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DETAILED ENGINEERING EVALUATION

123 BLENHEIM ROAD

CHRISTCHURCH

ISSUE 2

14th Oct 2014

JOB NO: 140073

CONTENTS

INTRODUCTION

This report has been prepared for Paul Brown for the property at 123 Blenheim Rd. The report details the results found from an engineering investigation into the performance of the building in the recent earthquakes, and its likely structural capacity for future events.
The format of the investigation and the reporting is in accordance with the "Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury", Part 2. (Labelled as DEE in future references in this report)

WORK COMPLETED

The work completed consists of:

- The gathering of existing building information. This involved searching for existing plans and checking the structure on site against these plans.
- A detailed damage inspection has been carried out checking damage sustained from the recent earthquakes.
- Floor levels were checked on site to determine any areas of excessive settlement.
- A qualitative assessment has been carried out to determine a structural earthquake strength of the building comparative to the new building standard(%NBS)
- No invasive investigation was required as the structure was identifiable from the existing plans and visible on site.

BUILDING INFORMATION

Address	123 Blenheim Rd Riccarton, Christchurch, 8041
Usage	Ground floor – Commerical Use First floor – Commercial Use
No. of Storeys	2
Building Dimensions	Total dimensions 37m x 30m (Area approx. 790m^2)
Year of construction	1993
Foundations	Various size concrete post hole foundations situated under portal frame legs and tied to adjacent post hole over the full width of the slab with 2-H16 bar ties. Strip footings run underneath the concrete panels typically 200mm wide. Gravity load pad foundation under the first floor support column in the southern unit.
Floor	The first floor structure consists of 75mm Unispan units with 75mm topping containing 665 reinforcing mesh. The unispan units have a minimum seating of 15mm. The 75mm topping slab is tied into the ground floor wall panels with D10 starters at 275mm centres. The ground floor consists of a 125mm unreinforced poured concrete slab.

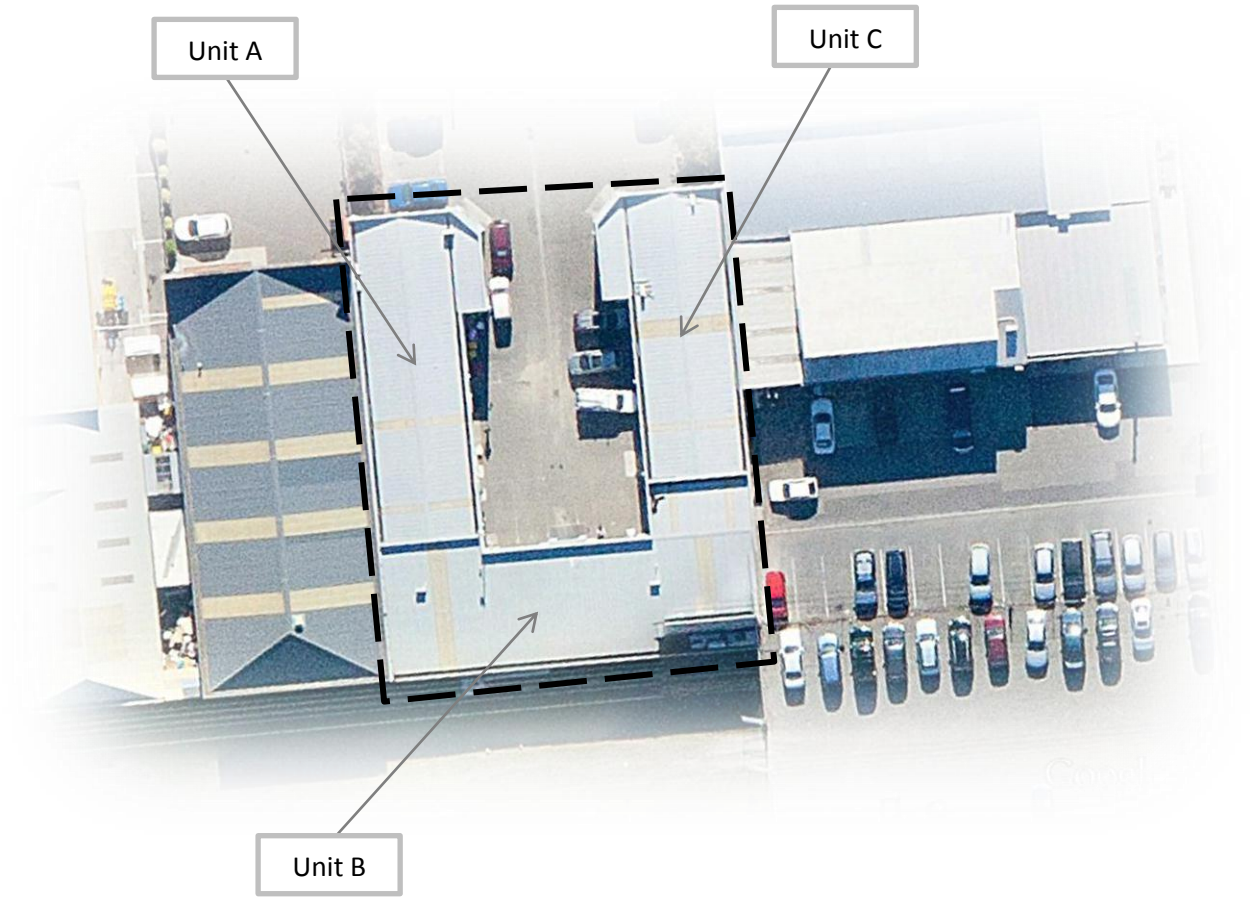
Walls 120mm precast concrete wall panels reinforced with 663 mesh.
Wall panels contain 2 layers of 663 mesh at pier locations and typically additional D12 reinforcing bars.
250UB portals span the 8.1m width in the single storey units.

Roof The roof structure comprises of lightweight iron cladding on BP150/19 purlins spanning between the UB portal rafters and precast concrete wall panels.

Structural System The gravity load system comprises of the portal frames and concrete precast panels. The unispan first floor slab distributes the first floor load to the ground floor panels and into the foundations.

The main lateral load resisting system in both directions consists of the precast concrete panels in plane. First floor loads are picked up through starter bars connected into the concrete panels.

The steel portal frames are also a main part of the lateral load resisting system in the east/west direction.



