Robbies on Riccarton

Quantitative Engineering Evaluation

Functional Location ID: PRO 0537 B004

Address: 199 – 205 Clarence Street, Riccarton

Reference: 227676

Prepared for:

Christchurch City Council

Revision: 2

Date: 24 June 2013

Leading. Vibrant. Global.
www.aurecongroup.com

Document Control Record

Document prepared by:

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011

PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Document control						aurecon
Report Title		Quantitative Engineering Evaluation				
Functional Location ID		**PRO 0537 B004**	**Project Number**		227676	
File Path		P:\ 227676 - Robbies on Riccarton.docx				
Client		Christchurch City Council	**Client Contact**		Michael Sheffield	
Rev	**Date**	**Revision Details/Status**	**Prepared**	**Author**	**Verifier**	**Approver**
1	**3 December 2012**	Draft	R. So-Beer	R. So-Beer	D. Elliott	L. Howard
2	**24 June 2013**	Final	R. So-Beer	R. So-Beer	D. Elliott	L. Howard
Current Revision		**2**				

Approval			
Author Signature		Approver Signature	
Name	Rose So-Beer	Name	Lee Howard
Title	Structural Engineer	Title	Senior Structural Engineer

Contents

Executive Summary 1

1 Introduction 2

1.1 General 2

2 Description of the Building 2

2.1 Building Age and Configuration 2

2.2 Building Structural Systems Vertical and Horizontal 3

2.3 Reference Building Type 3

2.4 Building Foundation System and Soil Conditions 4

2.5 Structural Documentation and Inspection Priorities 4

2.6 Available Survey Information 4

3 Structural Investigation 4

3.1 Summary of Building Damage 4

3.2 Record of Intrusive Investigation 4

3.3 Damage Discussion 5

4 Building Review Summary 5

4.1 Building Review Statement 5

4.2 Critical Structural Weaknesses 5

5 Building Strength (Refer to Appendix D for background information) 5

5.1 General 5

5.2 Percentage NBS Assessment 5

Transverse Direction 6

Longitudinal Direction 7

5.3 Results Discussion 7

6 Conclusions and Recommendations 7

7 Explanatory Statement 8

Appendices

Appendix A Site Map and Photos

Appendix B List of Drawings

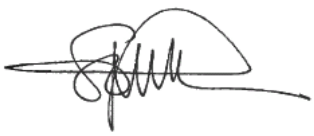
Appendix C Strength Assessment Explanation

Appendix D Background and Legal Framework

Appendix E Standard Reporting Spread Sheet

Executive Summary

This is a summary of the Quantitative Engineering Evaluation for the Robbies on Riccarton building and is based on the Detailed Engineering Evaluation Procedure document issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

Building Details	**Name**	Robbies on Riccarton			
Building Location ID	PRO 0537 B004			**Multiple Building Site**	N
Building Address	199 – 205 Clarence Street, Riccarton			**No. of residential units**	0
Soil Technical Category	NA	**Importance Level**	2	**Approximate Year Built**	1965 to 1975
Foot Print (m^2)	660	**Storeys above ground**	1	**Storeys below ground**	0
Type of Construction	Single storey two-way concrete moment frame supporting light roof.				
Quantitative L5 Report Results Summary					
Building Occupied	Y	The Robbies on Riccarton is currently occupied.			
Suitable for Continued Occupancy	Y	The Robbies on Riccarton is suitable for continued occupancy.			
Key Damage Summary	Y	Refer to summary of building damage Section 3.1 report body.			
Critical Structural Weaknesses (CSW)	N	No critical structural weaknesses were identified.			
Levels Survey Results	N	No evidence of differential settlement or cracks in the foundation due to seismic activities. Therefore, floor level survey is not considered necessary to complete this report.			
Building %NBS From Analysis	43%	Based on an analysis of capacity and demand (refer to Section 5.2 for Summary of Seismic Performance).			
Report Recommendations					
Geotechnical Survey Required	N	Geotechnical survey not required due to lack of observed ground damage on site.			
Strengthening Required	N	There is no statutory requirement to strengthen the building. However, we recommend strengthening be undertaken to increase the seismic capacity of the structure to at least 67%NBS and preferably to 100%NBS.			
Approval					
Author Signature		Approver Signature			
Name	Rose So-Beer	Name	Lee Howard		
Title	Structural Engineer	Title	Senior Structural Engineer		

1 Introduction

1.1 General

On 12 October 2012 Aurecon engineers visited the Robbies on Riccarton to undertake a quantitative building damage and strength assessment on behalf of Christchurch City Council. Detailed visual inspections and further intrusive investigations were undertaken on 31 October and 7 November 2012 to assess the damage caused by the earthquakes on 4 September 2010, 22 February 2011, 13 June 2011, 23 December 2011 and related aftershocks.

The scope of work included:

1. Re-assessment of the nature of the building as stated in the Qualitative Assessment Report.
2. Visual assessment of the building strength particularly with respect to safety of occupants if the building is currently occupied.
3. Assessment of requirements for detailed engineering evaluation including any areas where lining coverings need removal to expose connection details.

This report outlines the results of our Quantitative Assessment of damage to the Robbies on Riccarton and is based on the Detailed Engineering Evaluation Procedure document issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

2 Description of the Building

2.1 Building Age and Configuration

The Robbies on Riccarton is a single storey, regular-shaped, two-way concrete moment resisting frame building built in circa 1965-1975. The building has a lightly reinforced concrete parapet all around the building. It also features a core of structural walls which is used for cold store and is located at the south end of the building.

The external cladding is a combination of full height steel framed windows and concrete masonry blocks laid in a staggered pattern on top of the original external wall.

The internal transverse concrete beams span 6.60m over 5 bays and the internal longitudinal concrete beams span 9m and 11m over 2 bays. The internal longitudinal concrete beams support the timber roof rafters which in turn support timber sarking and a flat bitumen roof. Timber framed and lightly-reinforced masonry walls divide the building into different rooms.

The lightweight addition on the north side of the building was built in circa mid-2000. The steel frame has timber rafters running in the transverse direction and supporting a clear flexible sheeting and PVC frame around the sides.

Robbies on Riccarton has a reinforced concrete floor slab and we assume the structure has strip foundations around the perimeter and concrete tie beams in the both directions for internal columns.

The building has an approximate floor area of 660 square metres. Importance level 2 has been assumed in accordance with NZS 1170 Part 0:2002.

2.2 Building Structural Systems Vertical and Horizontal

The north to south direction is referred to as the transverse (across) direction and the east to west direction as the longitudinal (along) direction.

The building consists of horizontal elements (beams) and vertical elements (columns) connected by rigid joints. These elements are cast monolithically in order to act in unison.

The vertical loads in the main building are resisted by timber rafters which are supported by concrete moment resisting frames in both the transverse and longitudinal directions. The loads that are supported by the timber roof sarking are transferred to the timber rafters that span in the longitudinal direction.

The reinforced concrete columns support the axial loads from the roof and transfer the loads to the foundation. The concrete moment resisting frames in the main building resist lateral loads in both the transverse and longitudinal directions.

The Robbies on Riccarton has a concrete floor slab and we assumed is supported on in-situ concrete strip foundation along the perimeter and concrete tie beam in both directions for internal columns.

2.3 Reference Building Type

A general overview of the reference building type, construction era and likely earthquake risk is presented in the figure below. The Robbies on Riccarton, according to the figure below shows it is possibly earthquake prone.

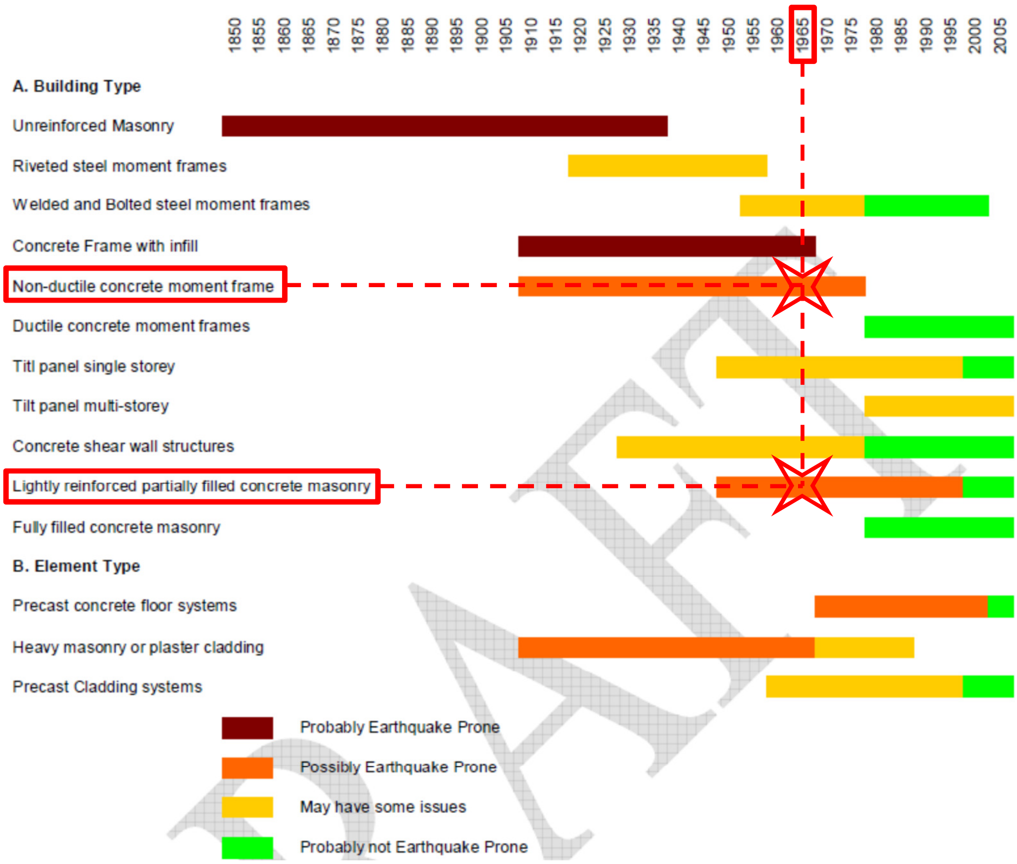


Figure 1: Timeline showing the building types, approximate time of construction and likely earthquake risk.

(From the Draft Guidance on DEEs of non-residential buildings by the Engineering Advisory Group)

2.4 Building Foundation System and Soil Conditions

The Robbies on Riccarton has a concrete floor slab and we assume concrete strip foundation along the perimeter and concrete tie beams in both directions under internal columns.

