). An example is concrete durability, which is addressed by providing adequate concrete strength and cover to reinforcement as specified in the Concrete Standard NZS 3101, and referred to as a compliance method in the section B2, cl 3.0 of the Building Code.

5. Fire

Structex has received and considered the project fire design report by Cosgroves, dated November 2016.

The key aspects of the fire report affecting the structural design are:

- The life safety fire resistance rating requirement is 60 minutes, including suspended floors and their supporting structure
- The Property fire resistance rating requirement is 120 minutes
- The Western external wall of the proposed extension meets the required 120 minute FRR inherent in the 15-series concrete block. The wall has also been detailed to meet the post-fire structural stability requirements of the NZBC by cantilevering above floor level.

Accessible Facilities Report Template

Applicant Information Sheet and Report Template

CCC Use Only:	Project No:	TRIM Ref:
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Project Address: 80 Byron Street, Sydenham, Christchurch

[include Level and Unit No]

If you have not used this template previously or need to reacquaint yourself on how to use this template please refer to the notes section on the last two pages for guidance notes.

All proposed features (including upgrade actions) must be shown on the plans and specifications.

COMPLETE SECTIONS 1-17 FOR BOTH NEW AND EXISTING BUILDINGS

Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
1. CAR PARKS (NZBC D1.3.5 & D1/AS1/10 (AS 2890.1), NZS 4121 SECTIONS 5 & F3)			
☐ NOT APPLICABLE (specify reason why):			
Provided at the ratio of 1 for up to 20, 2 for up to 50, plus 1 more for every additional 50 parks (or part thereof)(NZS 4121). Although this differs from our Proposed City Plan, our Planners will accept this Standard.	Sheet A2	No change	Ratio of 1 for up to 20 (NZS 4121)
Identified by the symbol of access (on ground or post)	Sheet A2	No change	Accessible parking symbol on parking surface
Location of accessible car park is either visible from a vehicle at the entrance to the car park area, or is sign posted from the entrance to the parking area.	Sheet A8	No change	Accessible sign located on wall in front of parking space between 1400 & 1700mm from the ground level
Min. 3500mm width (NZS 4121). Min. 3200mm width (AS2890.1 Fig. 2.2) but 3500mm if beside an obstruction (D1/AS1/10.1.1 Comment)	Sheet A2	No change	3,500 X 5,400 (NZS 4121)
Located on an accessible route, as close as possible to the building accessible entry	Sheet A2	No change	Accessible parking space located next to main entrance
Located on a surface with a max. 1:50 slope	Sheet A2	No change	Existing tar seal is reasonably flat 1:100

Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Located to avoid conflict between vehicles and people, and provided with direct access to an accessible route without having to pass behind parked cars	Sheet A2	No change	Parking space is located next to main entrance

2. RAMPS & FOOTPATHS (NZBC D1, D1/AS1/2.3, 3.0 & 6.0, NZS 4121 SECTION 6)

☐ NOT APPLICABLE (specify reason why):

Where the footpath surface is more than 25mm above adjacent ground, either a 75mm high kerb or a low barrier rail is required.	Sheet A2, A8	No change	A ramp with 1:20 slope and a landing 1,200X2,000X100 with a 75mm high upstand
Accessible routes have a cross fall of no more than 1:50.	Sheet A2	No change	Access routes are flat
Footpaths and ramps have a min. 1200mm clear width (1000mm between handrails)	Sheet A2, A8 & A7	No change	A ramp with 1:20 slope and a landing 1,200X2,000X100
Footpaths and ramps have non slip surface (refer D1/AS1 Table 2)	Sheet A10	No change	Refer to notes on Sheet A10
Portable ramps are not permitted.	Sheet A2, A8	No change	Ramp and landing are of concrete construction
Ramps have a max. gradient of 1:12 (preferably 1:14)	Sheet A8	No change	Ramp has a 1:20 slope
Ramps have landings top and bottom, extending 1200mm beyond any doorway or door swing. Landings may have a maximum gradient, in the direction of travel, of 1:50	Sheet A2 & A8	No change	Landing will be 1200 wide X 2000 long
All ramps have an upstand or a low rail to prevent wheel-chair wheel from running off edge	Sheet A8	No change	75mm upstand
Ramps steeper than 1:20 have handrails both sides, continuing for 300mm beyond head and foot of ramp, plus an intermediate safety rail where not against a wall or barrier (NZS 4121 Fig. 12)	Sheet A8	No change	Ramp will be 1:20 no hand rail required
Height of handrails is between 840mm and 1000mm vertically above "plane" surface of ramp	None required	No change	None required
Handrail diameter is between 32mm and 50mm (or to Fig. 26(b) D1/AS1)	None required	No change	none required
Handrails have clearance between 45mm and 60mm from wall	None required	No change	None required
Handrails have projecting ends (NZS 4121 Fig. 13)	None required	No change	None required
Ramp landings (and rest areas) allow 1200mm space clear of door swings	Sheet A2	No change	Landing will be 2,000mm long
Max. rise between landings is 750mm	None required	No change	None required

3. KERB RAMPS (D1/AS1/3.4, NZS 4121 SECTION 13) AND STEP RAMPS (NZS 4121 SECTION 6)

☐ NOT APPLICABLE (specify reason why):

Footpath portion of kerb ramp has gradient no steeper than 1:8, and no longer than 1500mm	None required	No change	None required
Road/gutter segment of kerb ramp has gradient no steeper than 1:20	Sheet A2, A8	No change	North elevation

Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Kerb ramp has no lip at common surface (gutter channel)	Sheet A8	No change	Transition from paving to ramp shall have no lip
Kerb ramp has contrasting colour and texture to adjacent footpath, gutter or road.	Sheet A2	No change	Ramp shall be of contrasting colour and texture to parking lot
Step ramps replace isolated steps, and are no steeper than 1:8, max. 190mm high, and max. 1520mm long, with min. 1200mm long landing. (NZS 4121 Fig. 16)	None required	No change	None required
4. MAIN ENTRANCE AND ALL ACCESSIBLE ROUTES, INCL. CORRIDORS, DOORWAYS & DOORS (NZBC D1.3.4(f), D1 AS1/7.0, FIG.27, NZS 4121 SECTION 7)			
☐ NOT APPLICABLE (specify reason why):			
The main entrance is on the accessible route	Sheet A2	No change	Main entrance is at the end of accessible landing
If the main entrance is not accessible, it has signage indicating location of accessible entrance.	None required	No change	None required
Preferably there are no thresholds in doorways. If they cannot be avoided, they are max. 20mm high, or 56mm high if a 1:8 max. ramp is provided both sides (NZS 4121 Fig. 17)	Sheet A6	No change	Refer to floor plan note
There are accessible routes extending from the accessible entry to all spaces that are required to be accessible, 1200mm min. width	Sheet A7	No change	Refer to dimensions on Framing plan
If existing corridors are less than 1200mm wide, doorways off it are made wider to compensate.	None required	No change	None required
Doorways have 760mm min. clear opening (unless from narrow corridors where wider clear openings are required)	Sheet A6	No change	Refer to door dimensions on floor plan
Double doors have at least one leaf which provides 760mm min. clear opening.	None required	No change	None required
Doors are colour-contrasted with their surroundings	Sheet A10	No change	Refer to notes on sheet A10
Doors with dual swing have visibility glazing panels	None required	No change	None required
Doors with full height glazing have manifestation markings 700 -1000mm above floor.	None required	No change	None required
Clear space between successive doors is 1200mm min. (Fig. 27 D1/AS1)	None required	No change	None required
Where doors open towards wheelchair, an unobstructed wall space not less than 300mm wide is required at side of door adjacent to door handle	Sheet A7	No change	Refer to door to wall dimensions on Framing plan
Forces required to open non-fire doors are within limits	Sheet A10	No change	Refer to notes on Sheet A10
5. PUBLIC FACILITIES (NZBC G5.3.4, NZS 4121 SECTION 11)			
☒ NOT APPLICABLE (specify reason why): Not a retail outlet			
Where public counters or desks are provided in reception areas, bars, shops and supermarkets, at least one is accessible, for both the public and for the staff using it.			



Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Accessible portion of counter has top of work surface 775mm max. above floor, with 675mm min. height clearance under for a depth of 540mm.			
Public telephones comply with NZS 4121 Section 11.2			
6. LIFTS (NZBC D1.3.4 (c), D2.3.5, D2/AS1/71, NZS 4121 SECTION 9)			
☒ NOT APPLICABLE (specify reason why): <i>No lifts required</i>			
Lifts are required as follows: • In all buildings with four or more floors • In a three floor building when the total gross floor area of the two upper floors is 500m² or more and the design occupancy exceeds 50 persons • In a two floor building when the gross floor area of upper floor is 400m² or more and the design occupancy exceeds 40 persons • Notwithstanding any of the above, a lift is required if an upper floor is used for: a place of assembly for 250 or more persons, public reception area for a bank, central and local government offices and facilities (including libraries), medical and dental rooms, health care centres • Notwithstanding any of the above, lifts are not required in two or three storey hotels and motels provided that the accessible accommodation units, reception office, restaurant, bars and other communal facilities are on the ground floor (NZS 4121 clause 14.4.1)			
At least one lift is on the accessible route			
Lobbies have 1800mm min. unobstructed depth in front of lift doors			
Car floor has 1400mm x 1400mm min. internal dimensions			
Doors have 900mm min. clear opening			
Doors are readily distinguishable from their surroundings			
Doors remain open for at least 5 seconds before starting to close			
Car has handrails on walls to NZBC D1/6.0 or NZS 4121 Fig. 26			
All controls are located between 900mm and 1350mm above the floor			
All controls have tactile features			
Lift indicators are provided as NZS 4121:2001 clause 9.2.5			
7. STAIRS (NZBC D1.3.4(g)(h)(i), D1/AS1/4.0, 4.2, 4.4, 4.5. NZS 4121 SECTION 8)			
☒ NOT APPLICABLE (specify reason why): <i>No stairs required</i>			
All multi-storeyed buildings that are required to be accessible have at least one accessible stair.			



Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Stair treads 310mm min.; Risers 180mm max. (of uniform height over each flight)			
Stair has 900mm min. width between handrails			
Landings have 900mm min. depth (1200mm recommended)			
Max. total rise of 2500mm between landings			
No open risers, no winders, no spiral stairs			
Nosings are rounded, and colour contrasted with rest of tread			
Colour-contrasted change of floor surface texture are provided at head and foot of stair. (NZS 4121 Fig. 22)			
8. STAIR HANDRAILS (NZBC D1.3.4(i), D1/AS1/6.0, NZS 4121 SECTION 8.6)			
☒ NOT APPLICABLE (specify reason why): No hand rails required no stairs and have 1:20 slope on ramp			
Are provided on both sides of the stair			
Have no obstruction to the passage of the hand along the rail			
Are continuous around landings (except at doorways)			
Extend 610mm min beyond the foot of the stair and 300mm min beyond the head of the stair			
At the same slope as the pitch line			
Between 900mm and 1000mm above pitch line			
Profiles are to D1/AS1 Fig. 26(b)			
Have no projecting ends, and have domed buttons 150mm from the ends (NZS 4121 Fig. 23)			
9. TOILET FACILITIES (NZBC D1.3.2 (c) & G1.1 & 1.3.4 G1/AS1, NZS 4121 SECTION 10)			
☐ NOT APPLICABLE (specify reason why):			
Accessible toilets are on the accessible route			
Route to accessible toilets does not traverse different tenancies			
Minimum dimensions of space are 1900mm x 1600mm, and the layout of fittings is correct			
In certain large buildings having more than 300 occupants, accessible toilets are evenly distributed			
If doors are hinged, they swing outwards unless the space is sufficiently large (sliding doors are also acceptable)			
Door has 760mm min. clear opening (with 1200mm clear space in any lobby between door swing arcs)			
If hinged, the door has a grab rail on inner face			



Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Indicator bolt is of sufficient size so as to be usable by person with limited hand movement			
Horizontal leg of grab rail beside WC pan is fixed 700mm above floor			
Vertical leg of grab rail is fixed between 150mm and 250mm from front of WC pan			
Top of WC pan seat is 460mm above floor			
Front edge of WC pan is 700mm - 750mm from wall behind it			
Toilet paper holder is located in the correct zone			
Washbasin has 675mm min. underside clearance from floor, and is located 300mm min. from the front of the WC pan			
Taps on washbasin have capstan or lever handles (hot tap to left of cold tap)			
Any nappy-changing tables do not intrude into the wheelchair manoeuvring space			
10. SHOWERS (NZBC G1.3.4, G1/AS1/TABLE 9, NZS 4121 SECTION 10)			
☒ NOT APPLICABLE (specify reason why): <i>No shower required</i>			
If the building requires showers, at least one is accessible. If the building use does not require showers, but has two or more showers, at least one is accessible (BIA News No.131)			
Minimum internal dimensions of combined toilet/shower space are 2100mm x 1900mm			
Accessible shower is on an accessible route			
If doors are hinged, they swing outwards unless the space is sufficiently large (sliding doors are also acceptable)			
Shower door has 760mm min. clear opening			
Shower has self draining floor with no lip or upstand			
Floor covering is of impervious, non-slip material			
Grab rail is of correct shape, size and position			
Mixing valve is lever-operated, and is fixed 1100mm above floor			
Hand-held shower rose on flexible hose			
Shower head can be fixed to slide rail between 1000mm and 1900 mm above floor. Slider rail is to be as strong as a grab rail			
Shower seat is 800mm min. length x 450mm, in correct position			
Clothes-hanging device is located between 1200mm and 1350mm above the floor			



Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
11. DOOR & WINDOW CONTROLS AND LIGHT SWITCHES (NZBC D1.3.4(f), G9/AS1, NZS 4121 Sections 4,7, C5)			
☐ NOT APPLICABLE (specify reason why):			
Doors can be opened with one hand	Sheet A10	No change	Refer to note on sheet A10
Door handles are fixed between 900mm and 1200mm (1000mm optimum) above floor	Sheet A10	No change	Refer to note on sheet A10
Door handles are lever action, with end returned towards door (knob handles are not permitted)	Sheet A10	No change	Refer to note on sheet A10
Door closers have minimum tension required to bring door to closed position	Sheet A10	No change	Refer to note on sheet A10
Electronic access units are located as NZS 4121 clause 4.11.5	None required	No change	None required
Window locking and opening controls are located between 900mm and 1200mm above the floor	Sheet A11	No change	Refer to Cross Section A-A
Light switches throughout building are horizontally aligned with door handles	Sheet A10	No change	Refer to sliding door detail and notation
Socket outlets are located 500 -1200mm above the floor	Sheet A10	No change	Refer to sliding door detail and notation
12. VISIBILITY FACTORS (NZBC F2, G7 AND G8, NZS 4121 215, D1/AS1/1.5.4 & 1.8)			
☐ NOT APPLICABLE (specify reason why):			
All signs, information boards and all elements of accessible routes are well illuminated	Sheet A10	No change	Refer to notes
Check D1/AS1 1.5 "Obstructions"	None required	No change	No obstructions in building
13. ALERTING DEVICES (F7/AS1/2.1, NZS 4121 CLAUSES 4.12 & 4.13)			
☐ NOT APPLICABLE (specify reason why):			
Alerting devices (where required) have both audible and visual signal (see 'ACCESSIBLE ACCOMMODATION' section 16)		No change	Refer to fire report
14. PLACES OF ASSEMBLY, ENTERTAINMENT & RECREATION (D1/AS1/8.0, G5.3.5, NZS 4121 Sections 12, H)			
☒ NOT APPLICABLE (specify reason why): Not a place of entertainment/recreation			
Where a sound amplification system is installed, it has a listening system for people with hearing aids			
Two wheelchair spaces are provided for up to 250 seats, plus one for every additional 250			
Wheelchair spaces are located amongst other seating, and evenly distributed where possible			
An accessible route is provided to podium or stage area, including to all back-stage areas (portable ramps are not permitted)			
Swimming pools have unaided access into the water (preferably by a ramp at max. 1:12 slope)			
Sports tracks and fields are accessible			



Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)						
15. SIGNS (BUILDING ACT CL. 47A(5), NZBC G5.3.5, 5.3.6 & F8.3.4, F8/AS1/5.0, NZS SECTIONS 3.6 & 4.8)									
☐ NOT APPLICABLE (specify reason why):									
Signs are positioned on walls, doors, etc, between 1400mm and 1700mm above the floor	Sheet A10	No change	Refer to sheet A10						
International symbol of access is displayed outside the building or so as to be visible from outside it.	Sheets A2, A8	No change	Refer to East elevation						
Access symbol on main information board(s) identifies location of lift, accessible routes, toilets, rooms with listening aids, etc.	Sheet A10	No change	Refer to note on sheet A10						
Accessible toilets / showers are identified with an access symbol on entrance door.	Sheet A10	No change	Refer to notes on sheet A10						
All symbols have correct proportional layout, lettering and colour contrast with background.	Sheet A10	No change	Refer to notes on sheet A10						
Identify facilities: • accessible car park spaces • accessible entrance • services available in building • accessible routes, lifts and / or stairs • toilet / shower facilities • rooms with listening aids	Sheet A2, A8, A10	No change	Refer to all sheets and notation						
16. ACCESSIBLE ACCOMMODATION UNITS (NZS 4121 SECTION 14, D1/AS1/9.0, G3.1(c), G9/AS1)									
☒ NOT APPLICABLE (specify reason why): <i>Not an accommodation provider</i>									
In hotels, motels, hostels, halls of residence, holiday cabins, groups of pensioner flats, boarding houses, guest houses, old peoples homes, and other buildings providing accommodation for the public, accessible units (including kitchen, bedroom, shower/toilet arrangement, laundry and all other accessible features and route requirements) are provided as follows: <table border="1"> <tr> <td>Total guest units</td><td>1-10</td><td>11-25</td></tr> <tr> <td>Accessible units required</td><td>1</td><td>2</td></tr> </table> For every additional 25 guest units, 1 accessible unit is required.				Total guest units	1-10	11-25	Accessible units required	1	2
Total guest units	1-10	11-25							
Accessible units required	1	2							
An accessible car park is available at the main accessible entrance to assist those booking in/out									
Reception counters are accessible (see 'PUBLIC FACILITIES' on page 3)									
In hotel or motel complexes, an accessible telephone and toilet is available in public areas for guests, casual patrons and staff									
Bedrooms, sitting and dining areas, kitchens and laundries have 1500mm dia. wheelchair turning circle									
If the unit has kitchen and/or laundry facilities, these are fully accessible (refer to NZS 4121 Section 14 for detailed requirements)									
If a building has common laundry facilities, at least one of these is accessible (BIA News No.67 Pg. 2, 3)									

Required Feature	Reference where found on drawings / specification, e.g. sheet 3, detail 2. (all buildings)	Current Situation (existing buildings only)	Upgrade action proposed under Sections 112 or 115 of the Building Act. (existing buildings only)
Socket outlets are fixed between 500mm and 1200mm above the floor, at least 500mm from internal corners of rooms, and within a 500mm horizontal dimension from the front edge of any bench or fixed unit			
Telephone, television and radio controls, wardrobe rails, curtain pull cords, are easily reachable			
At least one room light has a bedside switch			
Where an ablution block contains communal toilet/shower facilities, there is also one or more all-gender accessible toilet/shower(s) provided			
17. OTHER FACILITIES USED BY PEOPLE WITH DISABILITIES (in order for persons with disabilities to carry out 'normal activities and processes in that building' as Building Act 2004 section 118(1)(b))			
☒ NOT APPLICABLE (specify reason why): <i>Not a retail outlet</i>			
Fitting rooms in clothes shops (or the like) having 1500mm dia turning circle, clothes hooks at 1350mm max. above floor (or two adjoining rooms of a similar overall size, with a drawable curtain between)			

COMPLETE IN FULL FOR ALL EXISTING BUILDINGS

Report Prepared by: *Adrian Ellis*

Contact Details: **Phone:** [Day]: 075782899 **Mobile:** 0211892850 **Email:** *Adrian@architecturaldesigngroup.co.nz*

Has a site visit been carried out? ☐ Yes ☒ No **Date of Visit:** 06/01/2017

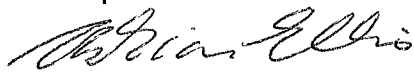
Has the building previously been upgraded?

☐ No

☒ Unknown

☐ Yes - provide details, e.g. project number(s):

I declare that this report is a true and accurate reflection of the accessible features currently in the building.

Signed:  **Dated:** 16/02/2017

Signature of: *Adrian Ellis* ☐ Owner / ☒ Agent [on behalf of and with the consent of the owner]

[print name]

The following pages are guidance notes and do not need to be submitted to Council with your application.



14 March 2017

Our Ref: 47003 - Rev 1

Julius Long
Structex Harvard Ltd
248 Montreal Street,
Christchurch, NZ
Email: JLong@structex.co.nz

**RE: 80 BYRON STREET, SYDENHAM
GEOTECHNICAL LETTER FOR PROPOSED EXTENSION**

Dear Mr Julius Long

1.0 INTRODUCTION

Engineering Design Consultants Ltd (EDC) has been engaged to provide a brief geotechnical investigation and soil bearing assessment for the proposed extension of the western warehouse building at 80 Byron Street in Sydenham, henceforth referred to as 'the site'. The new single storey extension will be used as offices.

1.1 Site Identification

The site's legal description is Lot 1 DP 449853. The property is rectangular, covers an area of 1280m² and is located on the south side of Byron Street in Sydenham, as shown below on Figure 1:



Figure 1: Site Location

1.2 Proposed Extension

The client has provided an extension drawing set, drafted by Architectural Design Group (ADG) Ltd (Ref: 5996; January 2017) for the proposed offices.