SITE PLAN- 123 BLENHEIM ROAD

BUILDING HOT SPOTS

The evaluation has been completed using Appendix A of the DEE guidelines.
The building has been reviewed to determine potential "hot spots" in the structural system. As the building consists of predominantly concrete precast wall panels and steel portal frames, the following areas are of concern:

Potential Issue	Observation of the performance
Inadequate foundations	The foundations have performed well. The site has not sustained large amounts of settlement or liquefaction. Only minor gradients were noted <1:350 and each unit was found to be within 10-20mm.
Inadequate face load capacity of precast wall panels	The precast panels were found to contain non ductile reinforcing mesh. As a result, the panels have been assessed at a ductility level of 1.25. The calculated strength of the concrete panels in face loading is 73%NBS. Widespread cracking up to 0.5mm is visible in all units. These are typically vertical cracks at the mid-span location of each panel. Panel 5 in Unit B has displaced by up to 18mm at the mid-span. This can be observed at ground level where the panel has separated from the ground floor slab. It is recommended that the concrete panels are repaired back to pre-earthquake condition using epoxy injection techniques.
Excessive deflection of portal frame during in plane loading	No excessive deflections were witnessed to the portal frames. No pounding damage was observed to the neighbouring buildings as a result of excessive deflections.
Inadequate panel connections	Panel connections appear in sound structural condition where inspected. No structural damage was witnessed to bolted connections.
Inadequate in plane capacity of concrete precast panels	Diagonal cracking was noted to several concrete panels around openings. This type of damage is typical for concrete panels having experienced large shear forces. The panels can be repaired back to pre-earthquake strength using epoxy injection.

BUILDING STRUCTURAL STRENGTH COMPLIANCE

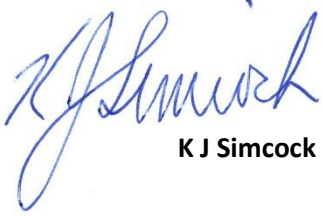
Detailed structural calculations have been carried out to determine the seismic capacity of the building relative to the new building standard (%NBS).
The capacity of the critical structural elements in the lateral load resisting systems has been checked.
The building has a structural seismic capacity of approximately 73%NBS.

SUMMARY

The building has sustained a reasonable amount of structural damage to the concrete wall panels during the recent earthquake events. The cracking in the wall panels is due to face load deflection during seismic loading.
It has been concluded that the building has a strength of approximately 73%NBS.
The floor slab settlement throughout the building is minor.
Structural repair is to be carried out as stated in appendix 2.