The land and surrounds of the Robbies Riccarton does not have a technical classification. It is of note however, that the closest suburb consists primarily of Technical Category 2 (TC2) land which means that “minor to moderate land damage from liquefaction is possible in future significant earthquakes”.

2.5 Structural Documentation and Inspection Priorities

Structural drawings of the Robbies on Riccarton were not available when we prepared the Qualitative Assessment Report in 22 February 2012. However, we have some architectural plans which we have used during our quantitative analysis.

The inspection priorities for the building focused on confirming the building geometry and identifying forms of potential damages such as inadequate reinforcement and column sidesway.

2.6 Available Survey Information

There is no evidence of differential settlement or cracks in the foundation due to seismic activities. Therefore, a floor level survey is not considered necessary to complete this report.

3 Structural Investigation

3.1 Summary of Building Damage

The Robbies on Riccarton was in use at the time of our internal and external visual damage assessment. It has performed well and there are no significant visible signs of damage that can be attributed to seismic actions.

3.2 Record of Intrusive Investigation

As per our recommendation in our 22 February 2012 Qualitative Assessment Report, intrusive investigations were undertaken on 12 October, 31 October and 7 November 2012.

As part of our intrusive investigation, ceiling linings and manholes were removed to confirm the concrete moment resisting frame layout and connection details. The following elements were measured and scanned (if necessary) to estimate reinforcing bar sizes and spacing (see Appendix A and B):

- Main external concrete beam (top and bottom);
- Internal concrete beam in the transverse direction;
- Internal concrete beam in the longitudinal direction;
- Concrete columns;
- Timber rafters (size and spacing were measured);
- Timber joist, metal cleat and bolts supporting timber rafters; and
- Ceiling joists.

3.3 Damage Discussion

There was no observed damage to the building as a result of the earthquakes.

4 Building Review Summary

4.1 Building Review Statement

The building has been reviewed based on our intrusive investigation and architectural drawings provided by the Christchurch City Council. We have conducted intrusive investigations to verify the structural system and elements, investigate the potential critical structural weaknesses (CSW) and address any concerns raised in our qualitative report.

4.2 Critical Structural Weaknesses

No specific critical structural weaknesses were identified during our quantitative assessment of the building.

5 Building Strength (Refer to Appendix D for background information)

5.1 General

The Robbies on Riccarton is a symmetrical, single storey and concrete moment resisting framed building with simple and well defined load paths. Although a building of this type, era and configuration in some cases can be problematic; this particular building has performed very well. It is likely that the good performance is due to the very substantial nature of a single storey building supporting primarily its own weight. We assume the building may have been originally designed with the intention of adding an upper storey in a later date.

5.2 Percentage NBS Assessment

The Robbies on Riccarton has been subject to specific engineering design and the IEP from the Qualitative Assessment Report dated 22 February 2012 gave a percentage new building standard of 46% in both directions.

For this quantitative assessment, we estimated the lateral load capacity by adopting assumed values for the strengths of existing materials and calculating the capacity of existing beams and columns.

Construction plans were not available but based on the architectural design the building era could be between 1965 and 1976.

Selected seismic parameters used in our assessment are tabulated in the tables below.

Table 1: Parameters used in the Seismic Assessment

Seismic Parameter	Quantity	Comment/Reference
Site Soil Class	D	NZS 1170.5:2004, Clause 3.1.3, Deep or Soft Soil
Site Hazard Factor, Z	0.30	DBH Info Sheet on Seismicity Changes (Effective 19 May 2011)
Return period Factor, R_u	1.00	NZS 1170.5:2004, Table 3.5, Importance Level 2 Structure with a Design Life of 50 years
Ductility Factor in the Longitudinal Direction, μ	1.25	Concrete moment resisting frame
Ductility Factor in the Transverse Direction, μ	1.25	Concrete moment resisting frame

The seismic demand for the Robbies on Riccarton was analysed based on the current loading code NZS 1170.5:2004.

The capacity of the concrete moment resisting frames was calculated from the strengths of existing materials present in both the transverse and longitudinal directions. The seismic demand was then compared with the building capacity in these directions.

Table 2: Summary of Seismic Performance

Transverse Direction		
Structural Element/System	Description of the limiting criteria	%NBS – Based on calculated capacities
Concrete Moment-resisting Framed System		**43%**
Flexural capacity		
Beam	Flexural strength	92%
Column	**Flexural strength**	**43%**
Shear capacity		
Beam	Shear strength	>100%
Column	Shear strength	76%
Displacement	Lateral displacement at column top	>100%
Strip Foundation	Allowable bearing capacity of ground	>100%

Longitudinal Direction		
Structural Element/System	Description of the limiting criteria	%NBS – Based on calculated capacities
Concrete Moment-resisting Framed System		**45%**
Flexural capacity		
Beam	Flexural strength	56%
Column	**Flexural strength**	**45%**
Shear capacity		
Beam	Shear strength	>100%
Column	Shear strength	84%
Displacement	Lateral displacement at column top	>100%
Strip Foundation	Allowable bearing capacity of ground	>100%

Notes:

1. Reference: New Zealand Society for Earthquake Engineering – Assessment and Improvement of the Structural Performance of Buildings in Earthquakes – June 2006, NZS1170:2004, and NZS3101:2006.
2. Allowable bearing pressure assumed as 200 kPa.
3. Assumed compressive strength (f'c) of 25MPa and yield strength (fy) of 275MPa.

5.3 Results Discussion

Based on the intrusive investigations undertaken on 12 October, 31 October and 7 November 2012 at Robbies on Riccarton and our independent calculations, we can conclude that the calculated flexural capacity of the column in the transverse direction is **43%NBS** which makes this the governing element (i.e. a 'moderate risk' building according to NZEE Guidelines). The flexural failure to transverse columns is due to inadequacy in reinforcement.

6 Conclusions and Recommendations

Given the good performance of the Robbies on Riccarton in the Canterbury earthquake sequence, the lack of foundation damage, **a geotechnical investigation is currently not considered necessary**.

The Robbies Riccarton is currently occupied and the building has suffered no loss of functionality and in our opinion the Robbies on Riccarton **is suitable for continued occupation**.

However, the seismic capacity of the building is governed by the flexural strength of the column in the transverse direction. The calculated capacity of the weakest column in this quantitative assessment is **43%NBS**. The building is considered to be a moderate earthquake risk. There is no statutory requirement to strengthen the building (unless there is a change in use). However, we recommend strengthening be undertaken to increase the seismic capacity of the structure to at least 67%NBS and preferably to 100%NBS where economic to do so.

7 Explanatory Statement

The inspections of the building discussed in this report have been undertaken to assess structural earthquake damage. No analysis has been undertaken to assess the strength of the building or to determine whether or not it complies with the relevant building codes, except to the extent that Aurecon expressly indicates otherwise in the report. Aurecon has not made any assessment of structural stability or building safety in connection with future aftershocks or earthquakes – which have the potential to damage the building and to jeopardise the safety of those either inside or adjacent to the building, except to the extent that Aurecon expressly indicates otherwise in the report.

This report is necessarily limited by the restricted ability to carry out inspections due to potential structural instabilities/safety considerations, and the time available to carry out such inspections. The report does not address defects that are not reasonably discoverable on visual inspection, including defects in inaccessible places and latent defects. Where site inspections were made, they were restricted to external inspections and, where practicable, limited internal visual inspections.

To carry out the structural review, existing building drawings were requested from the Christchurch City Council records. However, there were no available drawings. Therefore, we based our assessment on visual inspections.

While this report may assist the client in assessing whether the building should be repaired, strengthened, or replaced that decision is the sole responsibility of the client.

This review has been prepared by Aurecon at the request of its client and is exclusively for the client's use. It is not possible to make a proper assessment of this review without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Aurecon. The report will not address issues which would need to be considered for another party if that party's particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.

Appendices

Appendix A

Site Map and Photos

12 October 2012 , 31 October and 7 November 2012 – Robbies on Riccarton Site Photographs

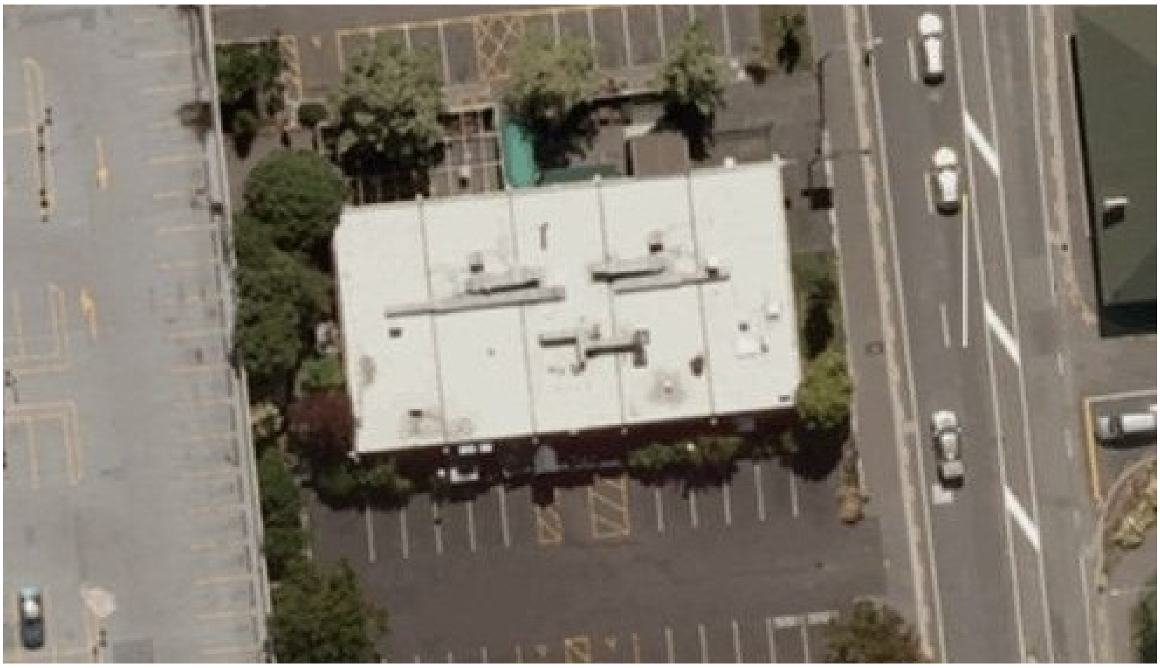


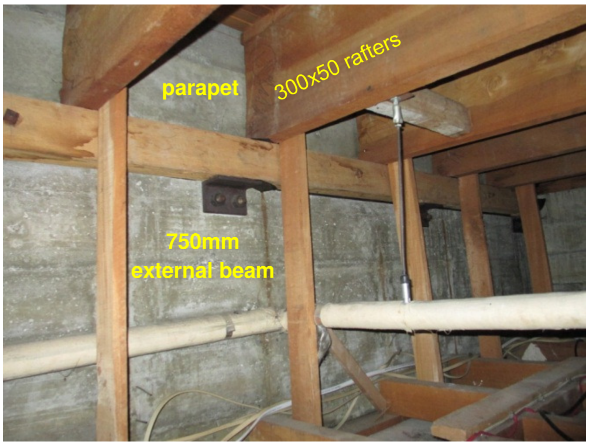
Image: Sourced from koordinates.con and LINZ. Crown Copyright Reserved