These drawings indicate that the proposed extension is to be situated near the northwest corner of the existing west building, as shown on Figure 1 above. The drawings also indicate that the extension is approximately 13m long (north-south), 7.8m wide (east-west) and one-storey. The foundation is proposed to be a concrete slab and is to be tied into the existing buildings concrete slab.

A copy of the proposed extension drawings is attached in Appendix A.

2.0 NEARBY GEOTECHNICAL INVESTIGATION

The site owner has supplied a geotechnical report completed for the property at 83 Byron Street (approx. 40m northeast of extension; see Figure 1) by Engco Consulting Engineers (Ref: 16363) in January 2017. The following is a summary of relevant information:

- Engco undertook 2 No. Cone Penetration Tests (CPT') and 2 No. Hand Augers (HA's) across the site. The HA's indicated that the shallow ground profile consists gravel fill to 0.3m below ground level (bgl), underlain by clayey silt to 2.0m bgl.
- Groundwater was not encountered during the HA's.
- Estimated '*Free-Field*' index (upper 10m) ground settlements, based on the on-site CPT's, range between 60mm and 90mm under SLS 2 (0.19g 6.0Mw) earthquake conditions and 90mm to 115mm under ULS earthquake conditions. Very little settlement is anticipated in the upper 4.5m under SLS or ULS conditions.
- The risk of lateral spreading as a result of liquefaction is considered low and the risk of lateral stretch is considered to within the MBIE minor to moderate category (less than 200mm).
- Due to the liquefaction risk, conventional shallow foundations are not recommended.
- A piled foundation is considered a viable solution for a single-storey warehouse building. It is anticipated that piles would need to be founded at 12.5m bgl. The CPT's indicated that the soil layer between 12m and 16m bgl has sufficient bearing capacity (>15MPa) and thickness for deep piles.

Based on the level of estimated settlement from the Engco on-site CPT's, the ground performance in a future earthquake event would be considered equivalent of CERA Technical Category 3 (TC3) if the site were residential.

The Engco geotechnical report is available upon request.

3.0 DESK BASED INFORMATION

3.1 Historical Imagery

Historical aerial imagery indicates that the site was residential in 1941, with two dwellings located in the northern half of the property (not covering location of the current building). Between 1941 and 1994 the site was subject to several developments, none of which were in the area of the proposed extension. By 1994 the site appeared as it does currently (March 2017).

3.2 Historical Land Use

The Environment Canterbury (ECan) Listed Land Use Register (LLUR) holds all known information about Hazardous Activities or Industries (HAIL) that have historically (and/or currently) taken place on the site or within the vicinity of the site.

The ECan LLUR indicates that a known HAIL activity has not occurred on the site, however there are two properties identified on the LLUR within 50m as follows:

- 71 Byron Street, located approximately 45m northwest of the site. This portion of land has been listed for 'F4 – Motor Vehicle Workshops'. The impacts of this HAIL activity have not been investigated as the activity is on-going.
- A small portion of land in the northeast corner of 83 Byron Street, located approximately 45m northeast of the site has been listed for 'A17 – Storage tanks or drums for fuel, chemicals or liquid waste'. This HAIL activity was investigated in 2011 during decommissioning and soil testing results indicated that hydrocarbons were present in the soil, though the level of contamination was below industrial/commercial guideline values.

These nearby HAIL activities are considered unlikely to present a geotechnical constraint for the proposed extension.

The ECan LLUR is attached in Appendix B.

3.3 New Zealand Geotechnical Database

3.3.1 CERA Technical Classification

The site is located in an un-zoned CERA area as it is non-residential.

3.3.2 Geology and Hydrology

The GNS Geological QMap shows the site as being located on '*Modern river floodplain/low-level degradation terrace. Un-weathered, variably sorted, gravel/sand/silt/clay*'. Nearby geological investigation data suggests that the ground profile in vicinity of site (~50m northwest) consists 0.8m of fill, underlain by silt with occasional sand to 4.5m bgl and fine to medium sand from 4.5m to at least 15.0m bgl.

The GNS 'Depths to Water Table' maps indicate that the mean depth of groundwater is generally 0.0m – 2.0m bgl in the area of the site. The EQC 'Event Specific Depths to

Water Table' maps indicate that the depth to groundwater was generally closer to 1.0m – 2.0m bgl for each of the major 2010/2011 earthquakes.

3.3.3 Seismic

The EQC 'Vertical Ground Movements' map indicates that the area of the might have subsided between 100mm and 200mm following the 2010/2011 Canterbury Earthquake Sequence.

The EQC 'Horizontal Ground Movements' map indicates that the area of the site may have experienced 170mm of lateral movement in a south-westerly direction. However this amount of movement is highly consistent for the surrounding area.

EDC has reviewed post-earthquake aerial photos taken for the 2010/2011 Canterbury Earthquake sequence. No liquefaction ejecta was evident on-site or on surrounding areas following any of the major earthquakes during the 2010/2011 Canterbury Earthquake Sequence. Additionally, EQC did not observe any ground cracks on-site or within the surrounding area following the 2010/2011 earthquakes.

Estimated Peak Ground Accelerations (PGA's) for the site, based on a model by Bradley et al, indicate that the site experienced a median PGA of 0.33g during the February 2011 event (greatest shaking at the site) and therefore, the site can be considered 'sufficiently tested' to a Serviceability Limit State (SLS) earthquake event, but not to an Ultimate Limit State (ULS) earthquake. It is noted that the site was not 'sufficiently tested' during any of the other 2010/2011 earthquakes.

Important Notice

This section (Section 3.3) and information where NZGD has been referenced in this document was created from maps and/or data extracted from the Canterbury Geotechnical Database (<https://canterburygeotechnicaldatabase.projectorbit.com>), which were prepared and/or compiled for the Earthquake Commission (EQC) to assist in assessing insurance claims made under the Earthquake Commission Act 1993. The source maps and data were not intended for any other purpose. EQC and its engineers, Tonkin & Taylor, have no liability for any use of the maps and data or for the consequences of any person relying on them in any way. This "Important notice" must be reproduced wherever this information or any derivatives are reproduced.

It is understood that damage to the existing building from the earthquakes was light and limited.

3.4 Seismic Subsoil Classification

Based on the above, a seismic subsoil classification 'Class D –Deep or Soft Soil', as defined in NZS 1170.5 is considered appropriate for the site.

3.5 Flooding

The Christchurch City Council (CCC) has indicated that the site is located within a District Plan Flood Management Area (FMA) and therefore a Finished Floor Level (FFL) of 14.39m RL is required for new building at the site. LiDAR information indicates that the average ground level at the site is 13.82m RL, approximately 0.6m below the required FFL.

4.0 INTRUSIVE WORKS

4.1 Rational

Due to the relatively small footprint of the proposed extension and the lack of earthquake related ground damage at and within vicinity of the site, it was considered that two shallow intrusive holes would be adequate to gain an understanding of the ground conditions and that deep investigation/liquefaction analysis was not necessary.

4.2 Investigation

EDC visited the site on 03 March 2017 to undertake the shallow intrusive investigation to determine the subsoil conditions.

Two exploratory holes comprising a Hand Auger (HA) and Scala Penetrometer (SC) were undertaken at either end of the proposed extension footprint, as indicated below on Figure 2:

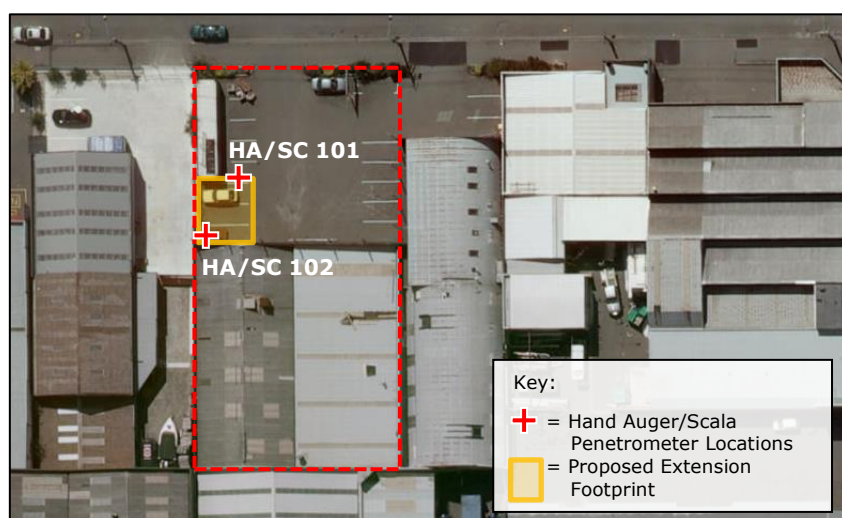


Figure 2: Intrusive Investigation and Extension Locations

Both HA's were drilled to the target depth of 3.2m below existing ground level (begl). SC 101 extended to its target depth of 3.9m begl and SC 102 extended to its target depth of 2.9m begl.

4.3 Ground Summary

Table 1 below is a summary of the ground profile encountered during EDC's HA's:

General Range (begl)	Depth	Ground Description	Density/ Consistency	Water Content
Surface to 0.025m		Asphalt	-	-
0.025m to 0.40m/0.50m		FILL - Fine to coarse sandy gravel with occasional cobbles (hardfill)	Medium dense	-
0.4m to 0.65m/0.75m		FILL - Dark grey organic silt with occasional ash and fine sand	Soft to firm	Moist to wet

General Range (begl)	Depth	Ground Description	Density/ Consistency	Water Content
0.65m to 2.50m		Light grey mottled orange clayey SILT	Firm to stiff	Moist to wet. Saturated from 1.8m/1.9m
2.50m to at least 3.20m		Bluish grey fine to medium sandy SILT	Firm	Saturated

Table 1: Summary of Ground Profile

Groundwater was encountered at 1.8m begl in HA 101, rising to 1.6m begl after one hour. Groundwater was encountered at 1.9m begl in HA 102.

A 150mm diameter plastic pipe was encountered at 0.9m depth in HA 102. Additionally, the natural soil below 1.0m at the location of HA 102 had a greenish colour and produced a slight hydrocarbon smell. It was not clear if the two changes in the soil are related.

A copy of the exploratory hole logs are attached in Appendix C.

4.4 Geotechnical Ultimate Bearing Capacity

The Scala Penetrometer results have been assessed for the approved bearing strata using a correlation between Scala blowcount and allowable bearing capacity by Stockwell, 1977. Using this correlation, the Scala Penetrometer results indicate that the Geotechnical Ultimate Bearing Capacities (UBC) shown in Table 2 can be assumed:

Soil Type	UBC (kPa)
Fill	150
Natural Silt (upper 3.0m)	300

Table 2: Available UBC

A copy of the Geotechnical UBC graph is attached in Appendix D.

5.0 CONCLUSIONS & RECOMMENDATIONS

No historical activities have been identified that are likely to present geotechnical constraints for the proposed extension.