Michael Hughes
TM CONSULTANTS LTD

Checked and approved by

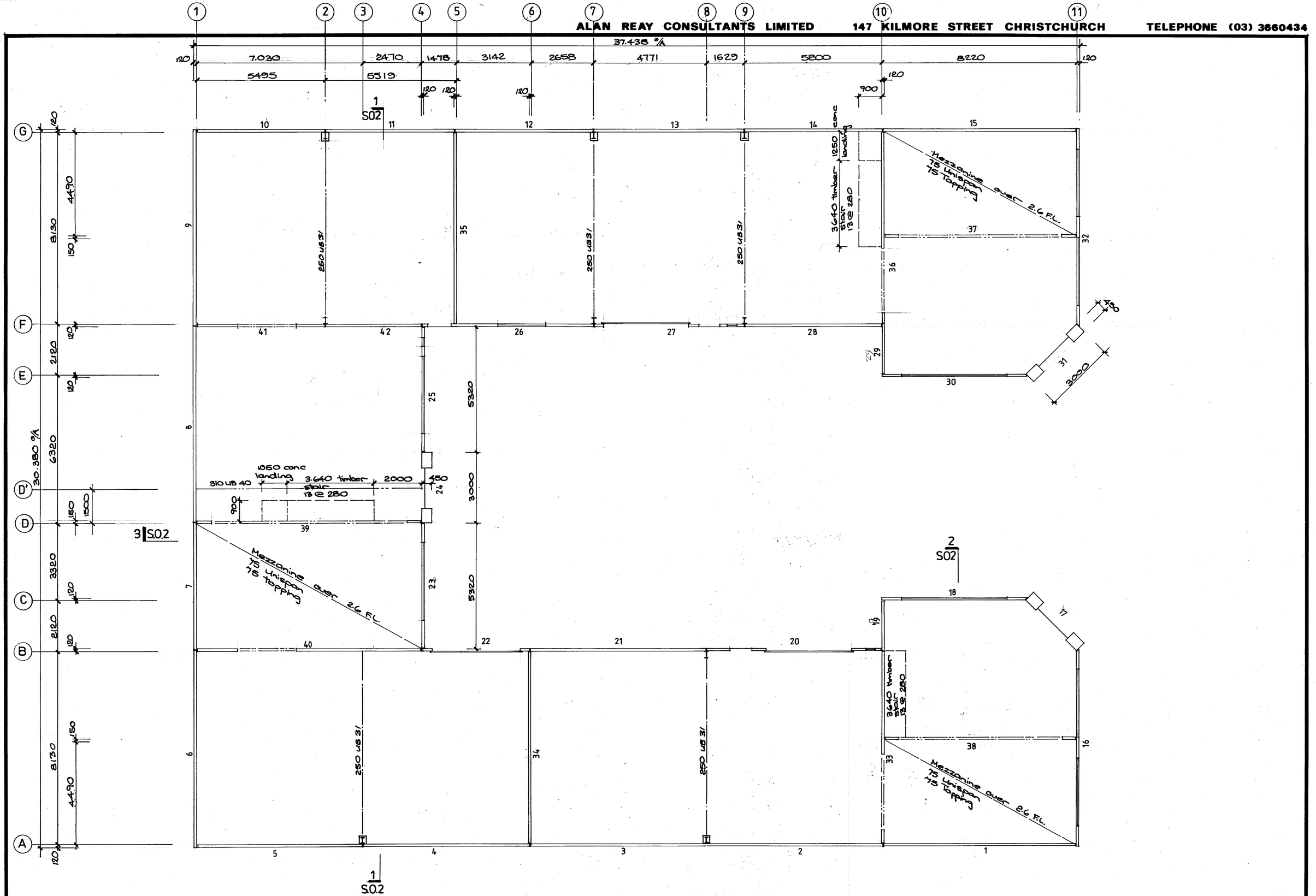


K J Simcock

Appendix 1

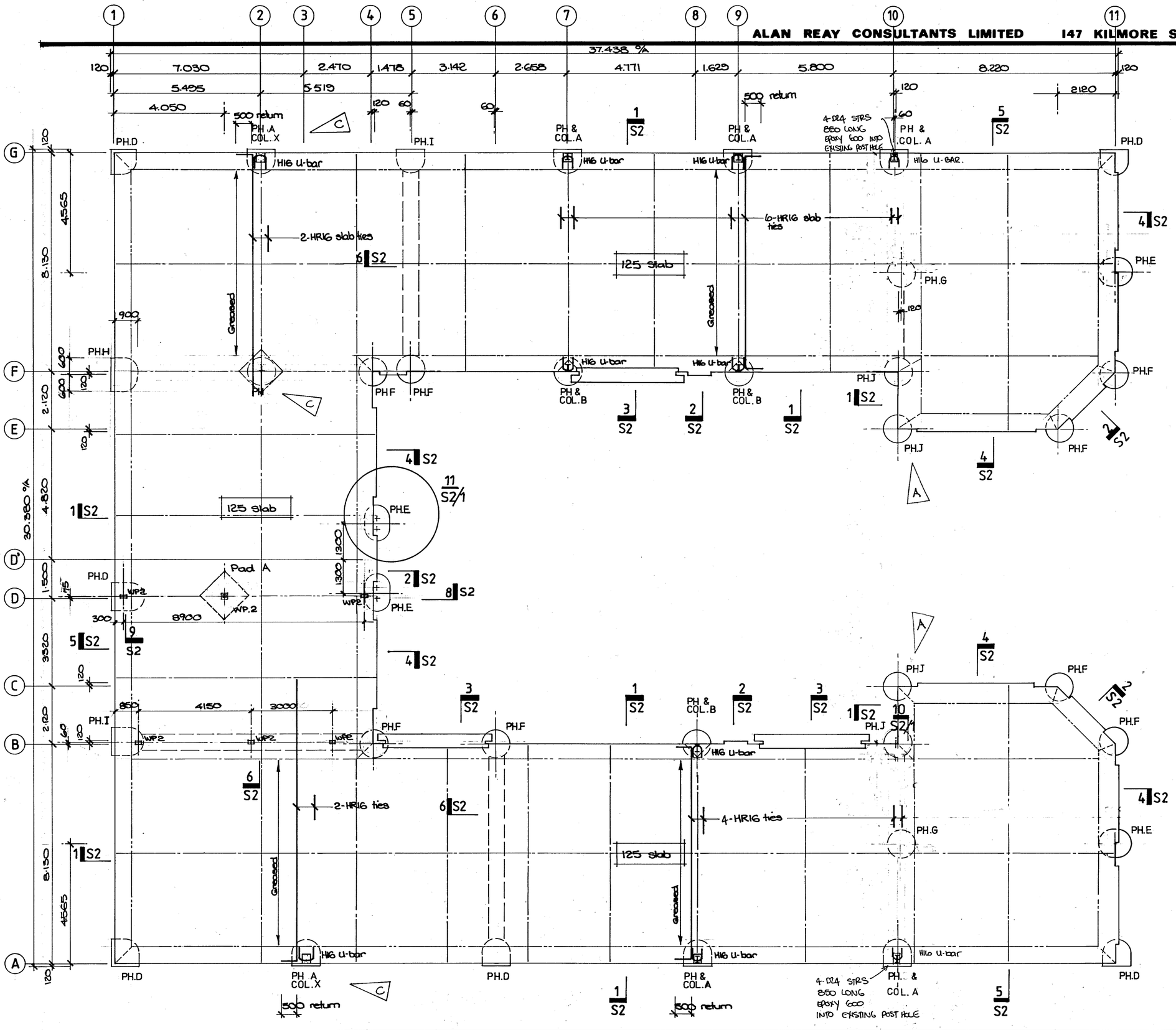
Building Plans

ALAN REAY CONSULTANTS LIMITED 147 KILMORE STREET CHRISTCHURCH TELEPHONE (03) 3660434



DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	W.L.S.	APPROVED	DATE	SCALES	FLOOR PLAN	SHEET	FILE
	DES			JUNE 1993	1:100		S01	4860
	CKD							

ALAN REAY CONSULTANTS LIMITED 147 KILMORE STREET CHRISTCHURCH TELEPHONE 660434



NOTES

- Contractor to verify all dimensions on site BEFORE commencing works.
- Refer to the Architectural drawings for all nibs, rebates, fixings, holes etc.
- Pour all foundations against natural undisturbed ground. Carry all foundations to solid bearing.
- Contractor to determine positions of all building services ie., sewer, stormwater, power, telephone cables etc., before pouring foundations.
- Slab Joints
  ——·——Denotes saw-cut or formed joint. Joint sealant is to be installed after slab shrinkage has taken place, and no sooner than 6 months after pouring slabs. For saw-cut joints install a temporary filler, to be removed when sealants shown are installed.

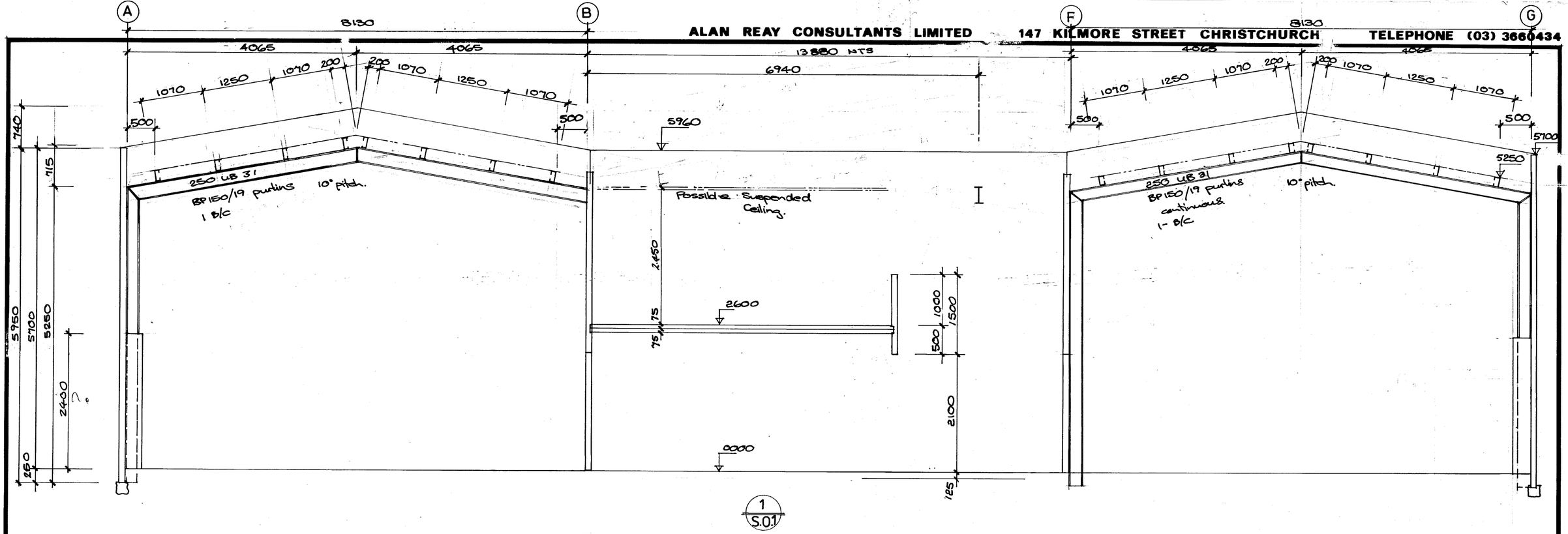
- POSTHOLES:
- Posthole D
  - 900 dia posthole, 1500 deep, top 270 below slab level. Square off to boundary, pour against natural undisturbed ground.
- Posthole E
  - 2 - 900 dia postholes, 400 apart, 1500 deep, top 270 below slab level. Pour against natural undisturbed ground.
- Posthole F
  - 900 dia posthole, 1000 deep, top 270 below slab level, Pour against natural undisturbed ground.
- Posthole G
  - 900 dia posthole, 1500 deep, top 125 below slab level. Pour against natural undisturbed ground.
- Posthole H
  2 - 900 dia postholes, 300 apart, 1500 deep, top 270 below slab level. Square off to boundary, pour against natural undisturbed ground.
- Posthole I
  900 dia posthole, 1000 deep, top 270 below slab level. Square off to boundary. Pour against natural undisturbed ground.
- Posthole J
  900 dia posthole, 1000 deep, top 270 below slab level. Pour against natural undisturbed ground. These postholes to have D12 starter rod. Refer Section 10 on sheet S2/1