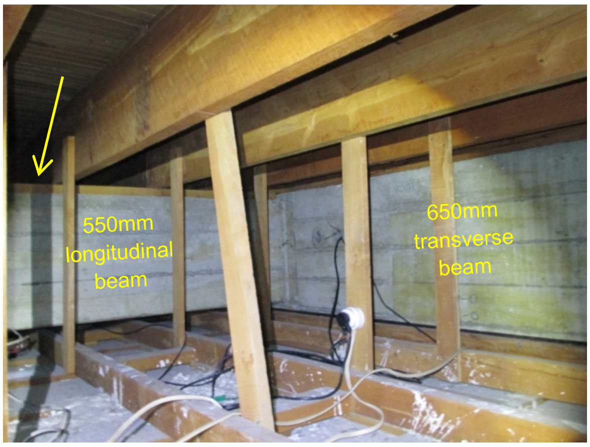
Northern view of the building.	

Western view of the building.	
Southern view of the building.	
Northeast view of the building.	
Typical view of the top external concrete beam at the corner of the building.	

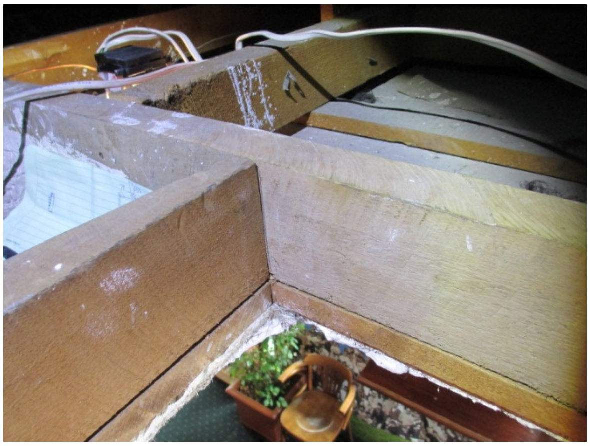
Typical view of the bottom external concrete beam at the corner of the building.	
View of the top external concrete beam in the south central part of the building.	
View of the bottom external concrete beam in the south central part of the building.	

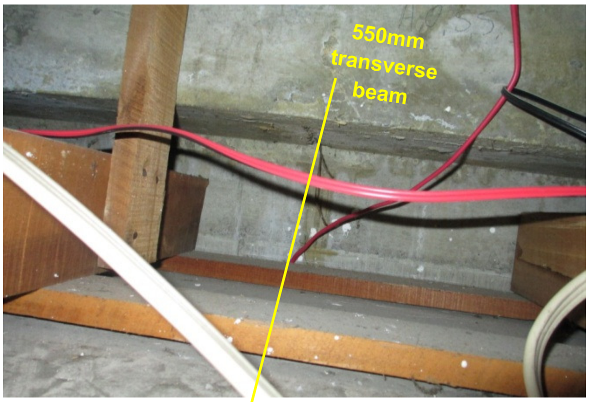
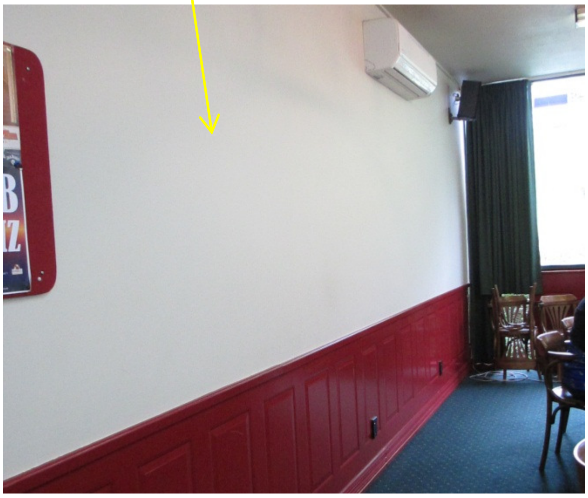
Internal southern view of one of the internal beams in the transverse direction. 400mm square reinforced concrete column supports this beam	
Internal northern view of one of the internal beams in the transverse direction. 400mm square reinforced concrete column supports this beam	
Typical connection detail between the external concrete beam and one of the beams in the transverse direction.	
Typical view of the timber rafters and suspended ceiling.	

Typical connection details of the timber rafters in the north and south end of the building.	
Typical connection details between the timber rafter and timber joists.	
100mm angle metal cleat supporting the timber joist.	
Timber joist is supported by angle metal cleat that is bolted to the external concrete beam by two M24 bolts. Note: There are 7 angle cleats per 6.60m span.	

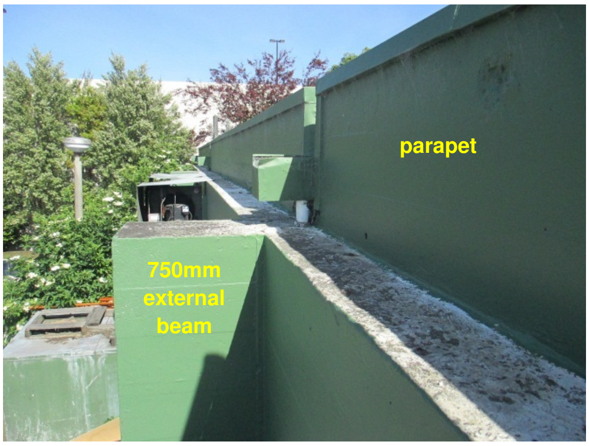
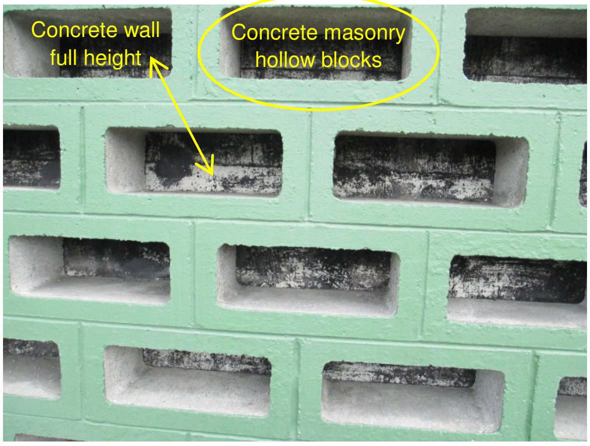
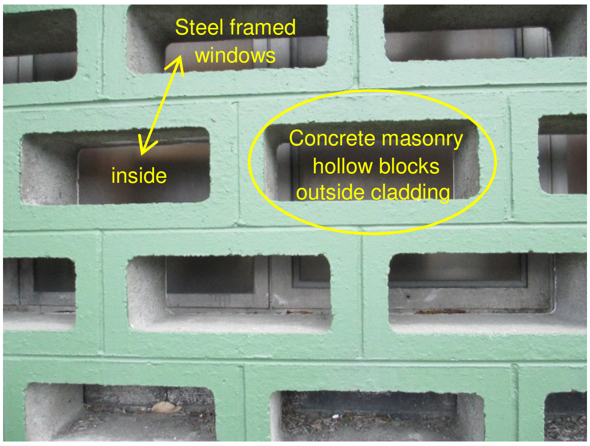
Additional M12 bolts have been placed in between the angle metal cleats.	
Timber rafters are supported by the longitudinal beams.	
Typical view of timber packers between the longitudinal beams and timber rafters.	
Timber packer is bolted to the longitudinal beam.	

Typical connection detail between the internal transverse and longitudinal beams.	
Typical view of the roof sarking.	

View from the manhole showing typical ceiling construction.	
Connection detail between longitudinal beam and concrete masonry wall in the transverse direction.	
Typical view of filled and reinforced concrete masonry.	
Concrete masonry wall has R16 horizontal reinforcement bars.	

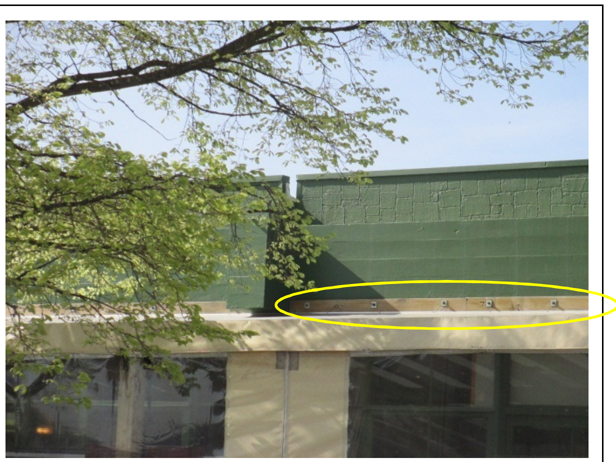
Concrete masonry wall along Grid B in the Conference area is restrained by the longitudinal beam.	
View of the northern end of the Conference area.	
Top southern view of the transverse concrete masonry wall in the Conference area.	
Southern view of the transverse concrete masonry wall in the Conference area.	

Top connection detail of the concrete core in the south end of the building.	
Bottom connection detail of the concrete core in the south end of the building.	
Concrete core in the south end of the building is internally lined with insulated steel panels.	
Roof top view of the building – facing east.	

Roof top view of the building – facing west.	
Typical view of 500mm high parapets.	
The building has a combination of steel framed window glazing and concrete masonry hollow blocks which are laid in a staggered pattern and placed on top of the original external wall. Only the southern core (cold store) has full height concrete wall.	
The building has a combination of steel framed window glazing and concrete masonry hollow blocks which are laid in a staggered pattern and placed on top of the original external wall.	