It is understood that damage to the existing building from the earthquakes was light and limited.

A geotechnical report for the adjacent land to the north indicates estimated '*Free-Field*' index ground settlements of between 60mm and 90mm under 'worst case' SLS earthquake conditions and 90mm to 115mm under ULS earthquake conditions.

The risk of lateral spreading as a result of liquefaction is considered low and the risk of lateral stretch is considered to within the MBIE minor to moderate category (less than 200mm).

Notwithstanding the above, estimated Peak Ground Accelerations (PGA's) for the site, indicate that during the February 2011 event (greatest shaking at the site) the site was considered 'sufficiently tested' to a Serviceability Limit State (SLS) earthquake event. Following this event no liquefaction ejecta was evident on-site or on surrounding areas.

The liquefaction analysis for the adjacent site indicates that little settlement is anticipated in an SLS or ULS event in the upper 4.5m despite a groundwater of 0.5m being used in the analysis. Based on this and the lack of significant earthquake damage from the Canterbury Earthquake Sequence it is considered that shallow foundation types are suitable for the proposed lightweight building extension.

The GNS 'Depths to Water Table' maps indicate that the mean depth of groundwater is generally 0.0m – 2.0m bgl in the area of the site. The EDC HA's indicated groundwater to be at approximately 1.6m depth.

EDC's HA's encountered a consistent soil profile comprising: 25mm asphalt, hardfill to approximately 0.45m depth, fill comprising dark grey organic silt to approximately 0.7m depth, firm to stiff silt to at least 3.2m depth.

The Scala Penetrometer results indicate the following Geotechnical Ultimate Bearing Capacities (UBC) can be assumed:

Soil Type	UBC (kPa)
Fill	150
Natural Silt (upper 3.0m)	300

The Christchurch City Council (CCC) has indicated that the site is located within a District Plan Flood Management Area (FMA) and therefore a Finished Floor Level (FFL) of 14.39m RL is required for new building at the site. LiDAR information indicates that the average ground level at the site is 13.82m RL, approximately 0.6m below the required FFL.

6.0 RECOMMENDATIONS

Based on the CCC floor level requirements to mitigate flood risk it is recommended that an assessment of the design implications for the extension is undertaken by the architect and structural engineer for the project.

It is understood that the preferred foundation for the proposed extension is a slab on grade. This is considered a suitable foundation type. The proposed extension is understood to be light weight (distributed load of less than 15kPa). The fill encountered on the site is hardfill to 0.5m over 0.25m thick organic silt fill. Settlement of the topsoil is considered unlikely to be significant (<10mm) if the foundation loads were above the organic fill. In view of this it is considered that the slab foundation can be founded above the organic fill, on the basis that the assumed distributed load of <15kPa is correct. A UBC of 150kPa should be assumed for design. A 300mm thick layer of compacted AP65 should be placed beneath the concrete slab. A layer of geotextile (Bidim A19 or equal) should be placed on the base and sides of the excavation. A layer of geogrid (Cirtex Duragrid 30/30 or equal) should be placed over the geotextile.

The foundation should be designed by a Chartered Professional Engineer.

The gravel hardfill should extend laterally a distance beyond the building footprint that is equal to the depth of gravel. Over excavation will not be possible along the southern and western sides of the excavation due to the site boundary and the existing building. As such, a Chartered Structural Engineer should design the new section of slab to suitably tie into the existing slab and cantilever along the western side.

It is recommended that services (particularly drainage) are not located below the new foundation. All services in the area of the new foundation should therefore be identified (such as the pipe identified at HA 102) and re-aligned (if required) as part of the final design.

It is not likely that dewatering of the excavation will be required.

Advice from a suitably qualified Geotechnical Engineer should be sought if ground conditions different to those encountered in the intrusive investigation are observed during foundation construction works.

Any filling work should be undertaken in accordance with NZS 4431:1989 Code of Practice for Earthfill for Residential Development and MBIE Module 5A: Specification of ground improvement for residential properties in the Canterbury region (MBIE & NZGS, 2015). Validation testing of the compacted gravel should be undertaken and signed off by a suitably experienced Geotechnical Engineer.

PREPARED BY:



Blair Griffiths

Dip Civil Eng GIPENZ
Geotechnical/Geoenvironmental Technician

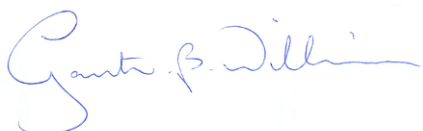
CHECKED BY:



Giles Learman

BSc (Hons) CGeol FGS
Geotechnical Team Leader - Canterbury

AUTHORISED BY:



Gareth B Williams

MSc(Eng) CPEng MIPENZ IntPE(NZ) MInstD MEIANZ
Snr Geotechnical Engineer, Director

LIMITATIONS

Except where required by law, the findings presented as part of this report are for the sole use of our client, as noted above. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing.

To the extent permitted by law, EDC expressly disclaims and excludes liability for any loss, damage, cost or expense suffered by any third party relating to or resulting from the use of, or reliance upon any information contained in this letter. It is the responsibility of third parties to independently make enquiries or seek advice in relation to their particular requirements.

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness. Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this letter are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

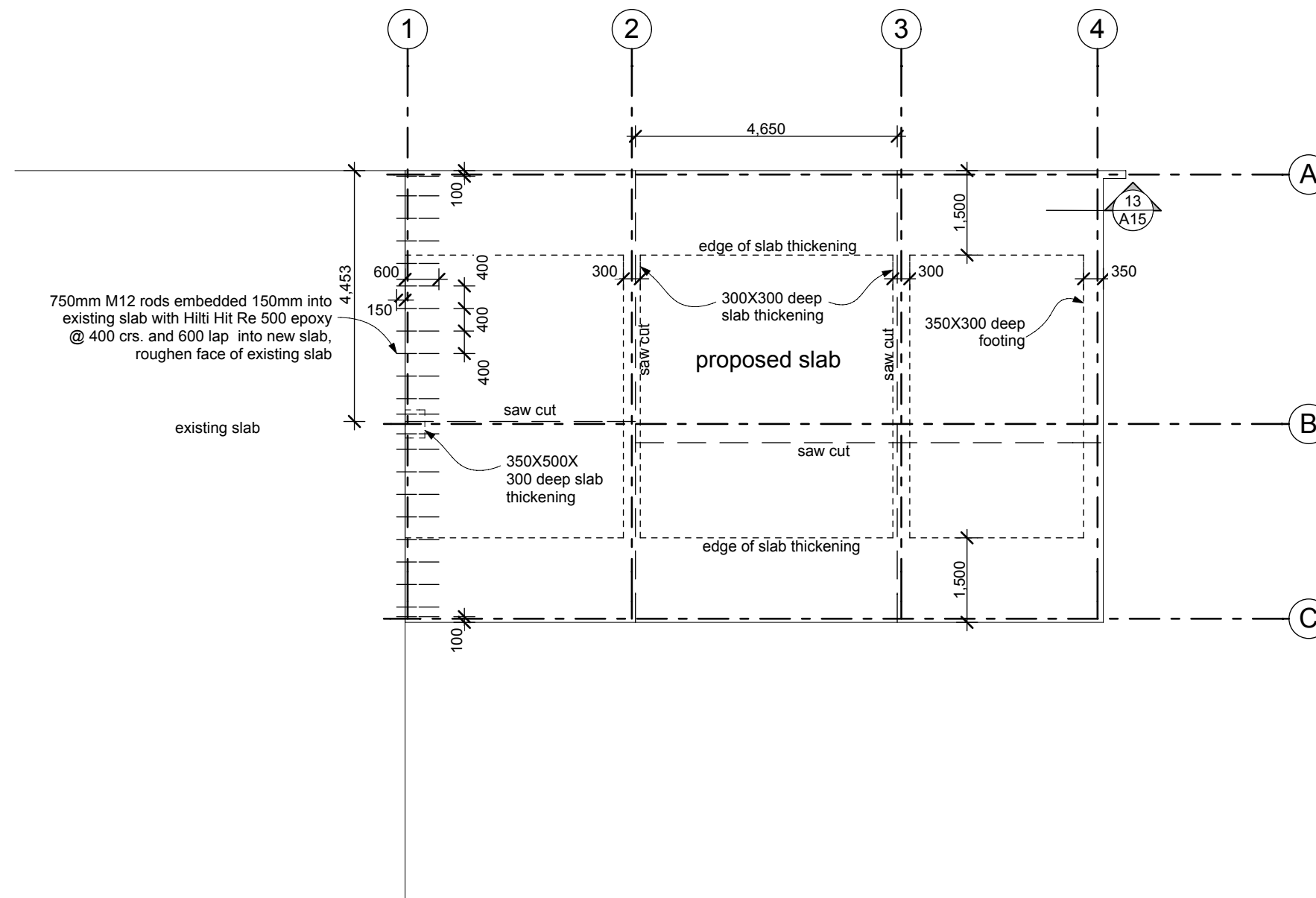
Appendices:

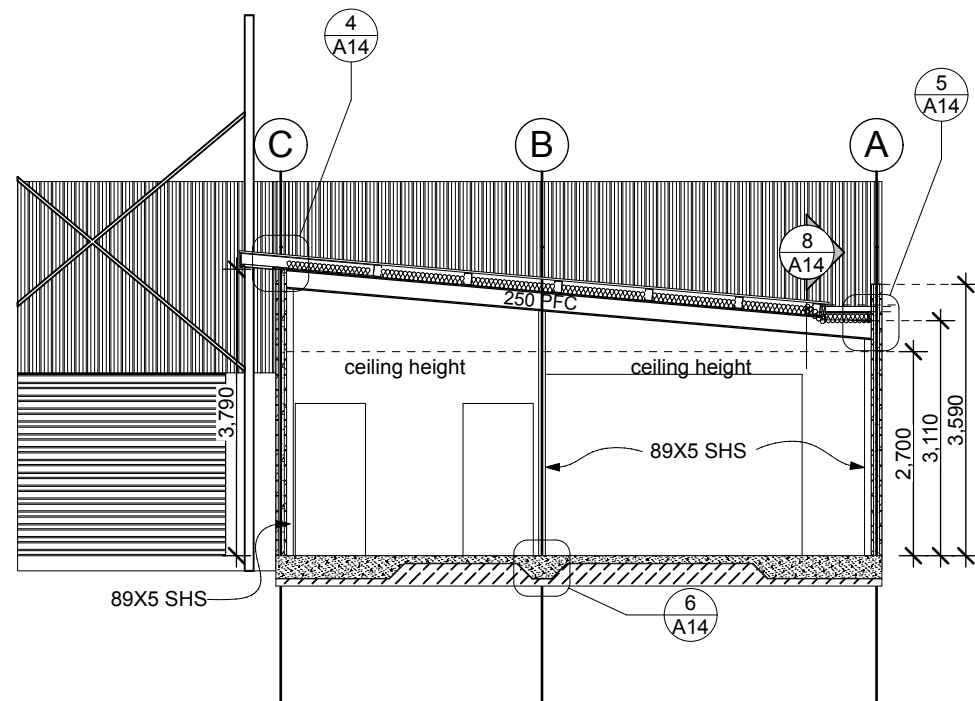
- Appendix A – Proposed Extension Drawing Set by Architectural Design Group (ADG) Ltd (Ref: 5996)
- Appendix B – Environment Canterbury Listed Land Use Register
- Appendix C – Exploratory Hole Logs
- Appendix D – Geotechnical Ultimate Bearing Capacity Graph

Appendices should be read in conjunction with letter and this letter should not be considered complete without them.