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH

DRN	CPC	APPROVED	DATE	SCALES		SHEET	FILE
DES			JUNE 1993	1:100	FOUNDATION PLAN	$S1_C$	4860
CKD							

A 20/7/93 Added Posthole J's.
B 11-8-93 COL.A'S ADDED AT 10-A & 10 G, WP'S & THICKENING DELETED.
C 30-8-93 2-COL A'S, 1 col C DELETED, 2-col X ADDED

ALAN REAY CONSULTANTS LIMITED 147 KILMORE STREET CHRISTCHURCH TELEPHONE (03) 3660434



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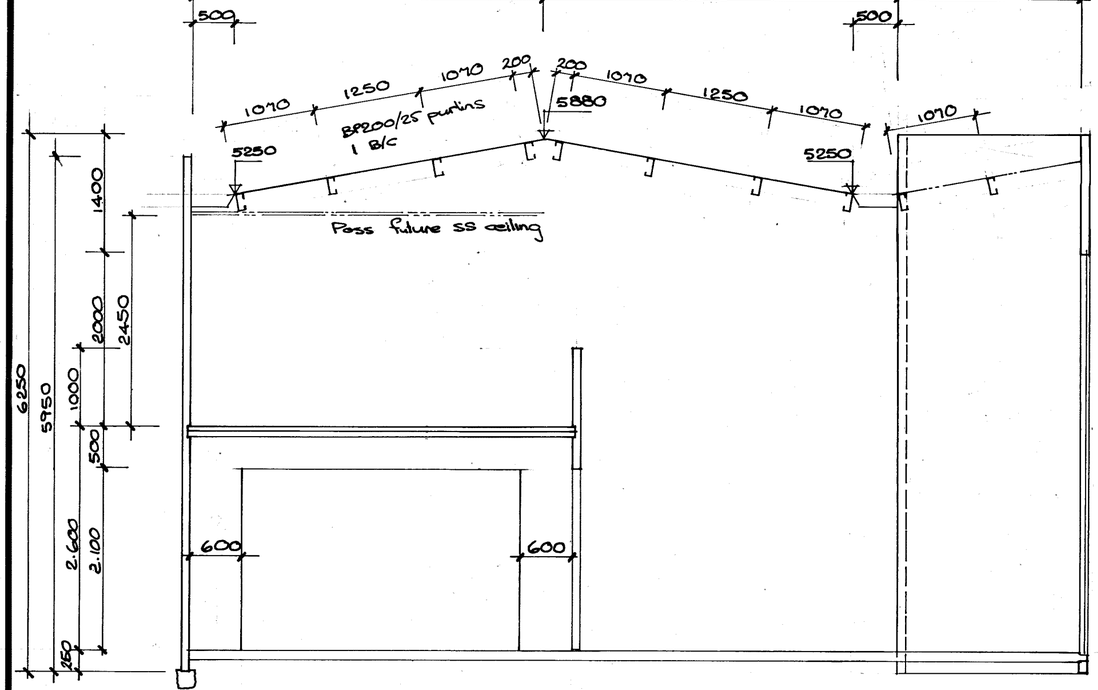

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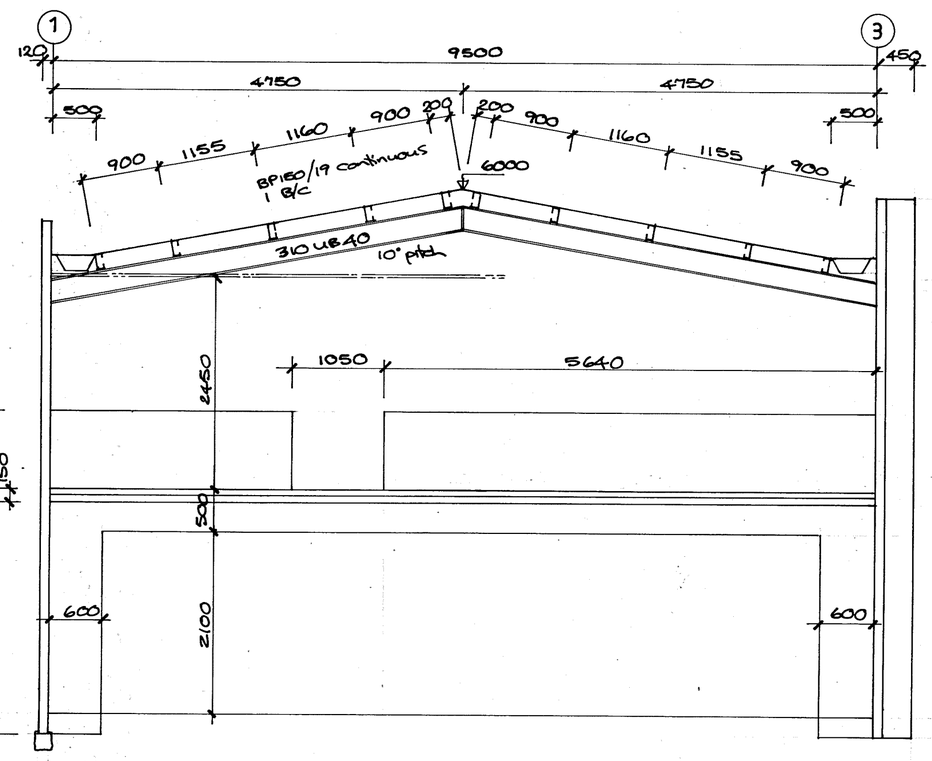