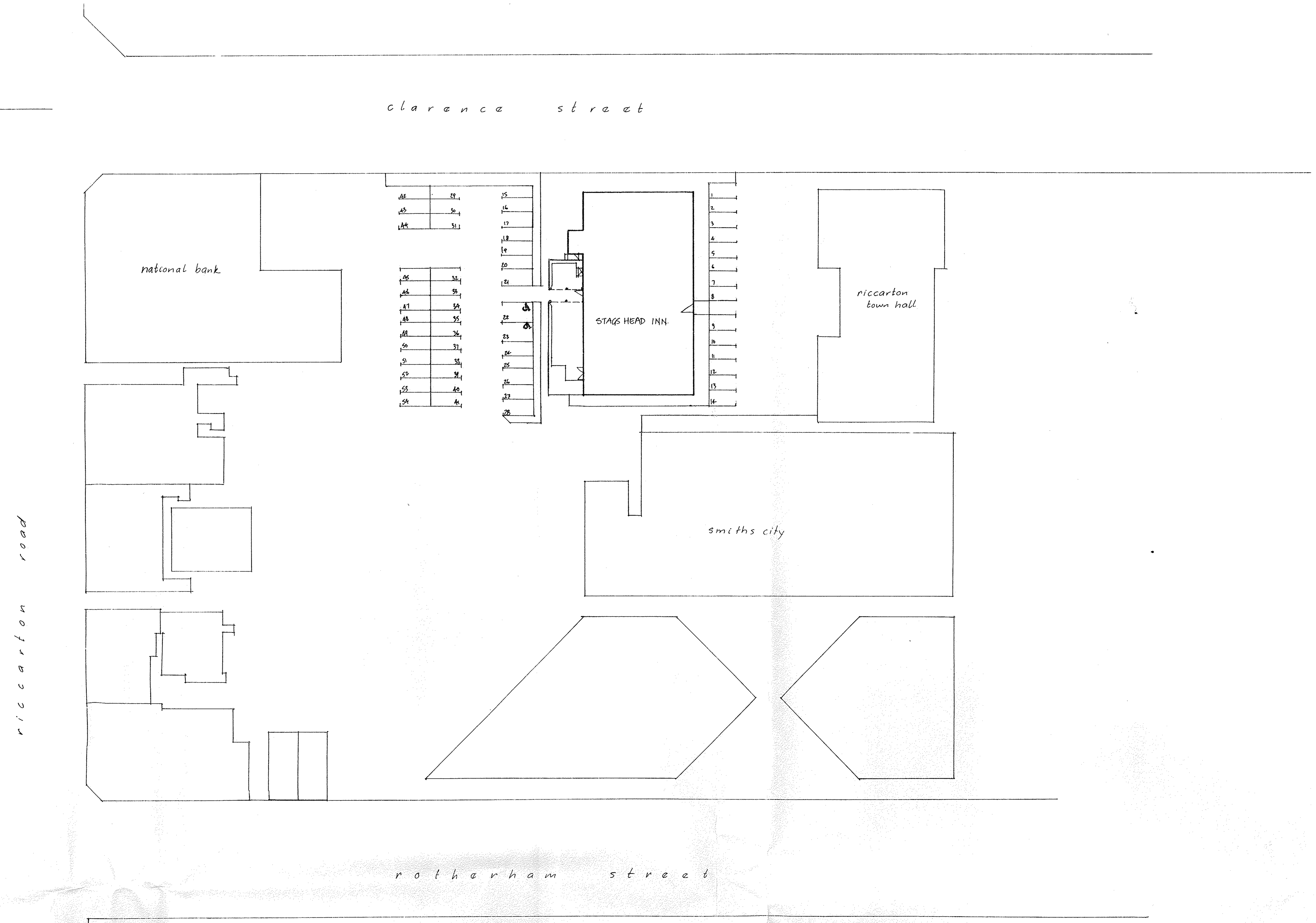
Standalone circular steel framed canopy in the north facing entrance. This lightweight canopy is supported by the cantilevered circular hollow section.	
Typical circular hollow section embedded into the ground.	
Lightweight addition to the North side of the building.	
100mm galvanised square hollow section acts as the main steel frame. Transverse beams have a span of 6.15m and are supported by columns bolted into the ground.	

Timber rafters are supported by longitudinal beams at both ends.	
Typical connection detail.	
Longitudinal beams spans at 6.60m over 2 bays. It is fully welded at both ends and supported by the transverse beams.	
The steel frame is bolted to the concrete columns on the north side of the building.	

The timber joists are bolted to the external concrete beams to support the timber rafters.	
Typical welded connection between galvanised beams.	

Appendix B
List of Drawings

Description	Page number
• Robbies Riccarton drawings	B - 1 to 7
• Draft – updated drawing as of October 2012	B – 8
• Sketch of typical roof diaphragm and suspended ceiling	B – 9
• Concrete beam and column sizes with estimated reinforcement bar sizes and spacing (based on the results from Hilti)	B – 10
• Hilti inspection plan and photos	B – 11 to 12



Car Park requirements are unchanged.
(Note there is an existing legal arrangement with adjacent property for shared additional carparks)

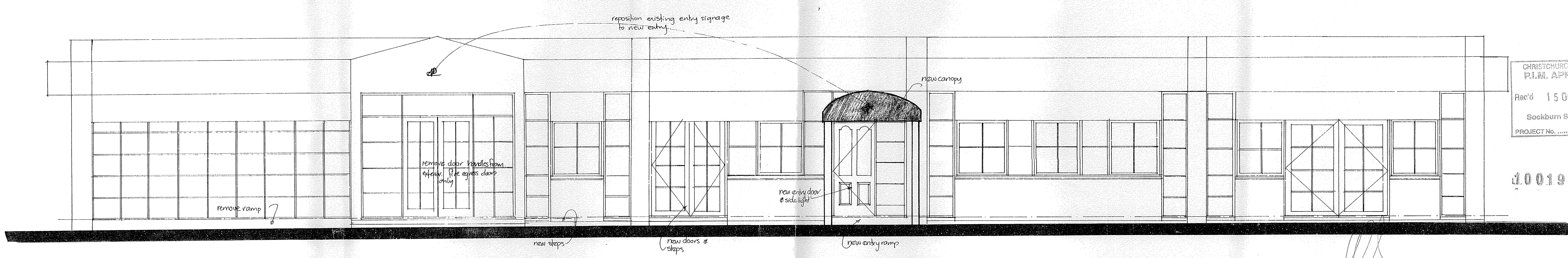
Existing Courtyard area 68.5 square metres

Proposed Courtyard area 73 square metres

Increase in PFA of 4.5 square metres but, new entry lobby reduces PFA by 7 square metres.

Therefore PFA is reduced by 2.5 square metres.

SITE PLAN 1:500



PROPOSED ELEVATION 1:50

CHRISTCHURCH CITY COUNCIL
P.I.M. APPLICATION
Rec'd 15 OCT 2001
Sockburn Service Centre
PROJECT No. ....

10019475

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
23 OCT 2001
All building work shall comply with the New Zealand Building Code notwithstanding any inconsistencies which may occur in the drawings and specifications.

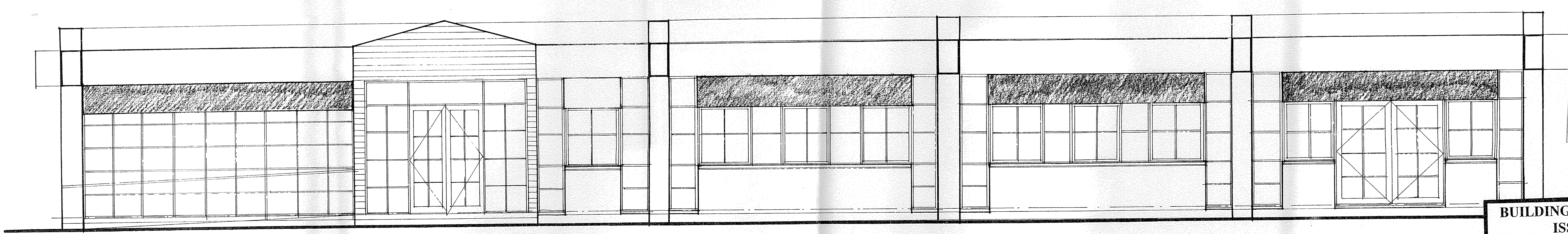
PIM ISSUE
25 September 2001

BUILDING CONSENT
ISSUE
15 October 2001

B1

Faye Ar... Designer

Faye Pearson-Green. NZCD Arch.
70 Ramahana Road. Huntsbury
P.O. Box 12-213 Christchurch
Phone/Fax. 332-0492.



EXISTING ELEVATION 1:50

BUILDING CONSENT ISSUE
15 October 2001

PIM ISSUE
25 September 2001

Faye Architec

B2

Faye Pearson-C... Arch. ...bury
70 Ramahana Road ...
P.O. Box 12-213, Christchurch
Phone/Fax. 332-0492.

BCP/0019475
OFFICE
WC
STORE
OFFICE
clnr.
inv.
WOMENS
MENS
KITCHEN
COOL STORES/ FREEZERS
WOMENS
MENS
CONFERENCE
15
OFFICE
OFFICE
D2 (1400)
GAMING MACHINES
20
BAR (SEATING)
BAR (STANDING)
170
BAR.
bar
5
S
CP
booths
EXISTING 1200 GAP
BAR. (SEATING)
BAR (SEATING)
RESTAURANT.
85
gas fire
gas fire
(850)
(850)
(850)
E
LOBBY new
new lobby
EXISTING DOORS REMOVED
REMOVE
D3
LOBBY ex.
D1 (1600) remove steps
ramp
stamped concrete
stamped conc.
FOOTPATH
asphalt
new doors
new steps
new entry door
ENTRY
COURTYARD
COURTYARD
Total Nett 73m²
new canopy over
garden
garden
new steps
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
23 OCT 2001
All building work shall comply with the New Zealand Building Code notwithstanding any inconsistencies which may occur in the drawings and specifications
CHRISTCHURCH CITY COUNCIL
P.I.M. APPLICATION
Rec'd 15 OCT 2001
Sockburn Service Centre
PROJECT No.
0019475
N
LEGEND:
= EXISTING ILLUMINATED EXIT SIGN
E = NEW EXIT SIGN
= MINIMUM REQUIRED DOOR WIDTHS
CP = EXISTING CALL POINT
S = EXISTING SOUNDER
= DESIGN EGRESS ROUTES
tree
tree
fill in gap in planter
form new opening in planter
CAR PARK
FIRE SAFETY FEATURES, F1
010898
ISSUE 1 10/10/01
Faye Architectural Designer
TITLE BOUNDARIES
PROPOSED LAYOUT 1:50
PIM ISSUE
B3