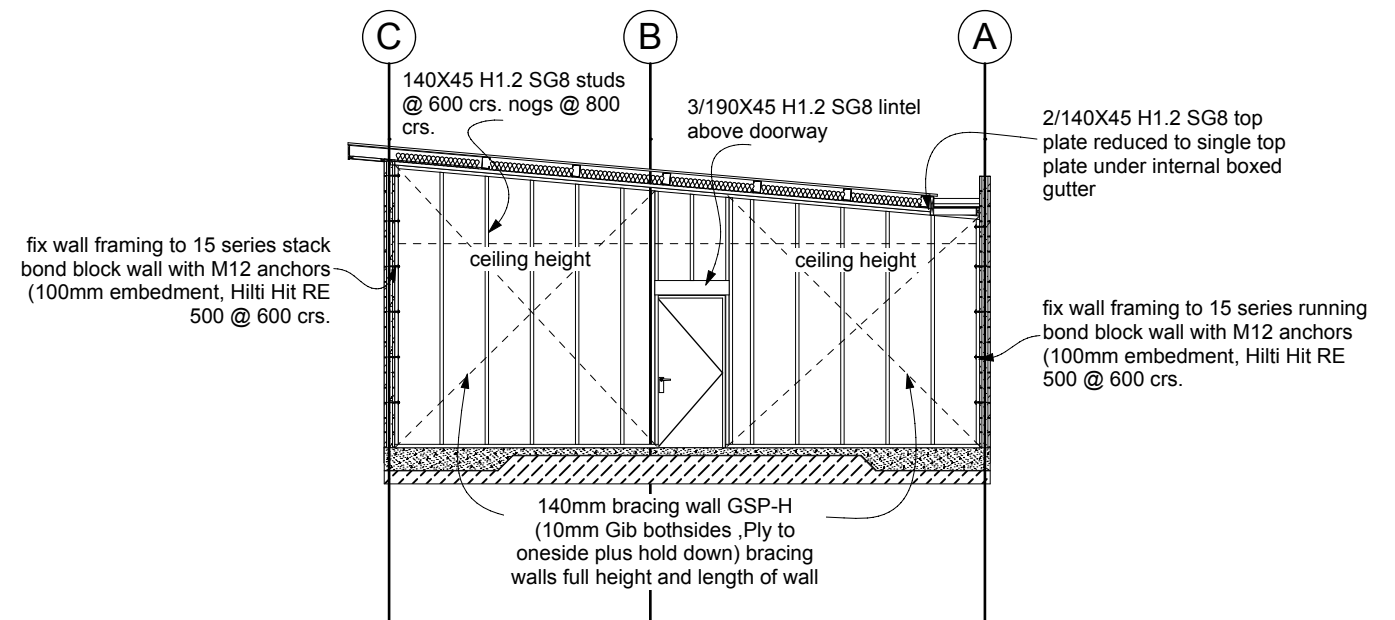
APPENDIX A

Proposed Extension Drawing Set by Architectural Design Group (ADG) Ltd (Ref: 5996)

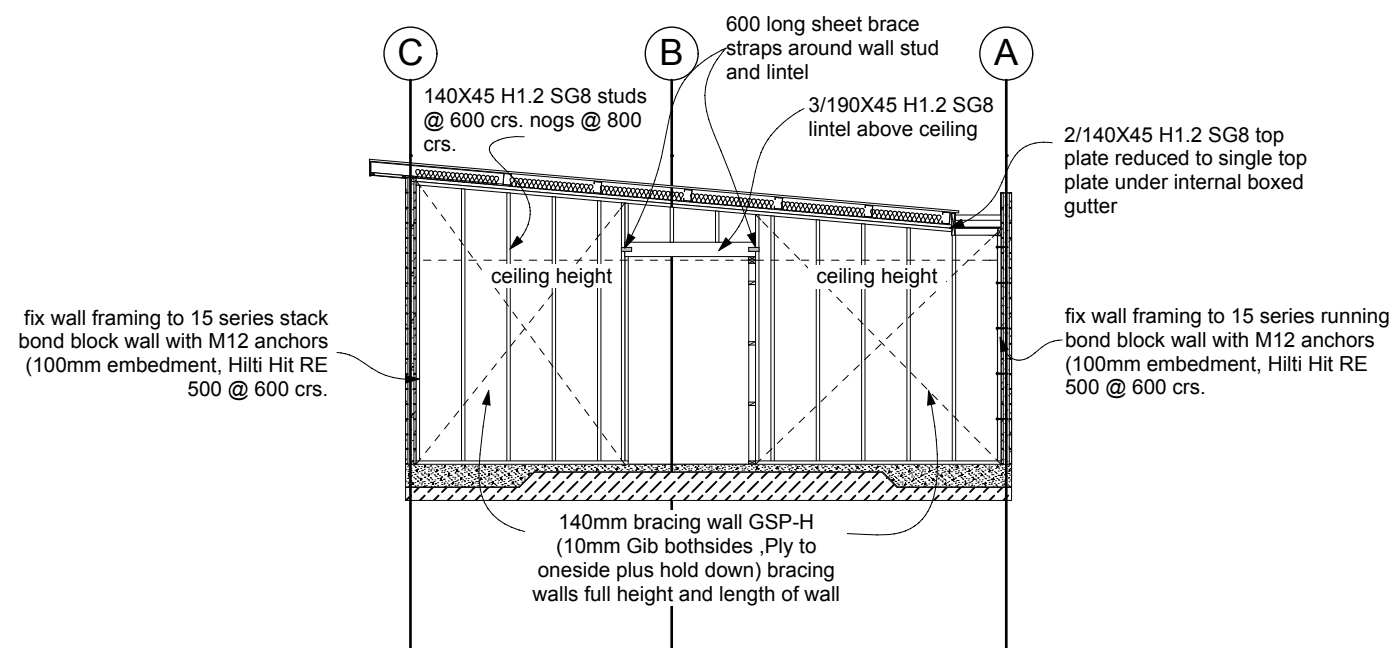




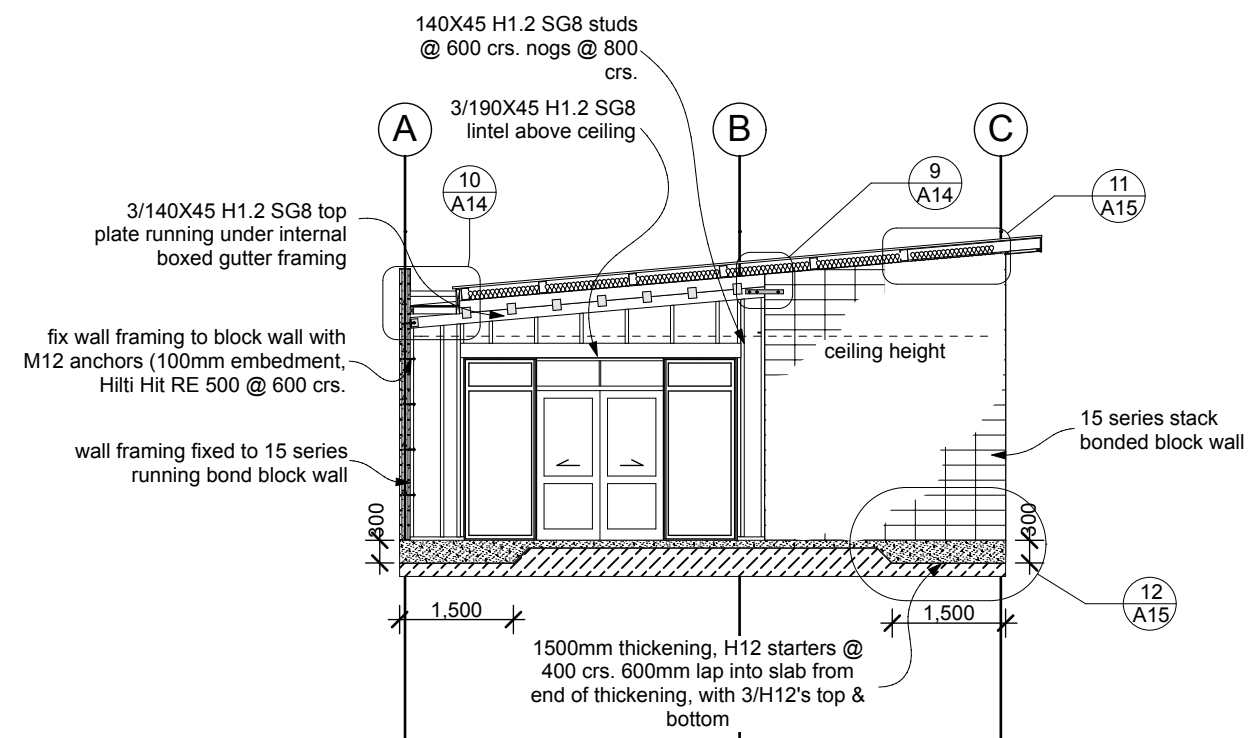
Gridline 1 Cross Section



Gridline 2 Cross Section



Gridline 3 Cross Section

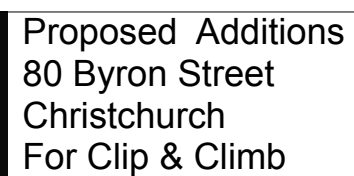
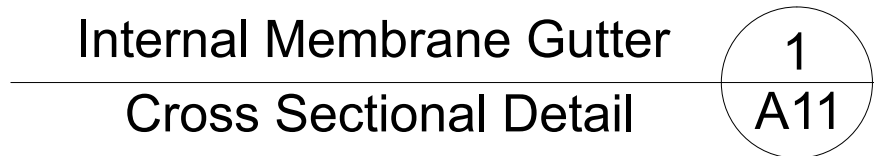


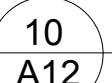
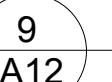
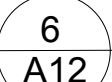
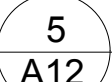
Gridline 4 Cross Section