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S0.1

DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH

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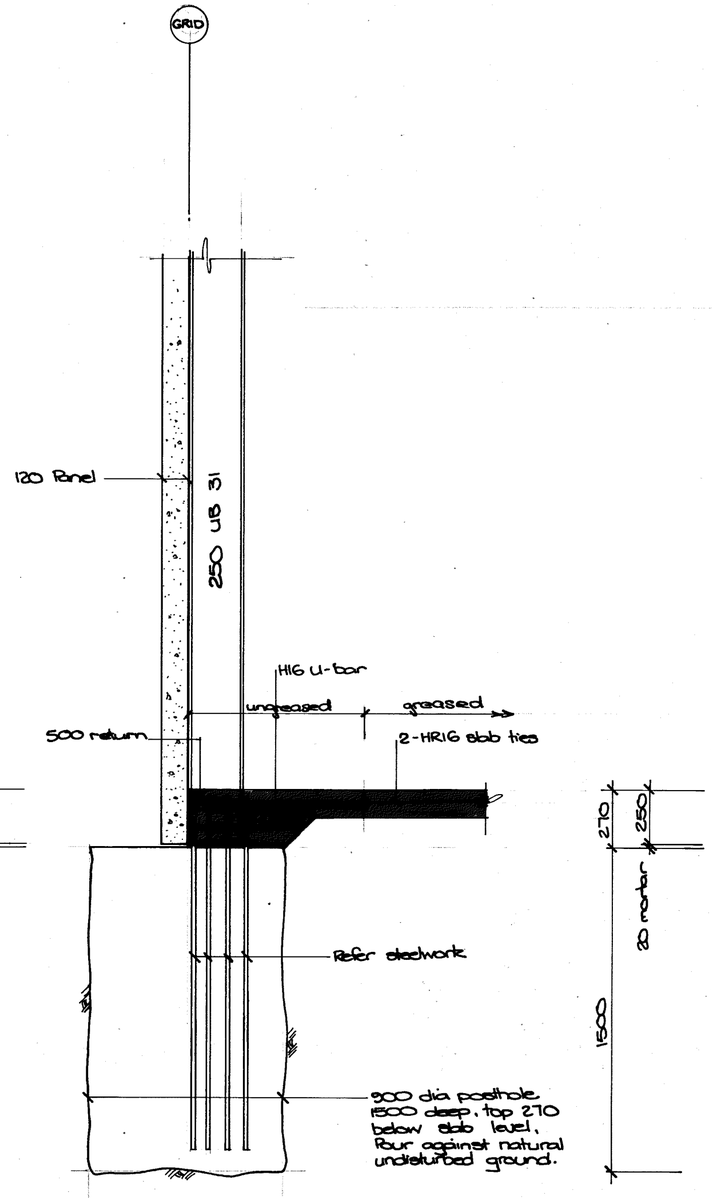
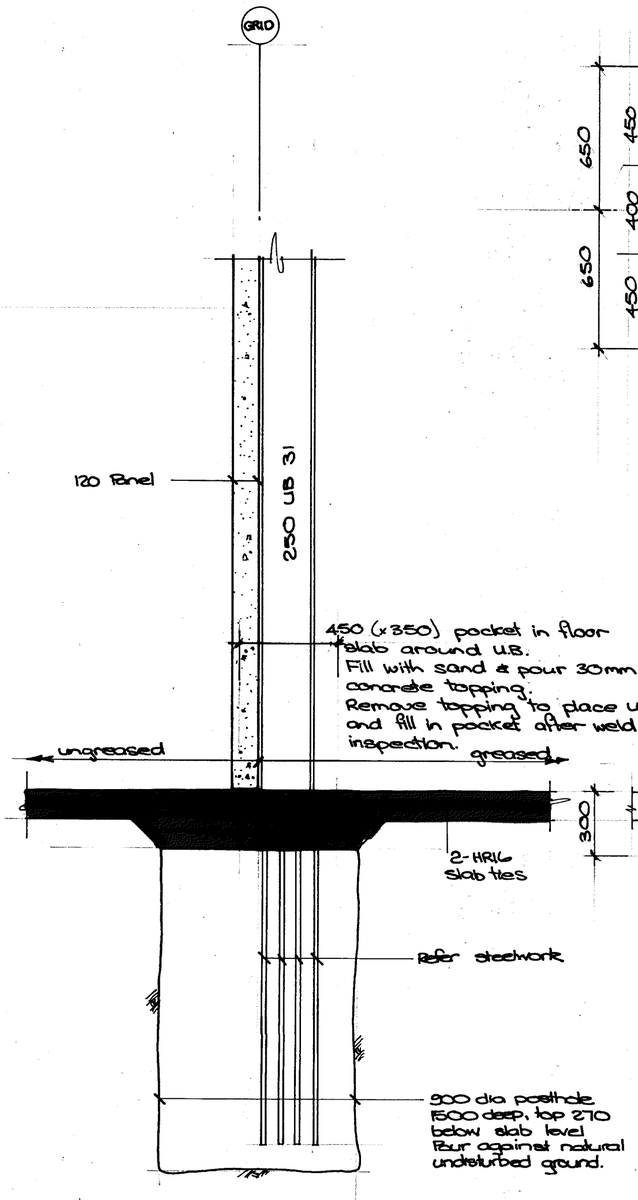
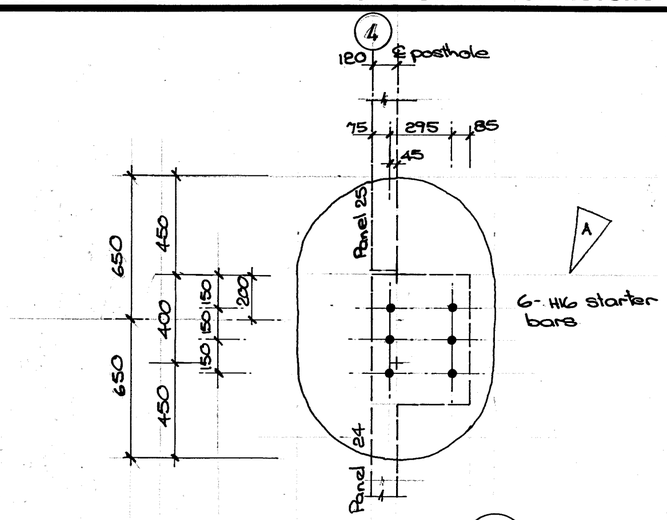
DES			JUNE 1993	1:50	SECTIONS	S02	4860
CKD							