BUILDING CONSENT
ISSUE
15 October 2001

PIM ISSUE
25 September 2001

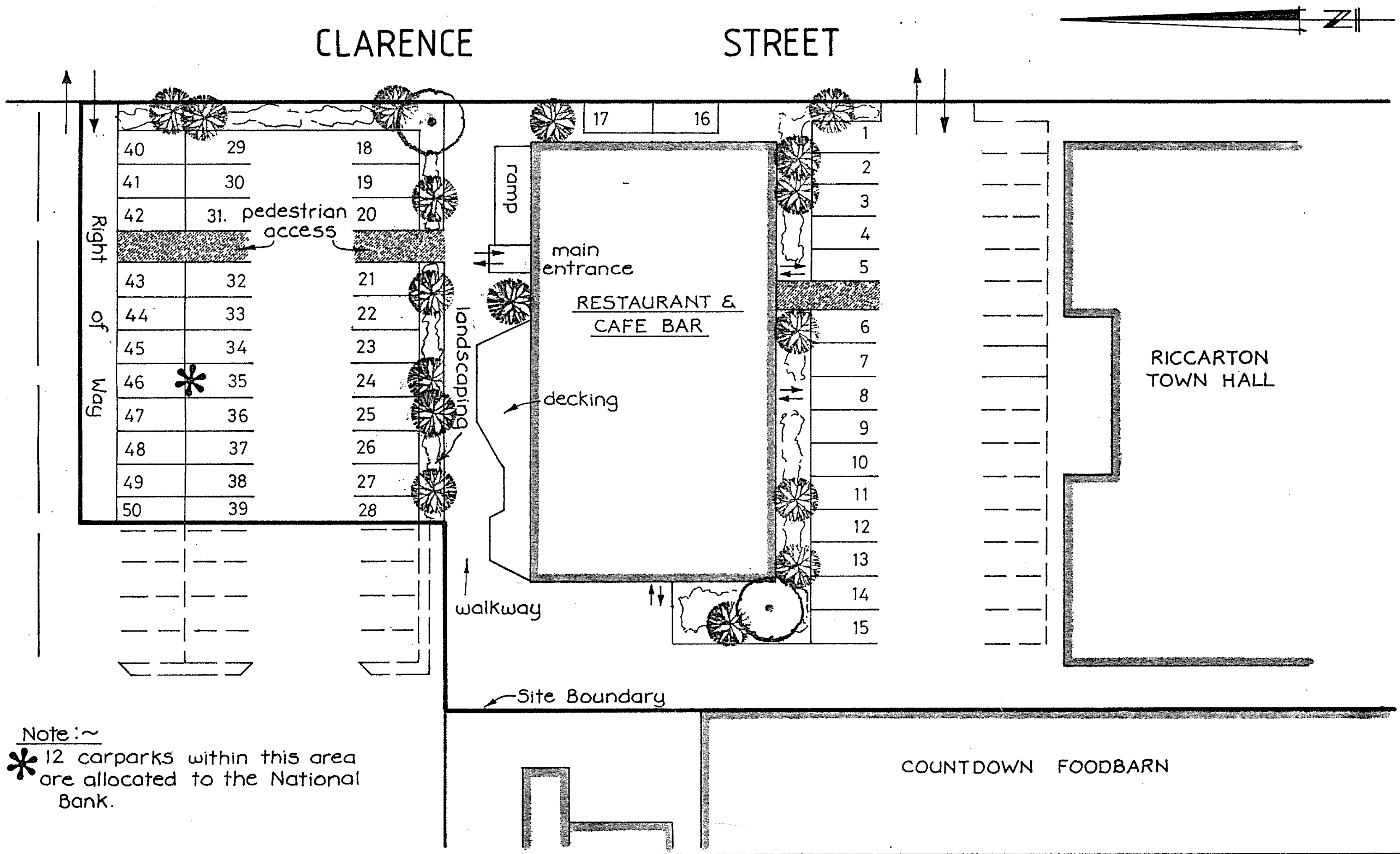
Faye
Architectural Designer
Faye Pearson-G
70 Ramahana
P.O. Box 12
9140

B4

EXISTING LAYOUT 1:50

GAMING MACHINES
garden
BAR
BAR.
RESTAURANT.
foot path
remove ramp
remove door
LOBBY ex.
new door
remove door handles from exterior. Fire egress door only
new steps
handrail
ex. steps
ANTI-SLIP: On all access routes (both external and internal), provide anti-slip surfaces complying with NZBC D1/AS1/Table 2 (except that surfaces inside entry doors of housing may be considered as dry areas).
CHRISTCHURCH
garden
new doors
new steps
handrails
COURTYARD
+ existing stamped concrete & asphalt
LOBBY new
860
glazing to comply with NZS 4223 incl. part 3.
new lobby
new entry door
ENTRY
1200
new ramp concrete coloured to match with broom finish
new canopy over
COURTYARD
Total Nett. 73m²
ex. stamped concrete & asphalt
SAFETY GLASS shall comply with NZBC F2/AS1.
Signs to comply with NZBC C2/AS1 3.20.1
Door locks to comply with NZBC C2/AS1 3.17.2
garden
CHRISTCHURCH CITY COUNCIL P.I.M. APPLICATION
Rec'd 15 OCT 2001
Sockburn Service Centre
PROJECT No.
T0019475
BUILDING CONSENT ISSUE 15 October 2001
fill in gap in planter
form new opening in planter
CAR PARK
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
23 OCT 2001
All building work shall comply with the New Zealand Building Code notwithstanding any inconsistencies which may occur in the drawings and specifications.
Faye Architectural Designer
Faye Pearson
B5
PROPOSED LAYOUT 1:50
PIM ISSUE 25 September 2001

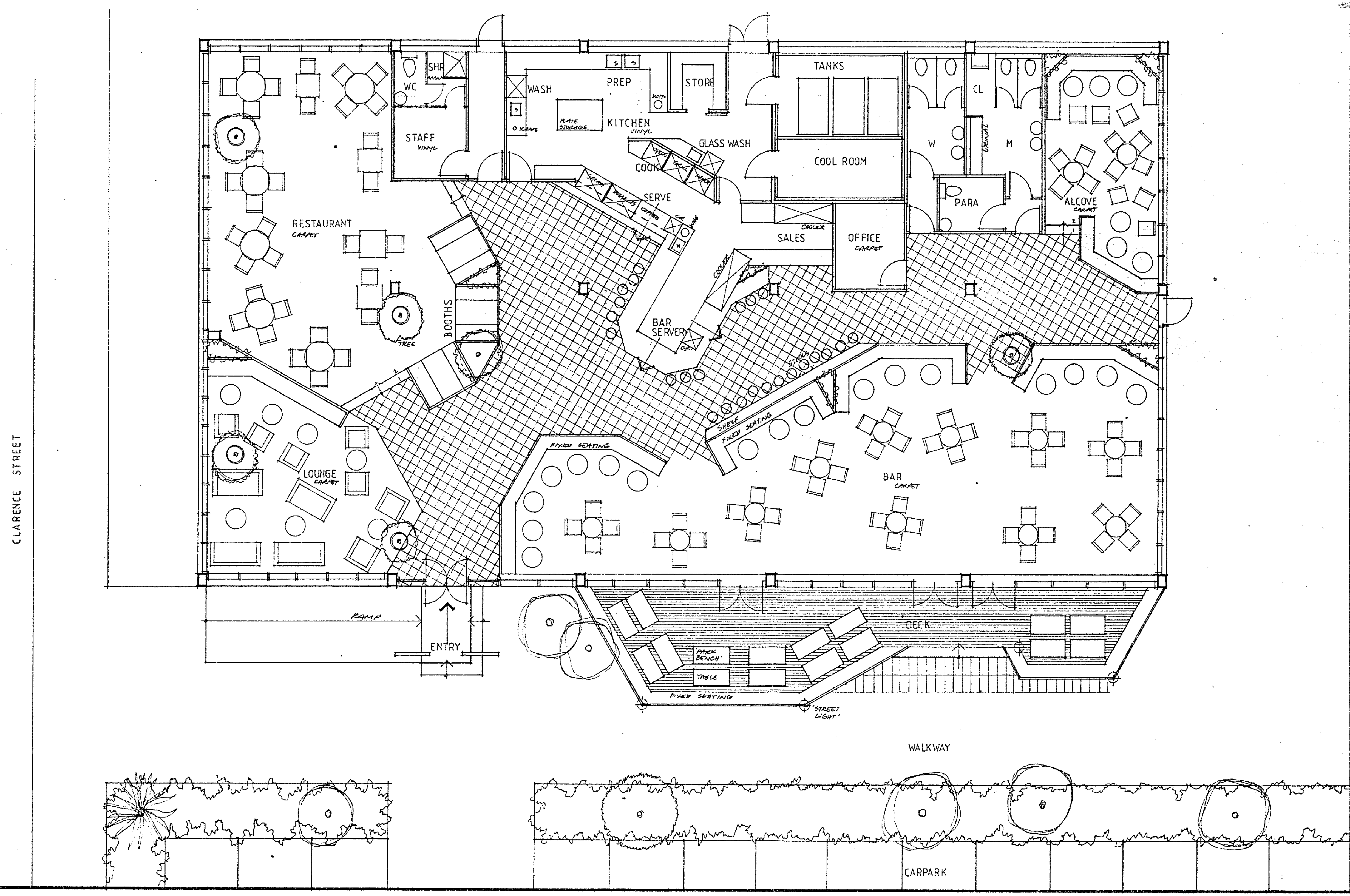
B6



Note :~
* 12 carparks within this area are allocated to the National Bank.