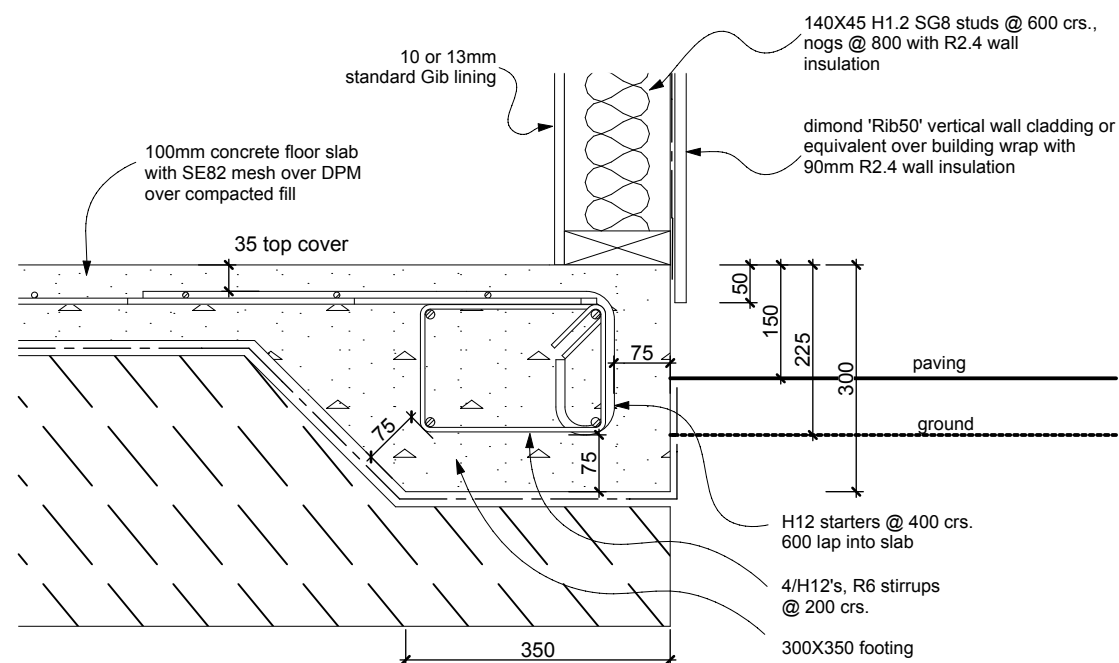
NOTE:
15 series block walls on grids A & C

- H12's @ 400 crs. verticals
- D16's @ 200 crs. horizontal in 3 courses by roof connection.
- H12's @ 400 crs. horizontal rest of wall.