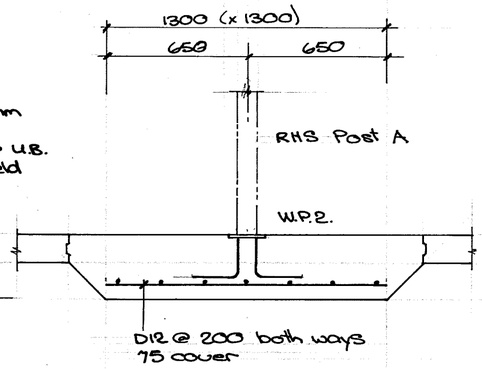
POSTHOLE B



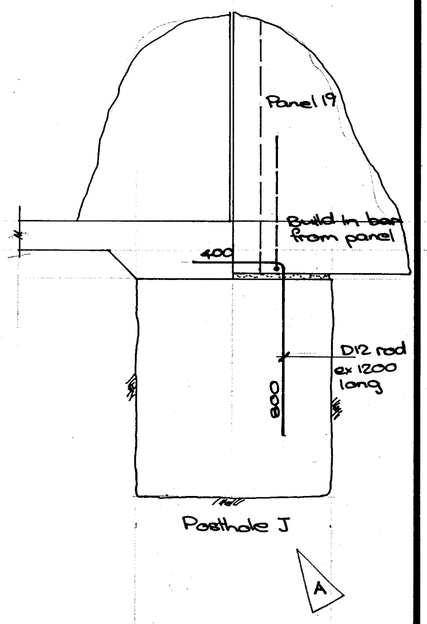
POSTHOLE C



PLAN P.H.E. 11/S1



PAD A



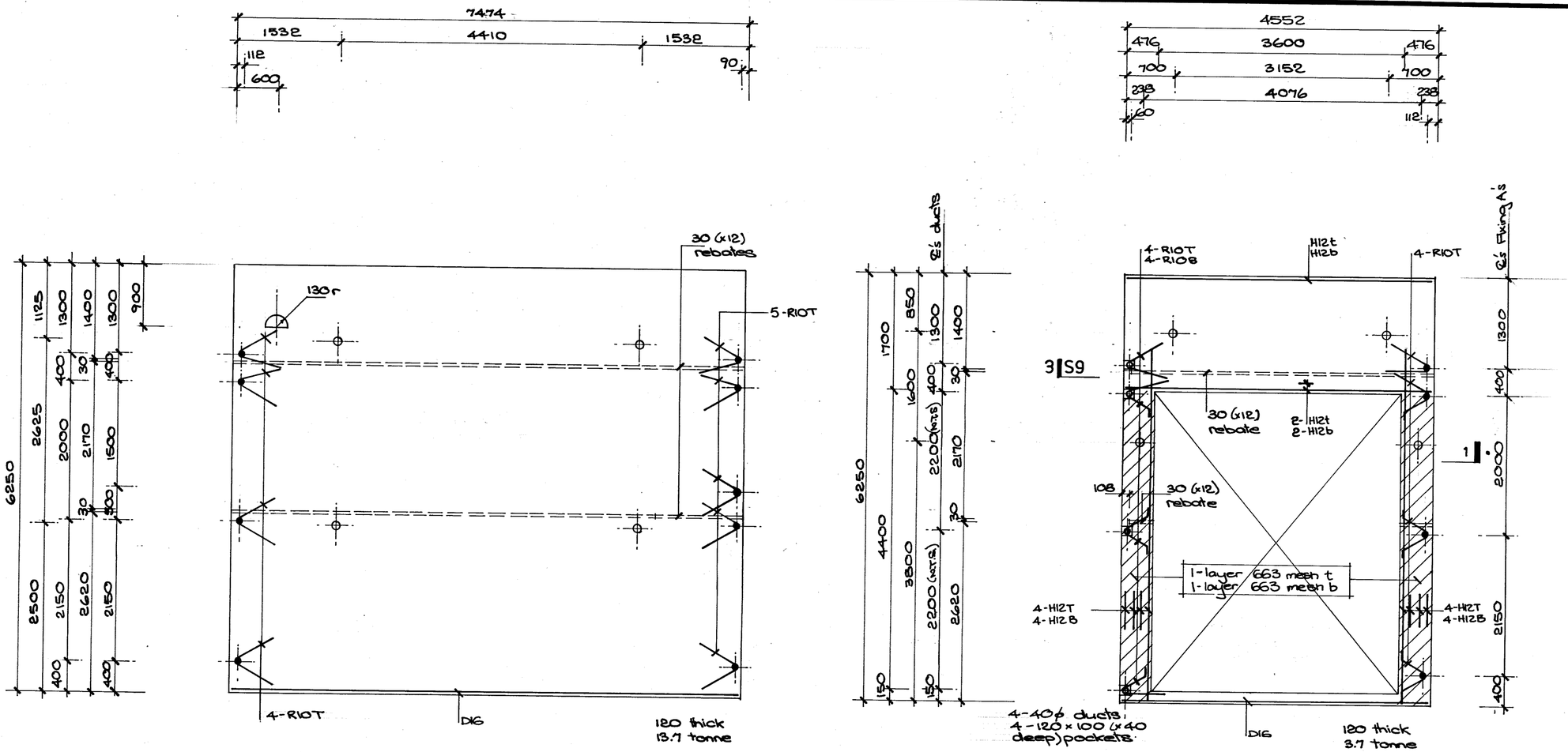
Posthole J

10/S1

Refer to sheet S1 for notes

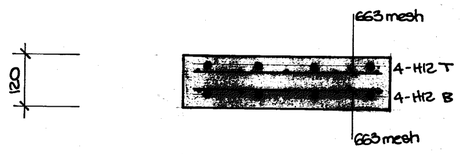
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	APPROVED	DATE	SCALES	FOUNDATION DETAILS	SHEET	FILE
	DES		JUNE 1993	1:20		S2/1 A	4860
	CKD						

A 20/9/93 Changed D12 starters to H16, Section 11
Changed Posthole F to J, Section 10



PANEL 21

PANEL 22



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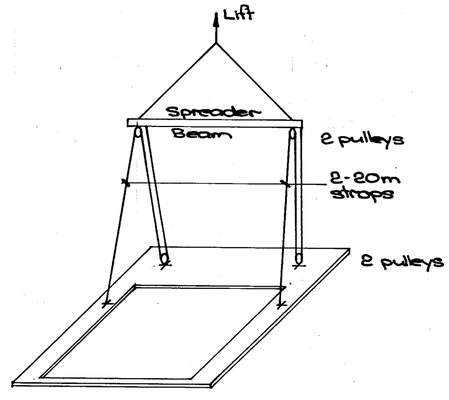