PROPOSED RESTAURANT & CAFE BAR — RICCARTON

SCALE : 1: 400
DATE : MAY 1991
M0856



NOTES

AMENDMENTS

DATE		DRAWN

THE DESIGN TEAM LIMITED
THE DESIGN TEAM LIMITED
42 Mandeville Street,
P.O. Box 8487
Riccarton Christchurch
Fax (03) 430-524
Telephone (03) 488-278

ALL CRITICAL MEASUREMENTS TO BE SITE CHECKED

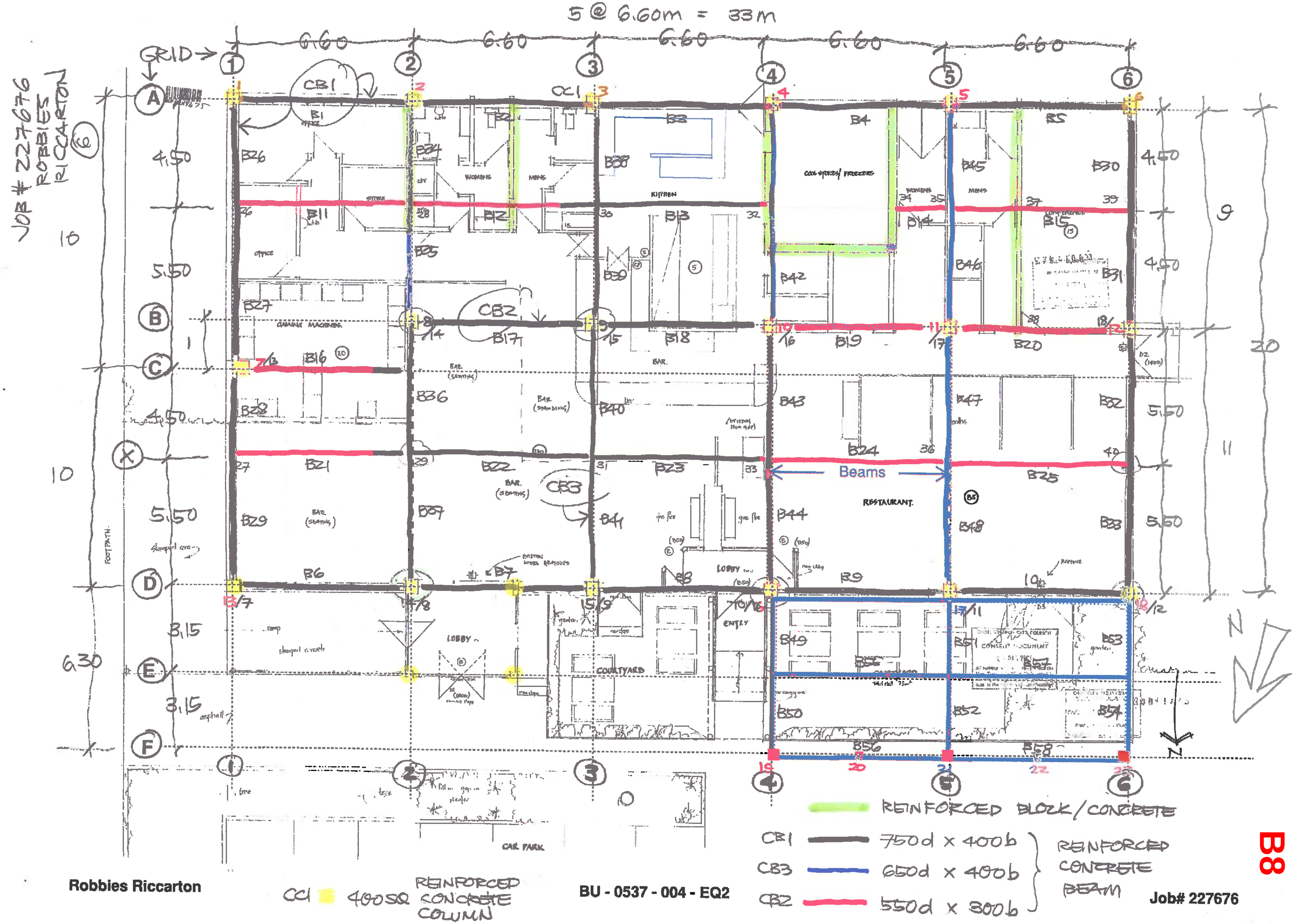
JOB TITLE
CLARENCE STREET
RESTAURANT AND BAR

DRAWING TITLE
PROPOSAL

B7

DRAWN	RC	CHECKE	
DATE	MARCH '91	SCALE	1:100
JOB	2298	5	1

B8



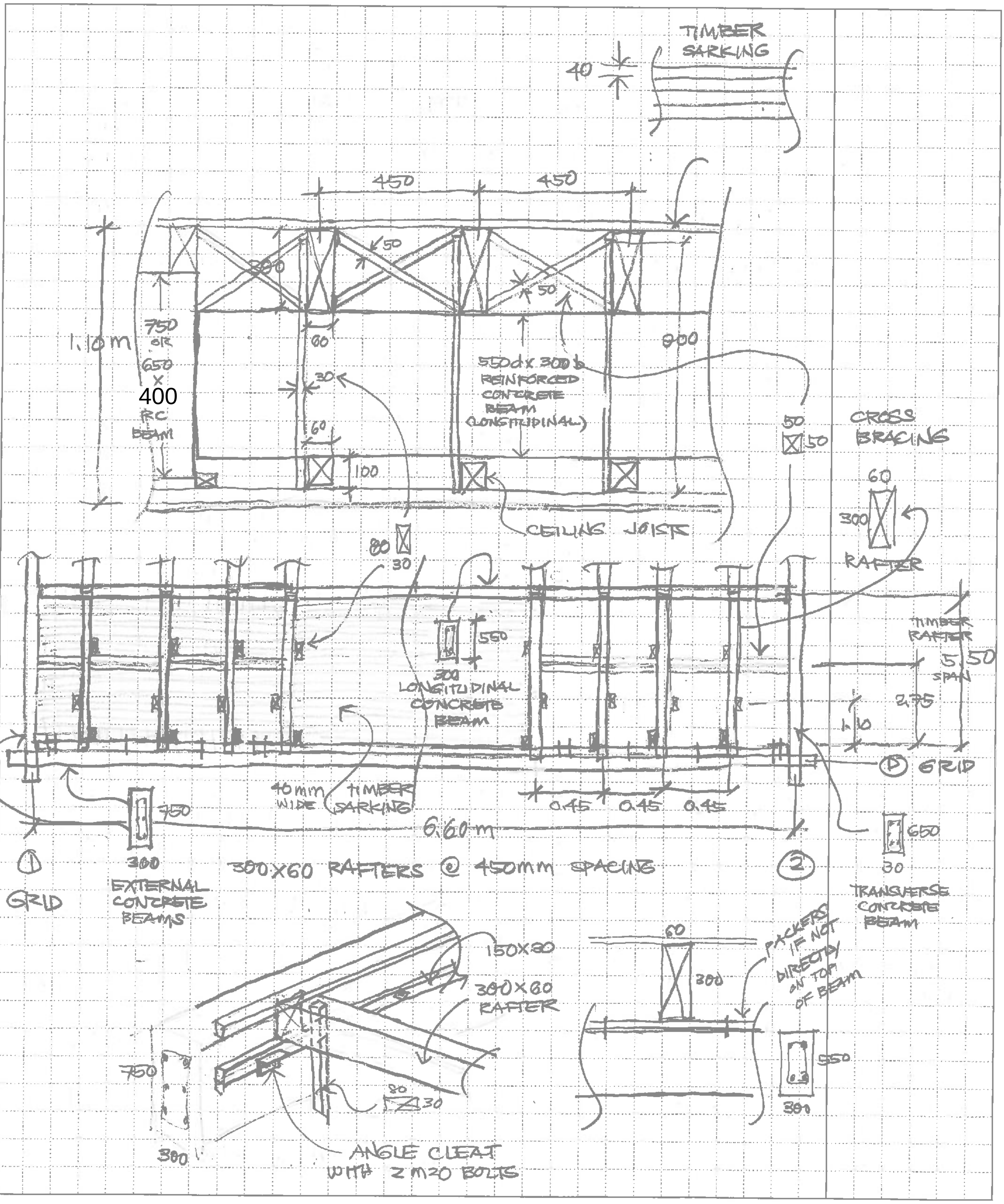
Robbies Riccarton

BU - 0537 - 004 - EQ2

Job# 227676

B9

Client:		Date:	
Project/Job: ROBBIES RICCARTON		Job No: 227676	
Subject: QUANTITATIVE ANALYSIS - NOTES		Sheet No: 4	By: RSB