wall framing to NZS 3604:2011



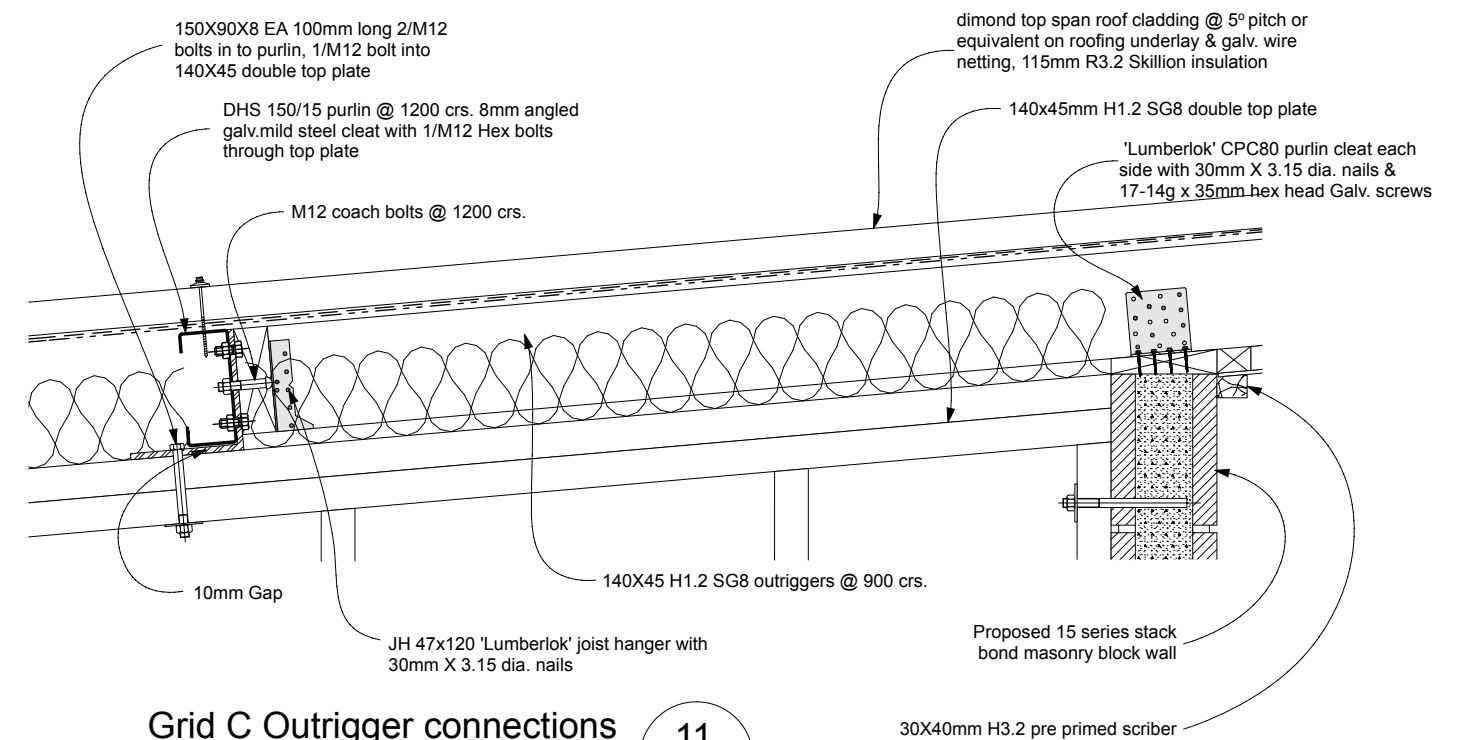




Grid 4 Slab Foundation

Section Detail

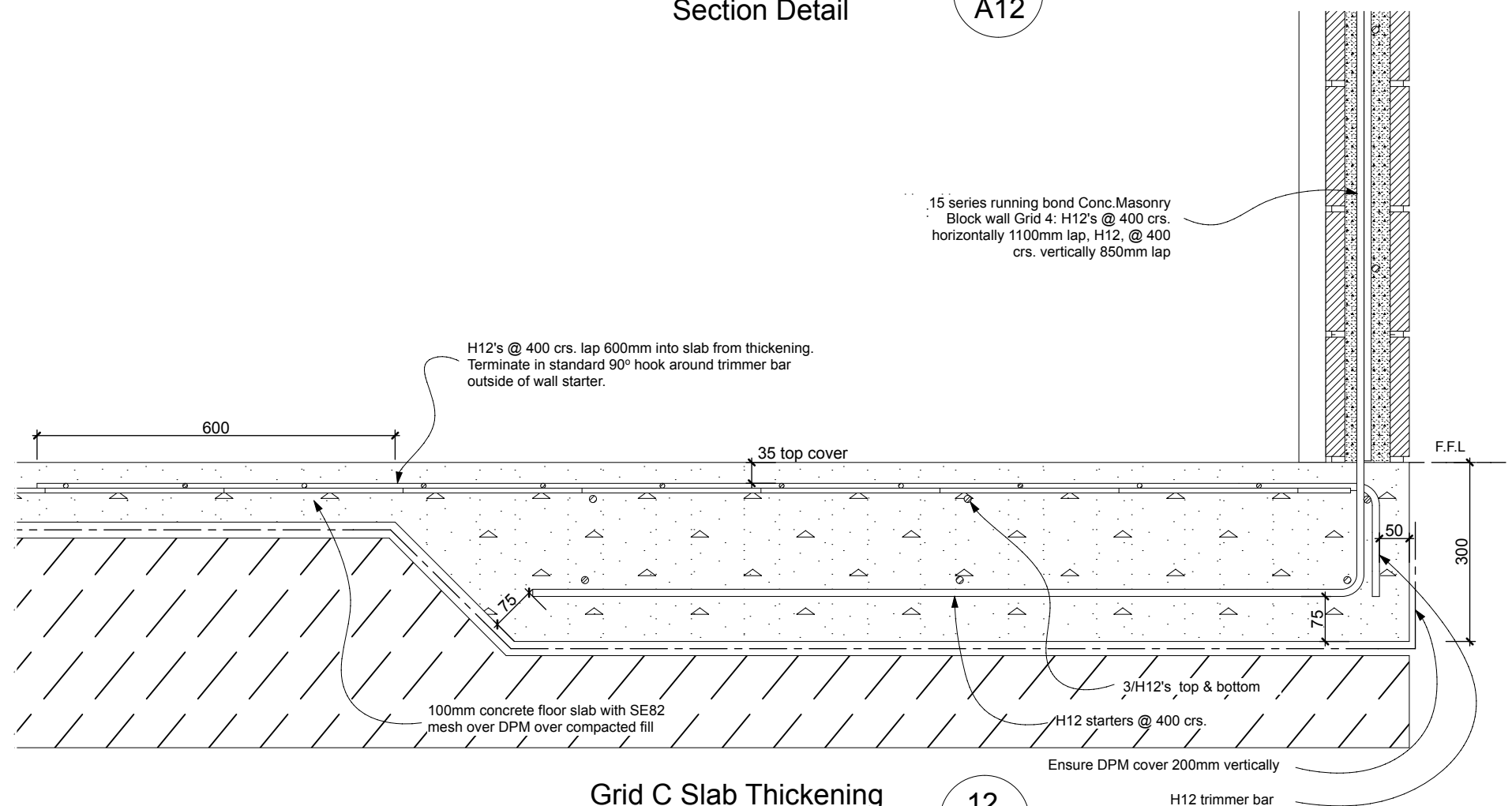
13
A9



Grid C Outrigger connections

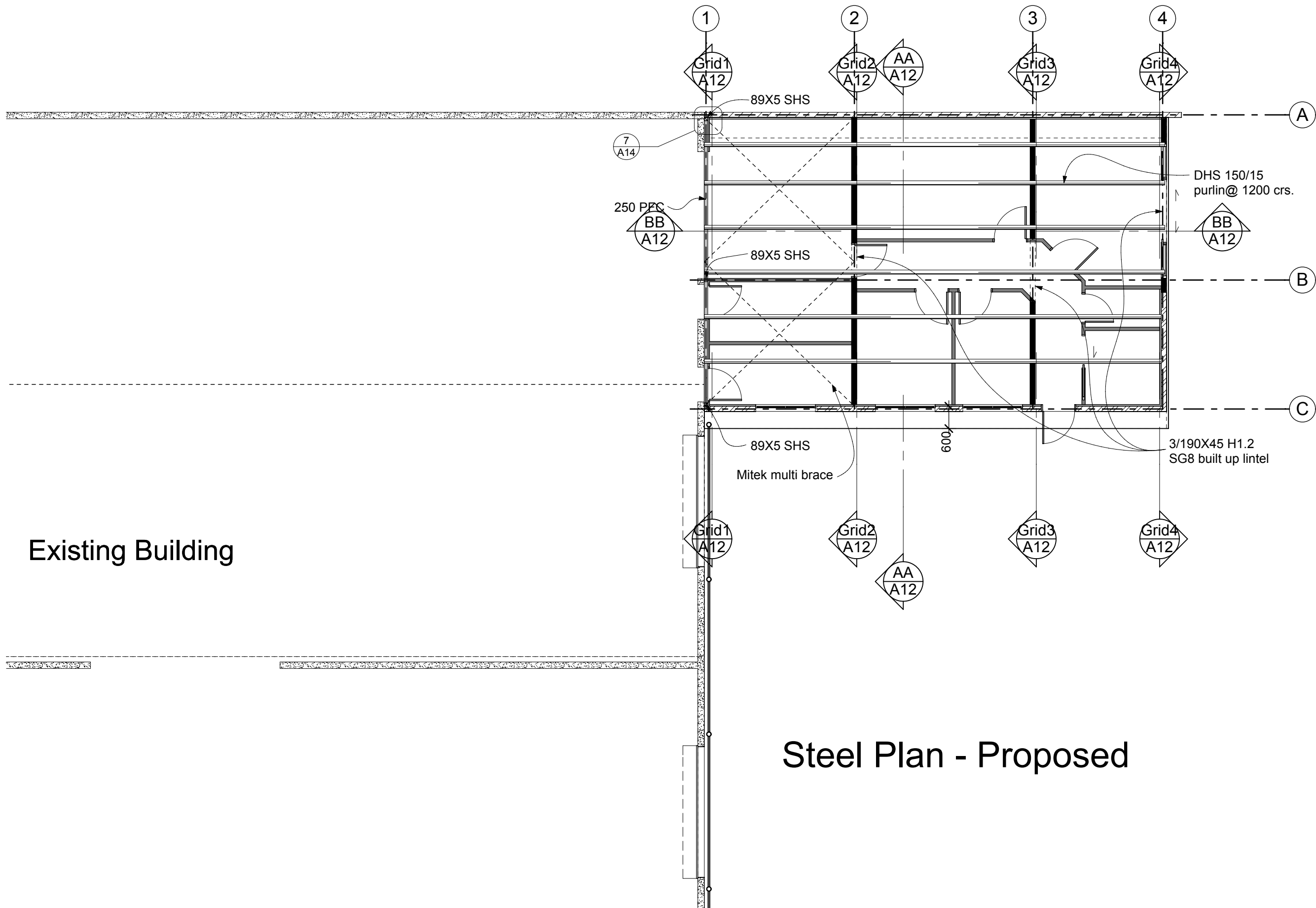
Section Detail

11
A12

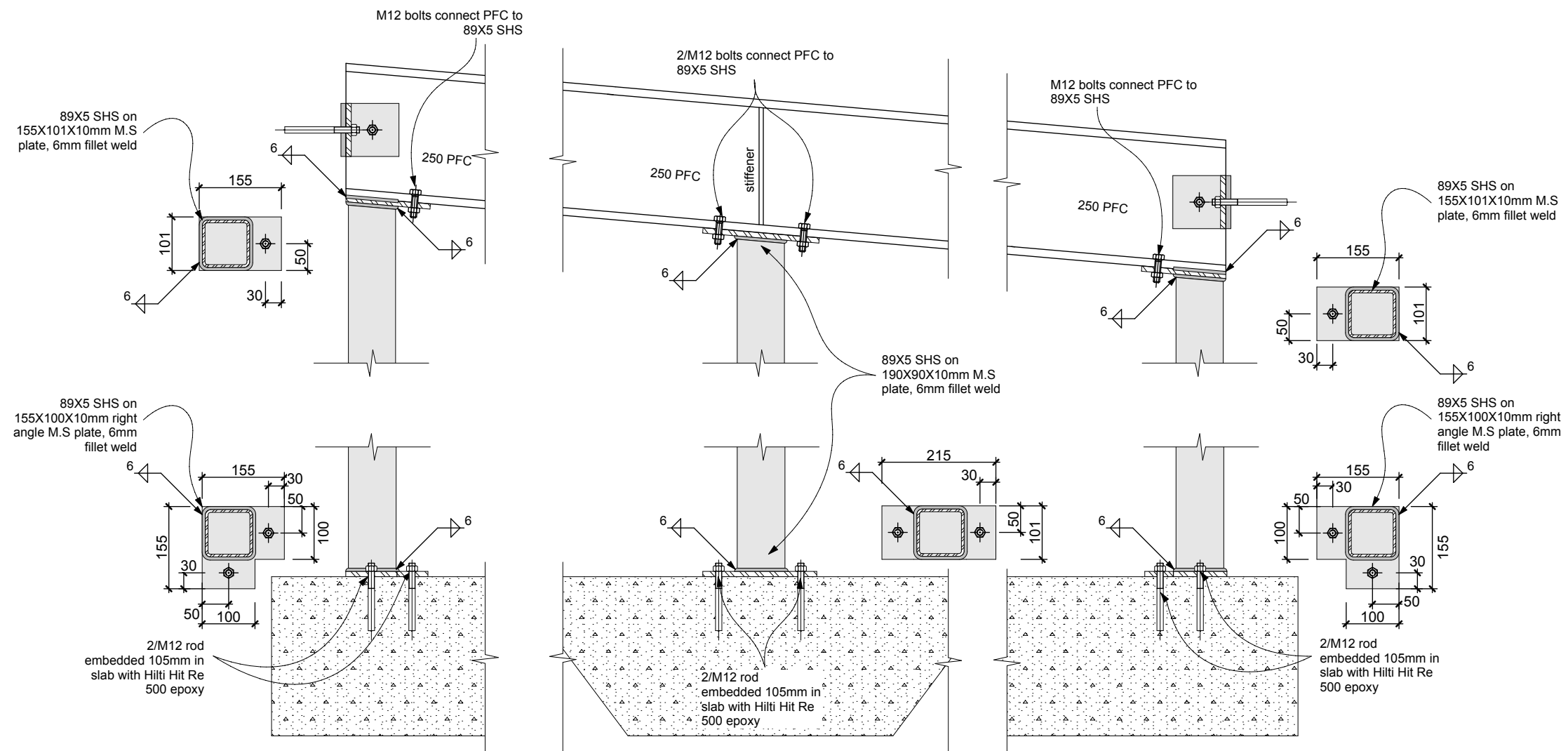


Grid C Slab Thickening Section Detail

12
A12



Steel Plan - Proposed



Gridline 1 Steel Details



Architectural Design Group
A DIVISION OF
WALKER COMMERCIAL SERVICES LTD

ADG

t/f 07 578 2899
e adg_architecture@xtra.co.nz
p PO Box 70131 Fraser Cove
Tauranga 3155
office 31 Fifteen Ave, Tauranga

Proposed Additions
80 Byron Street
Christchurch
For Clip & Climb

Drawing: Grid 1 Steel Details
Scale at A3: 1:10
Date: January 2017
Job no: 5996

Copyright:
The copyright of these drawings & ideas contained
therein remain the property of the author (Architectural
Design Group) unless otherwise agreed in writing.

Issue: 1
Sheet no.

A18

of sheets

APPENDIX B

Environment Canterbury Listed Land Use Register

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information. For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.



Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	28 February 2017		
Land Parcels:	Lot 1 DP 449853	Valuation No(s): 2256053900	
	Lot 1 DP 449853	Valuation No(s): 2256053900	



The information presented in this map is specific to the area within a 50m radius of property you have selected. Information on properties outside the search radius may not be shown on this map, even if the property is visible.

Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
3575	Rosiez Panel Paint & Performance	71 Byron Street, Sydenham	F4 - Motor vehicle workshops;	Not Investigated
8448	83 Byron Street	83 Byron Street, Sydenham	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Below guideline values - Industrial/Commercial

Please note that the above table represents a summary of sites and HAILs intersecting the area of enquiry within a 50m buffer.

Information held about the sites on the Listed Land Use Register

Site 3575: Rosiez Panel Paint & Performance (Within 50m of enquiry area.)

Our Ref: ENQ158640

Produced by: LLUR Public 28/02/2017 1:27:39 p.m.

Site Address:	71 Byron Street, Sydenham
Legal Description(s):	Lot 3 DP 19049

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):	Period From	Period To	HAIL land use
	?	present	Motor vehicle workshops

Notes:

22 Jan 2008 Panel beating and spray painting workshop. Site visited by Environment Canterbury's Pollution Prevention Officer in December 2007.

Investigations:

There are no investigations associated with this site.

Site 8448: 83 Byron Street (Within 50m of enquiry area.)

Site Address:	83 Byron Street, Sydenham
Legal Description(s):	Part Lot 180 DP 2

Site Category:	Below guideline values - Industrial/Commercial
Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Industrial/Commercial

Land Uses (from HAIL):	Period From	Period To	HAIL land use
	?	2011	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

27 Jun 2011 A 1,200 L underground storage tank was removed from 83 Byron Street, Sydenham on 2 June 2011. The tank was discovered during demolition of earthquake damaged buildings. Pattle Delamore Partners Ltd was engaged to supervise the tank removal and validate the natural soils surrounding the tank pit. No ancillary pipework was encountered in the excavations. Ten cubic metres of material impacted by petroleum hydrocarbon residues was removed from the site to Texco Remediation Ltd. The environmental investigation, conducted in accordance with national guidelines, shows that the petroleum hydrocarbon impact remaining at the site is minor and unlikely to pose a significant effect on the environment.

Investigations:

10 Jun 2011 **INV 8309: Site inspection for the removal of an underground storage tank at 83 Byron Street, Sydenham, Christchurch** (Detailed Site Investigation)
Pattle Delamore Partners Ltd

Summary of investigation(s):

The investigation to remove and validate a 1,200 L underground storage tank from 63 Byron Street, Sydenham was commissioned on discovery of the tank during demolition of earthquake damaged buildings at the property. It is understood that the tank held diesel and was used for heating purposes. Its condition was described as fair, but it was noted that the tank had taken on water. The tank was housed within a concrete lined pit, in close proximity to foundations of a building located at the neighbouring property. In order to preserve the stability of the building, the concrete lining was not completely removed. No pipework was observed during the tank removal excavations. Petroleum hydrocarbon residues (odour and staining) were observed around the tank, but reportedly confined to bedding material within the concrete lined pit.

Groundwater was not observed during the tank removal to a depth of 1.7 m below ground level, but is anticipated to occur within 2 m of the surface and flow in the general easterly direction. The property is located within the confined aquifer zone and the shallow non-artesian is not abstracted for sensitive purposes in the vicinity of the removed tank. An on-site artesian well was observed within 5 m of the former tank. The native soils surrounding the concrete lining were described as clayey silts over silt to 1.7 m below ground level. The nearest surface waterway is Jacksons Creek, located 1 km from the site. The property was vacant at the time of the investigation but is zoned as Business 3 in Christchurch City Plan.