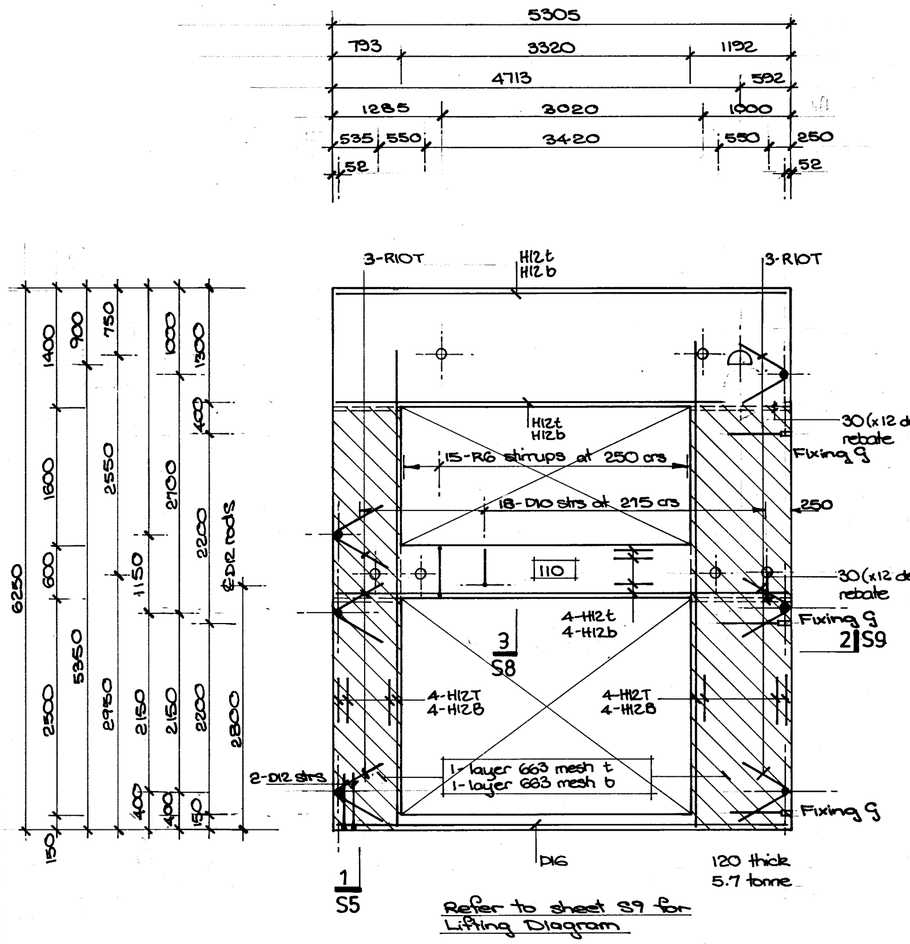
LIFTING DIAGRAM PANEL 22

Refer to sheet S3 for notes

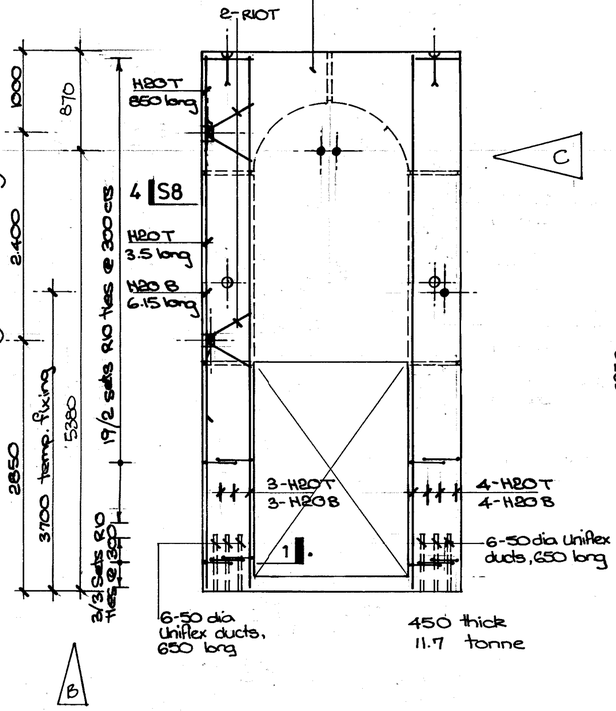
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH

DRN	W.L.S.	APPROVED	DATE	SCALES		SHEET	FILE
DES			JUNE 1993	1:50	PRECAST CONCRETE PANELS 21 & 22	S10	4860
CKD							

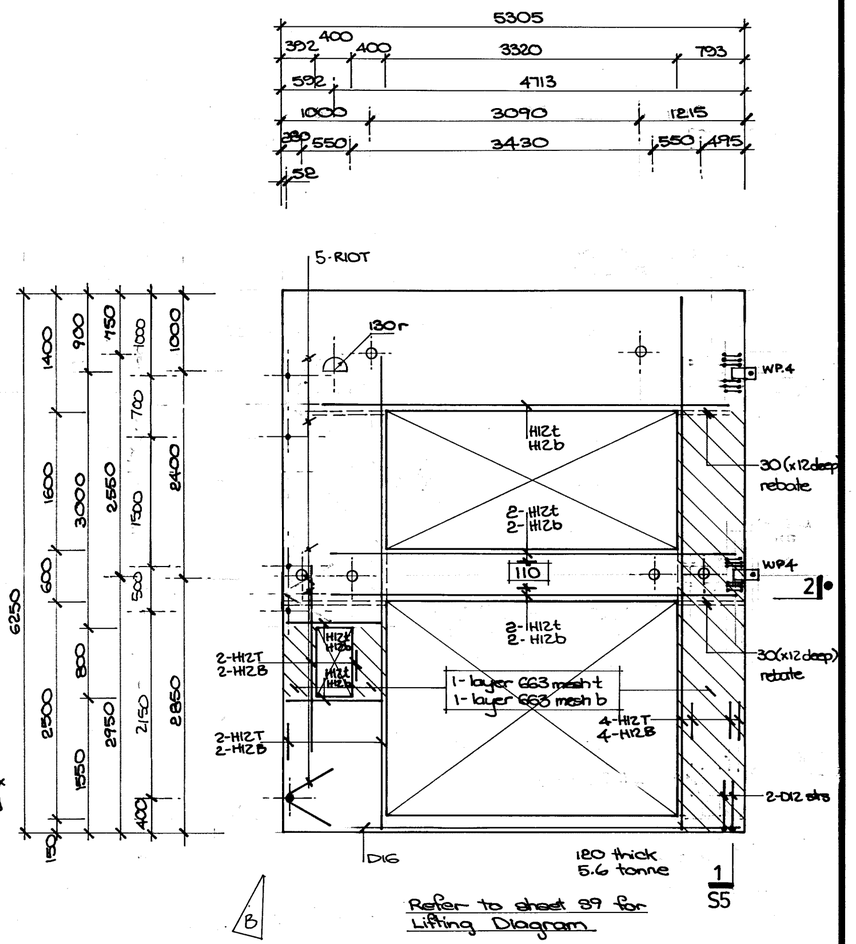
Refer to Panel M on sheet S8 for panel dimensions, lifting eyes, and reinforcing except where noted otherwise on this drawing.