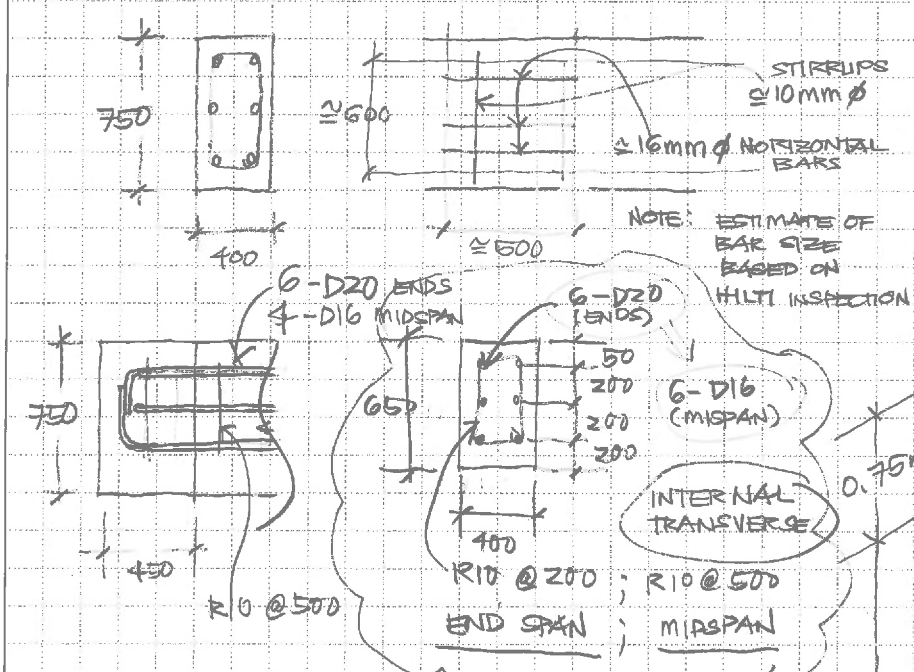


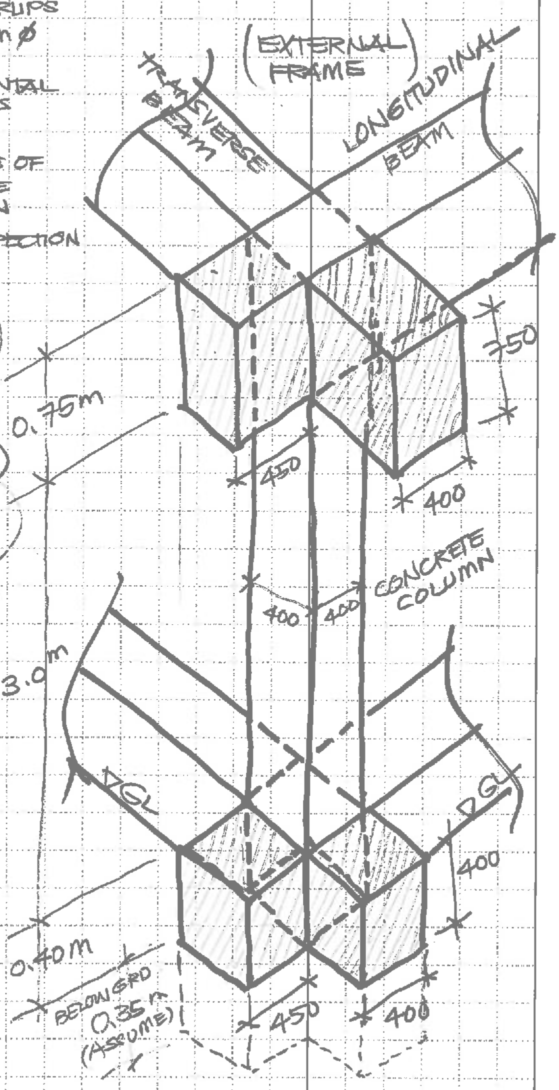
aurecon

B10

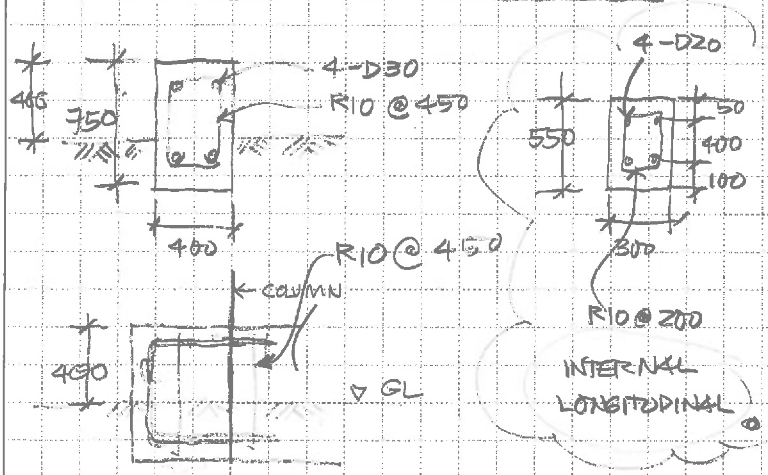
Client:		Date:	
Project/Job: ROBBIES RICCARTON	Job No: 227676		
Subject: QUANTITATIVE ANALYSIS - MEMBER SECTIONS	Sheet No: 7	By: RSB	

- EXTERNAL BEAM – (TOP)

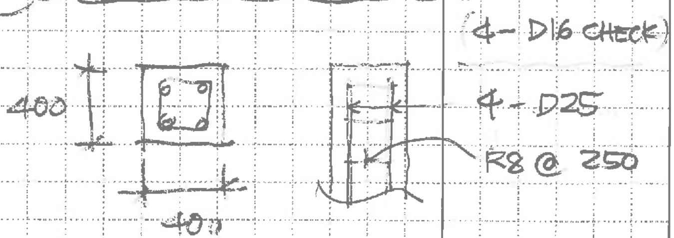




- EXTERNAL BEAM – (BOTTOM)

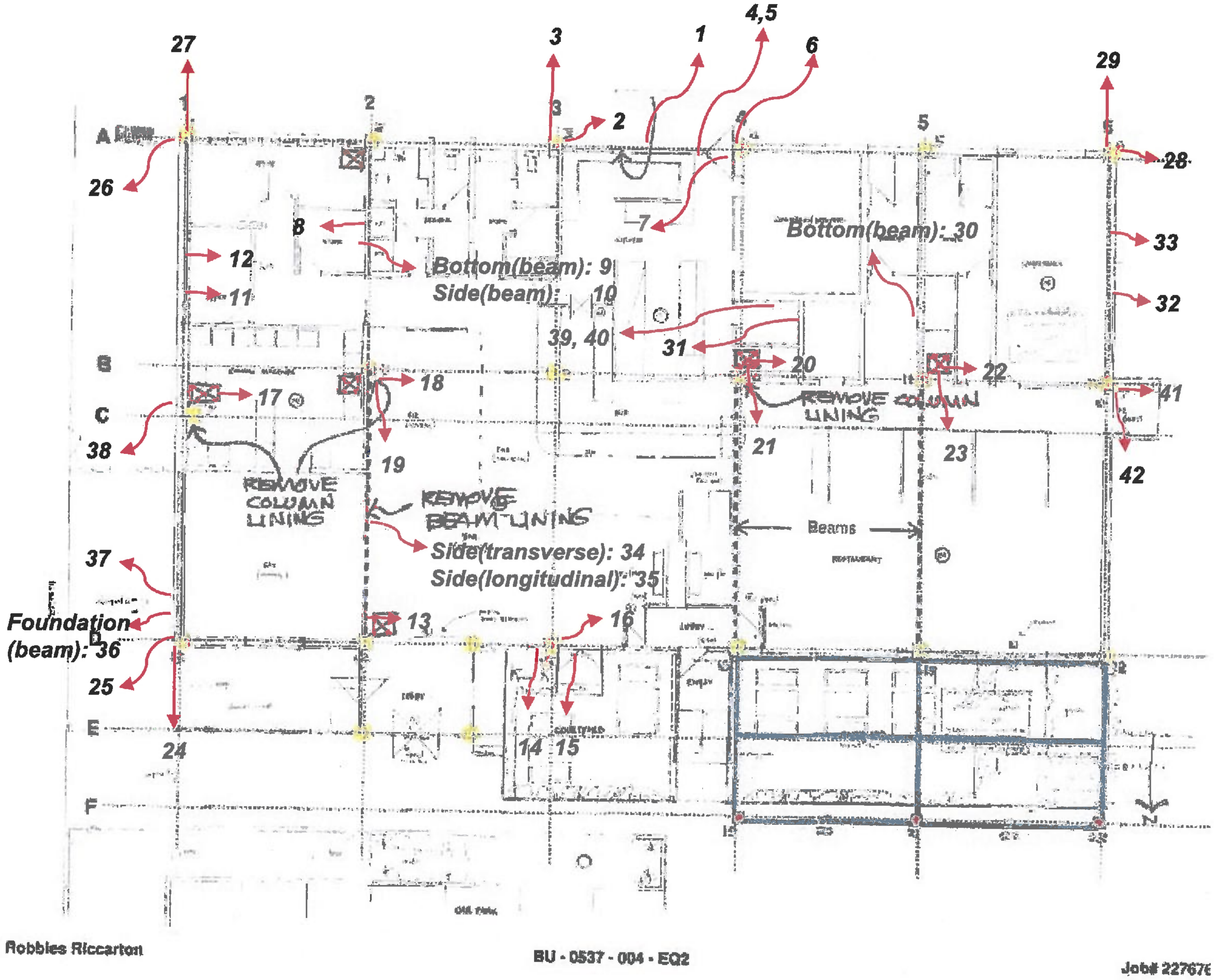


- EXTERNAL COLUMNS



B11

Robbies Riccarton, 199-205 Clarence Street, Christchurch – Quantitative Assessment



Remove ceiling lining

Robbies Riccarton Floor Plan

HILTI

Hilti. Outperform. Outlast.

















B12

Appendix C
Strength Assessment Explanation

New building standard (NBS)

New building standard (NBS) is the term used with reference to the earthquake standard that would apply to a new building of similar type and use if the building was designed to meet the latest design Codes of Practice. If the strength of a building is less than this level, then its strength is expressed as a percentage of NBS.

Earthquake Prone Buildings

A building can be considered to be earthquake prone if its strength is less than one third of the strength to which an equivalent new building would be designed, that is, less than 33%NBS (as defined by the New Zealand Building Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered at risk.

Christchurch City Council Earthquake Prone Building Policy 2010

The Christchurch City Council (CCC) already had in place an Earthquake Prone Building Policy (EPB Policy) requiring all earthquake-prone buildings to be strengthened within a timeframe varying from 15 to 30 years. The level to which the buildings were required to be strengthened was 33%NBS.

As a result of the 4 September 2010 Canterbury earthquake the CCC raised the level that a building was required to be strengthened to from 33% to 67% NBS but qualified this as a target level and noted that the actual strengthening level for each building will be determined in conjunction with the owners on a building-by-building basis. Factors that will be taken into account by the Council in determining the strengthening level include the cost of strengthening, the use to which the building is put, the level of danger posed by the building, and the extent of damage and repair involved.

Irrespective of strengthening level, the threshold level that triggers a requirement to strengthen is 33%NBS.

As part of any building consent application fire and disabled access provisions will need to be assessed.

Christchurch Seismicity

The level of seismicity within the current New Zealand loading code (AS/NZS 1170) is related to the seismic zone factor. The zone factor varies depending on the location of the building within NZ. Prior to the 22nd February 2011 earthquake the zone factor for Christchurch was 0.22. Following the earthquake the seismic zone factor (level of seismicity) in the Christchurch and surrounding areas has been increased to 0.3. This is a 36% increase.

For this assessment, the building's earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The new building standard load requirements have been determined in accordance with the current earthquake loading standard (NZS 1170.5:2004 Structural design actions - Earthquake actions - New Zealand).

The likely capacity of this building has been derived in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006. These guidelines provide an Initial Evaluation Procedure that assesses a buildings capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure C1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance	
					Legal Requirement	NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement	Unacceptable	Unacceptable

Figure C1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table C1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% probability of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% probability of exceedance in the next year.

Table C1: Relative Risk of Building Failure In A

Percentage of New Building Standard (%NBS)	Relative Risk (Approximate)
>100	<1 time
80-100	1-2 times
67-80	2-5 times
33-67	5-10 times
20-33	10-25 times
<20	>25 times

Appendix D
Background and Legal Framework

Background

Aurecon has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the building

This report is a Qualitative Assessment of the building structure, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011.

A qualitative assessment involves inspections of the building and a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available.

The purpose of the assessment is to determine the likely building performance and damage patterns, to identify any potential critical structural weaknesses or collapse hazards, and to make an initial assessment of the likely building strength in terms of percentage of new building standard (%NBS).

Compliance

This section contains a brief summary of the requirements of the various statutes and authorities that control activities in relation to buildings in Christchurch at present.