Six samples from the natural soils around and beneath the tank concrete lining and a single sample of backfill material were submitted for total petroleum hydrocarbon analysis. Approximately 10 cubic metres of petroleum hydrocarbon impacted spoil was removed to Texco Remediation Limited (Christchurch). While no pipework was encountered during the investigation, suggesting that the tank had been partially decommissioned previously, the tank pit area was adequately characterised. Additionally, given that the tank was located beneath a former building, it is assumed that the length of ancillary pipework was relatively short.

All seven samples characterising natural soil and backfill material at the former tank pit complied with the applicable petroleum hydrocarbon guidelines for commercial/industrial land use. Petroleum hydrocarbon residues were shown to remain at the site however, particularly in near-surface soils surrounding the former tank pit. Overall, while only a limited site history is presented, the investigation indicated that the minor contamination identified is unlikely to be of significant extent or severity in terms of the risk to human health or the environment. It is proposed to classify the tank pit area as Below Environmental Guidelines on the Register.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ158640.

Disclaimer: *The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).*

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

APPENDIX C

Exploratory Hole Logs

PROJECT: Geo Investigation

CLIENT: STRUCTEX HARVARD LTD

ADDRESS: 80 Byron Street, Sydenham

LOGGED

BG

PROCESSED

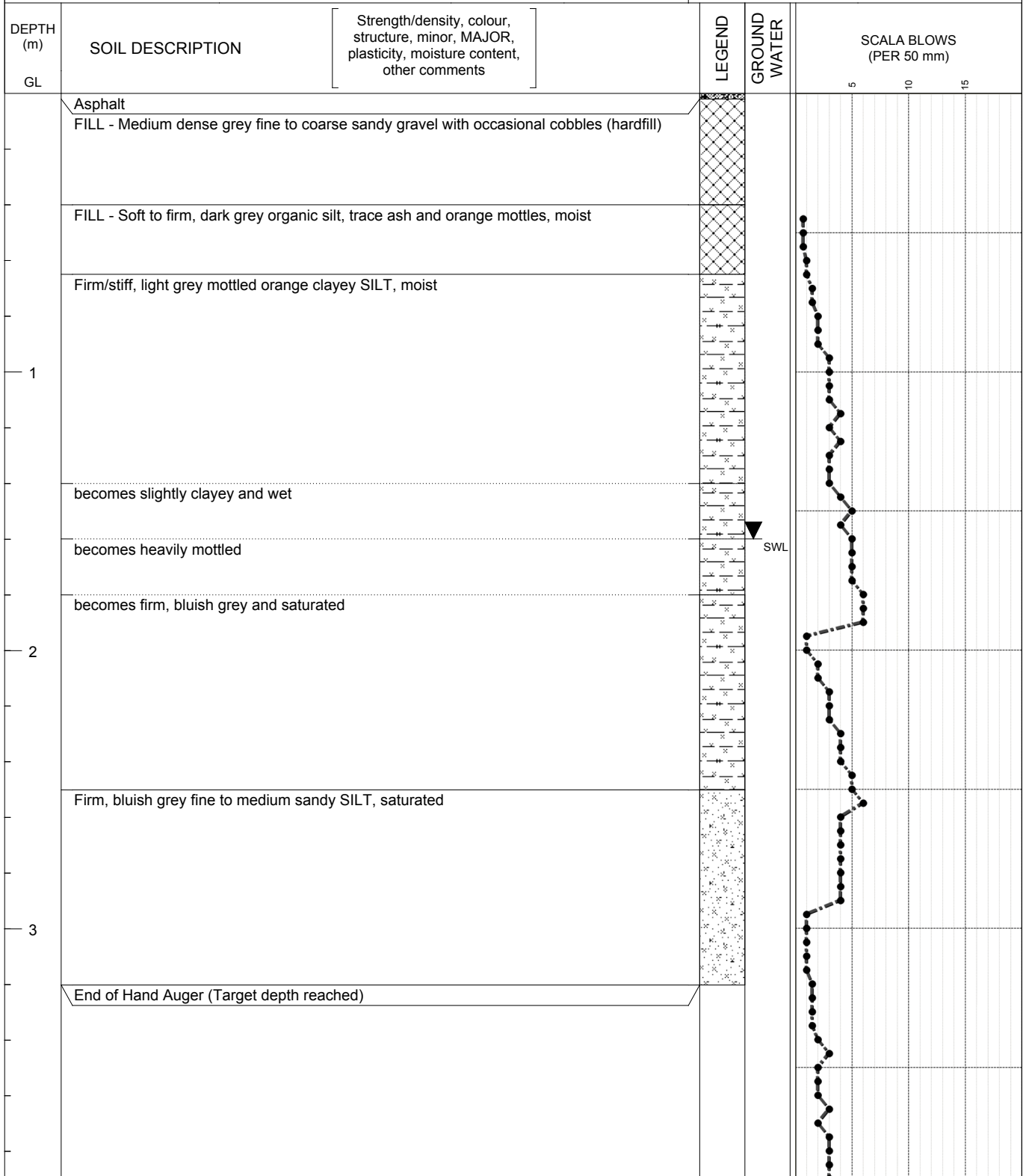
BG

CHECKED

GJL

BH LOCATION: COORDS:

RL GROUND:



NOTES:

Groundwater was encountered at 1.60m below ground level during the Hand Auger

ENGINEERING DESIGN CONSULTANTS LTD

CIVIL, STRUCTURAL,
ENVIRONMENTAL, GEOTECHNICAL AND
FIRE ENGINEERS

www.edc.co.nz
team@edc.co.nz

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PO BOX 7354, SYDENHAM,
CHRISTCHURCH 8240

PH (03) 355 5559
FAX (09) 415 1280

1st FLOOR, UNIT 1, 100 BUSH ROAD,
ALBANY, AUCKLAND

PH (09) 451 9044

PROJECT: Geo Investigation

CLIENT: STRUCTEX HARVARD LTD

ADDRESS: 80 Byron Street, Sydenham

LOGGED

BG

PROCESSED

BG

CHECKED

GJL

BH LOCATION: COORDS:

RL GROUND:

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)
GL					5 10 15
	Asphalt				
	FILL - Medium dense grey fine to coarse sandy gravel with occasional cobbles (hardfill)				
	FILL - Soft, dark grey organic silt, some ash, trace fine sand and ash, wet				
	Stiff, light grey mottled orange clayey SILT, moist				
1	soil becomes greenish and has a slight hydrocarbon smell				
	becomes firm and wet				
2	saturated			SWL	
	becomes very clayey				
3	Firm, bluish grey fine to medium sandy SILT, saturated. No hydrocarbon smell (though hard to distinguish when it finished)				
	End of Hand Auger (Target depth reached)		EOH @ 3.20 m		

NOTES:

Groundwater was encountered at 1.90m below ground level during the Hand Auger
Slight hydrocarbon smell from 1.0m to 2.6m below ground level

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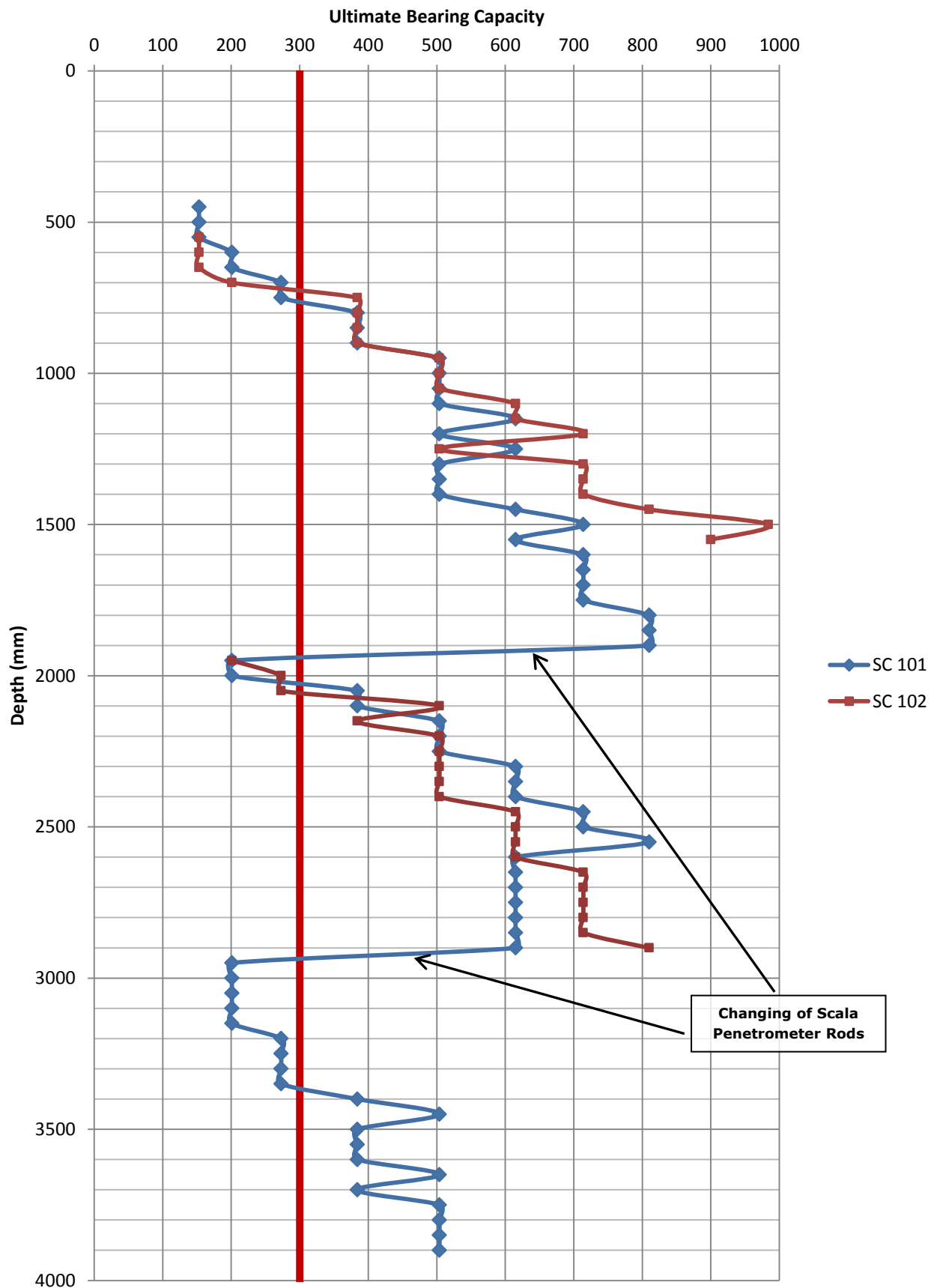
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APPENDIX D

Geotechnical Ultimate Bearing Capacity Graph

Summary of Ultimate Bearing Capacity vs Depth



NOTES

1. Based on Stockwell, M.J., 1977: Determination of allowable bearing pressure under small structures. New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.