Canterbury Earthquake Recovery Authority (CERA)

CERA was established on 28 March 2011 to take control of the recovery of Christchurch using powers established by the Canterbury Earthquake Recovery Act enacted on 18 April 2011. This act gives the Chief Executive Officer of CERA wide powers in relation to building safety, demolition and repair. Two relevant sections are:

Section 38 – Works

This section outlines a process in which the chief executive can give notice that a building is to be demolished and if the owner does not carry out the demolition, the chief executive can commission the demolition and recover the costs from the owner or by placing a charge on the owners' land.

Section 51 – Requiring Structural Survey

This section enables the chief executive to require a building owner, insurer or mortgagee carry out a full structural survey before the building is re-occupied.

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). It is anticipated that CERA will adopt the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011. This document sets out a methodology for both qualitative and quantitative assessments.

The qualitative assessment is a desk-top and site inspection assessment. It is based on a thorough visual inspection of the building coupled with a review of available documentation such as drawings and specifications. The quantitative assessment involves analytical calculation of the buildings strength and may require non-destructive or destructive material testing, geotechnical testing and intrusive investigation.

It is anticipated that factors determining the extent of evaluation and strengthening level required will include:

- The importance level and occupancy of the building
- The placard status and amount of damage
- The age and structural type of the building
- Consideration of any critical structural weaknesses
- The extent of any earthquake damage

Building Act

Several sections of the Building Act are relevant when considering structural requirements:

Section 112 – Alterations

This section requires that an existing building complies with the relevant sections of the Building Code to at least the extent that it did prior to any alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

Section 115 – Change of Use

This section requires that the territorial authority (in this case Christchurch City Council (CCC)) be satisfied that the building with a new use complies with the relevant sections of the Building Code 'as near as is reasonably practicable'. Regarding seismic capacity 'as near as reasonably practicable' has previously been interpreted by CCC as achieving a minimum of 67%NBS however where practical achieving 100%NBS is desirable. The New Zealand Society for Earthquake Engineering (NZSEE) recommend a minimum of 67%NBS.

Section 121 – Dangerous Buildings

The definition of dangerous building in the Act was extended by the Canterbury Earthquake (Building Act) Order 2010, and it now defines a building as dangerous if:

- in the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- in the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- there is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- there is a risk that that other property could collapse or otherwise cause injury or death; or
- a territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

This section defines a building as earthquake prone if its ultimate capacity would be exceeded in a 'moderate earthquake' and it would be likely to collapse causing injury or death, or damage to other property. A moderate earthquake is defined by the building regulations as one that would generate ground shaking 33% of the shaking used to design an equivalent new building.

Section 124 – Powers of Territorial Authorities

This section gives the territorial authority the power to require strengthening work within specified timeframes or to close and prevent occupancy to any building defined as dangerous or earthquake prone.

Section 131 – Earthquake Prone Building Policy

This section requires the territorial authority to adopt a specific policy for earthquake prone, dangerous and insanitary buildings.

Christchurch City Council Policy

Christchurch City Council adopted their Earthquake Prone, Dangerous and Insanitary Building Policy in 2006. This policy was amended immediately following the Darfield Earthquake of the 4th September 2010.

The 2010 amendment includes the following:

- A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
- A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
- A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
- Repair works for buildings damaged by earthquakes will be required to comply with the above.

The council has stated their willingness to consider retrofit proposals on a case by case basis, considering the economic impact of such a retrofit.

We anticipate that any building with a capacity of less than 33%NBS (including consideration of critical structural weaknesses) will need to be strengthened to a target of 67%NBS of new building standard as recommended by the Policy.

If strengthening works are undertaken, a building consent will be required. A requirement of the consent will require upgrade of the building to comply 'as near as is reasonably practicable' with:

- The accessibility requirements of the Building Code.
- The fire requirements of the Building Code. This is likely to require a fire report to be submitted with the building consent application.

Building Code

The building code outlines performance standards for buildings and the Building Act requires that all new buildings comply with this code. Compliance Documents published by The Department of Building and Housing can be used to demonstrate compliance with the Building Code.

After the February Earthquake, on 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

- Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)
- Serviceability Return Period Factor increased from 0.25 to 0.33 (80% increase in the serviceability design loads when combined with the Hazard Factor increase)

The increase in the above factors has resulted in a reduction in the level of compliance of an existing building relative to a new building despite the capacity of the existing building not changing.

Appendix E
Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Robbies on Riccarton	Reviewer:	Lee Howard
	Unit / No: / Street	CPEng No:	1008889
Building Address:	199 Clarence Street	Company:	Aurecon
Legal Description:		Company project number:	228701
		Company phone number:	03 375 0761
	Degrees / Min / Sec		
GPS south:	43 / 31 / 51.61	Date of submission:	24/06/2013
GPS east:	172 / 36 / 6.33	Inspection Date:	12/10/2011
		Revision:	2
Building Unique Identifier (CCC):	PRO 0537 B004	Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	
Soil type:	mixed	Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):		If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):		Approx site elevation (m):	7.00

Building

No. of storeys above ground:	1	single storey = 1 Ground floor elevation (Absolute) (m):	7.40
Ground floor split?	yes	Ground floor elevation above ground (m):	0.40
Storeys below ground			
Foundation type:	pads with tie beams	if Foundation type is other, describe:	Concrete Slab with Ground Beams
Building height (m):	3.00	height from ground to level of uppermost seismic mass (for IEP only) (m):	3
Floor footprint area (approx):	576		
Age of Building (years):	45	Date of design:	1965-1976
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	commercial	Brief strengthening description:	
Use (upper floors):			
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	frame system		
Roof:	timber framed	rafter type, purlin type and cladding	300x50 timber roof purlins supported by conc moment frame
Floors:	other (note)	describe sytem	Conc slab at ground level
Beams:			
Columns:			
Walls:			

Lateral load resisting structure

Lateral system along:	non-ductile concrete moment frame	Note: Define along and across in detailed report!	note typical bay length (m)	6.4
Ductility assumed, μ:	1.50			
Period along:	0.40	0.21 from parameters in sheet	estimate or calculation?	estimated
Total deflection (ULS) (mm):	20		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	20		estimate or calculation?	estimated
Lateral system across:	non-ductile concrete moment frame		note typical bay length (m)	9.5 , 7.6
Ductility assumed, μ:	1.50			
Period across:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):	20		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	20		estimate or calculation?	estimated

Separations:

north (mm):		leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

Non-structural elements

Stairs:			
Wall cladding:	exposed structure	describe	
Roof Cladding:	Membrane	substrate	
Glazing:	steel frames		
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	
Structural	none	original designer name/date	
Mechanical		original designer name/date	
Electrical		original designer name/date	
Geotech report		original designer name/date	

Damage

Site: (refer DEE Table 4-2)

Site performance:		Describe damage:	
Settlement:	none observed	notes (if applicable):	
Differential settlement:	none observed	notes (if applicable):	
Liquefaction:	none apparent	notes (if applicable):	
Lateral Spread:	none apparent	notes (if applicable):	
Differential lateral spread:	none apparent	notes (if applicable):	
Ground cracks:	none apparent	notes (if applicable):	
Damage to area:	none apparent	notes (if applicable):	

Building:

	Current Placard Status:	green		
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	no	Describe:	

$$Damage\_Ratio = \frac{(\% NBS\,(before) - \% NBS\,(after))}{\% NBS\,(before)}$$

Recommendations

	Level of repair/strengthening required:	none	Describe:	
	Building Consent required:	no	Describe:	
	Interim occupancy recommendations:	full occupancy	Describe:	
Along	Assessed %NBS before:	45%	##### %NBS from IEP below	If IEP not used, please detail assessment methodology: Quantitative
	Assessed %NBS after:	45%		
Across	Assessed %NBS before:	43%	##### %NBS from IEP below	
	Assessed %NBS after:	43%		

IEP **Use of this method is not mandatory - more detailed analysis may give a different answer, which would take precedence. Do not fill in fields if not using IEP.**

Period of design of building (from above): 1965-1976 h_n from above: 3m

Seismic Zone, if designed between 1965 and 1992: not required for this age of building / not required for this age of building

	along	across
Period (from above):	0.4	0.4
(%NBS)nom from Fig 3.3:		

Note:1 for specifically design public buildings, to the code of the day: pre-1965 = 1.25; 1965-1976, Zone A =1.33; 1965-1976, Zone B = 1.2; all else 1.0

Note 2: for RC buildings designed between 1976-1984, use 1.2

Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)

along across

Final $(\%NBS)_{nom}$: 0% | 0%

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6:

	along	across
Near Fault scaling factor (1/N(T,D), **Factor A**:	#DIV/0!	#DIV/0!

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:

Z_{1992}, from NZS4203:1992

Hazard scaling factor, **Factor B:** #DIV/0!

2.4 Return Period Scaling Factor

Building Importance level (from above): 2

Return Period Scaling factor from Table 3.1, **Factor C**:

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)		
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:		
Ductiity Scaling Factor, **Factor D**:	0.00	0.00

2.6 Structural Performance Scaling Factor:

Sp:		
Structural Performance Scaling Factor **Factor E**:	#DIV/0!	#DIV/0!

2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom}$ x A x B x C x D x E

$\%NBS_b$: **#DIV/0!** | **#DIV/0!**

Global Critical Structural Weaknesses: (refer to NZSEE IEP Table 3.4)

3.1. Plan Irregularity, factor A: 1

3.2. Vertical irregularity, Factor B: 1

3.3. Short columns, Factor C: 1

3.4. Pounding potential

Pounding effect D1, from Table to right

Height Difference effect D2, from Table to right

Therefore, Factor D: 0

3.5. Site Characteristics 1

Table for selection of D1	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Alignment of floors within 20% of H	**0.7**	**0.8**	**1**
Alignment of floors not within 20% of H	**0.4**	**0.7**	**0.8**

Table for Selection of D2	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Height difference > 4 storeys	0.4	0.7	1
Height difference 2 to 4 storeys	0.7	0.9	1
Height difference < 2 storeys	1	1	1

3.6. Other factors, Factor F

	Along	Across
For ≤ 3 storeys, max value =2.5, otherwise max valule =1.5, no minimum		
Rationale for choice of F factor, if not 1	no visible damage, frame supports only light roof	no visible damage, frame supports only light roof

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)

List any:

Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

3.7. Overall Performance Achievement ratio (PAR) **0.00** | **0.00**

4.3 PAR x (%NBS)b:

PAR x Baselline %NBS: **#DIV/0!** | **#DIV/0!**

4.4 Percentage New Building Standard (%NBS), (before) **#DIV/0!**

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com