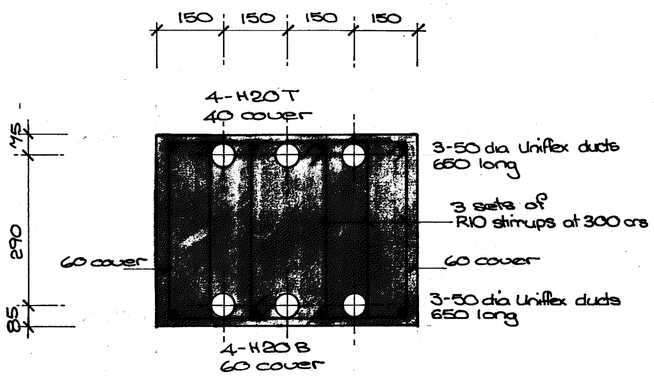
PANEL 23



PANEL 24



PANEL 25



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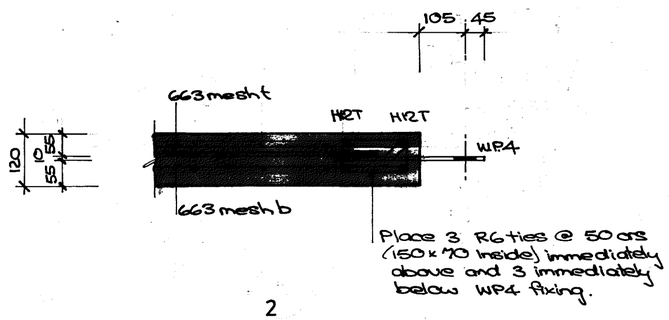
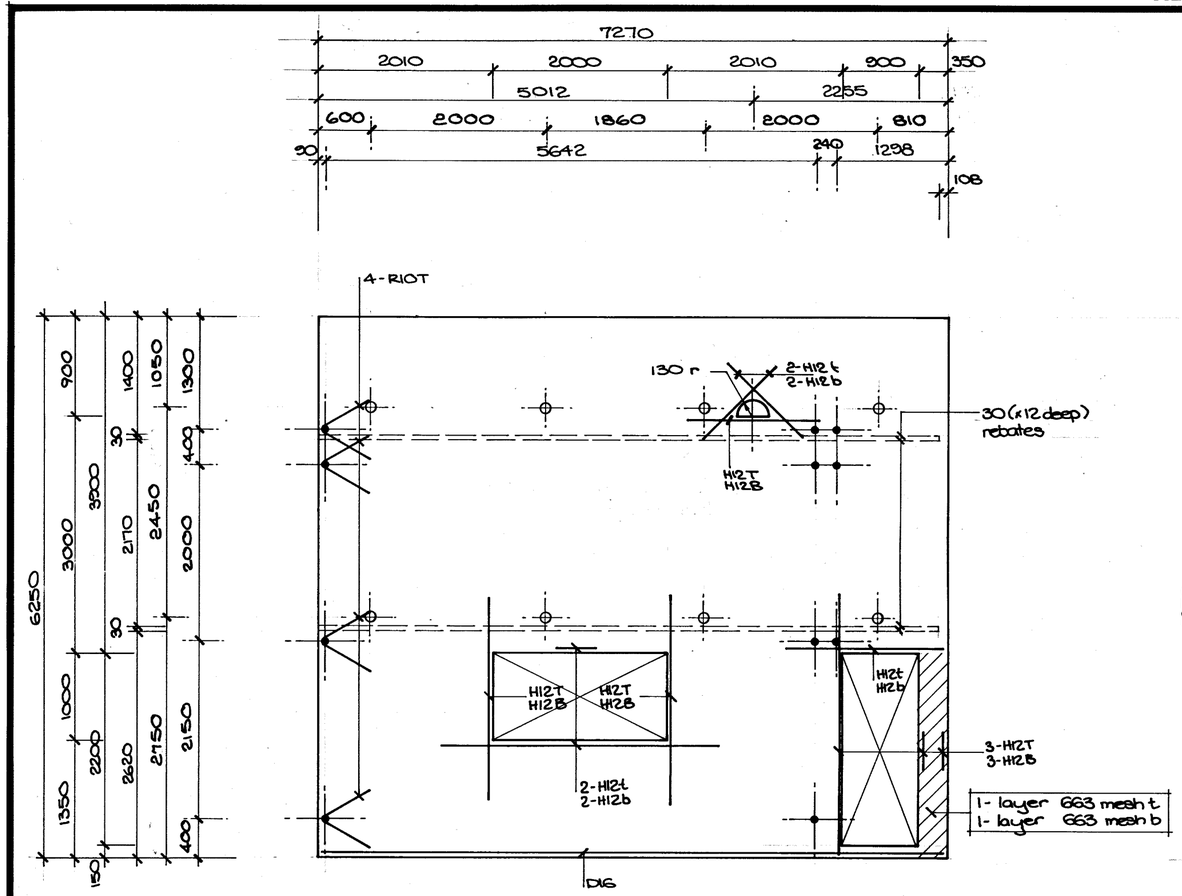


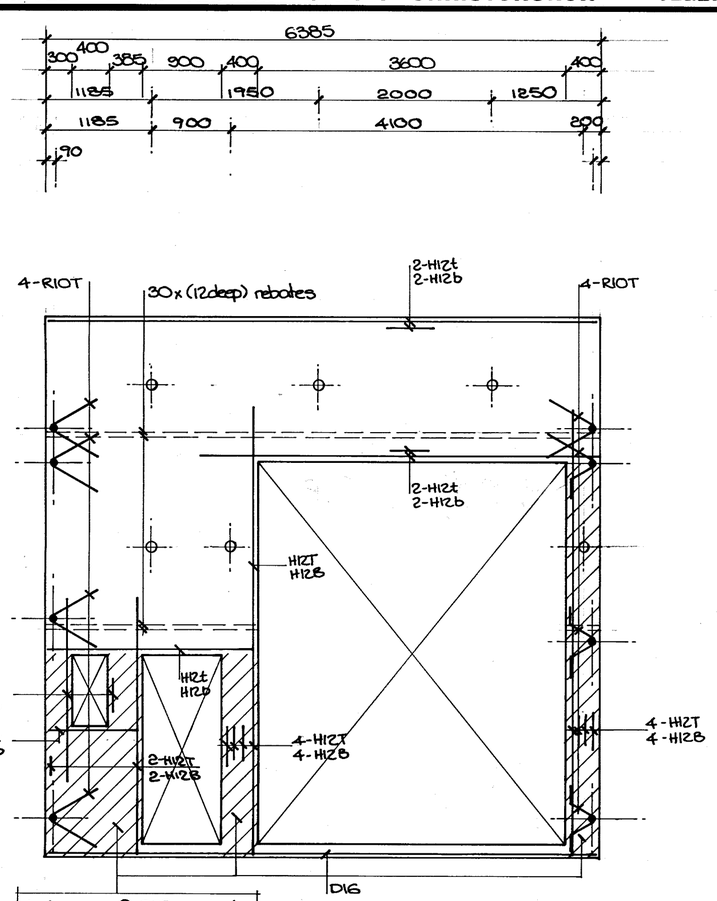
2

Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	CRC	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 23 – 25	SHEET	FILE
	DES			JUNE 1993	1:50		S11c	4860
	CKD							

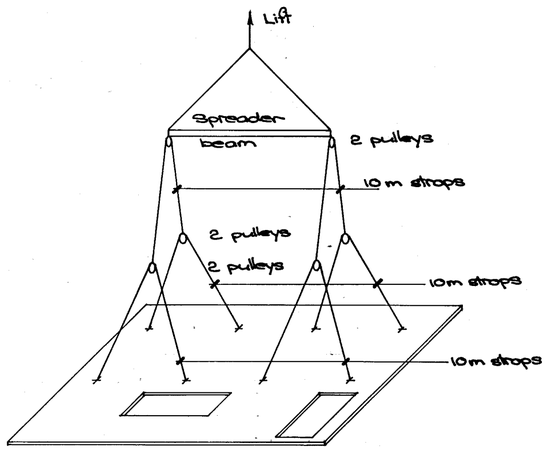
A 23-7-93 Changed D12-400 starters to D10 @ 215
B 23-8-93 TAM FIXINGS ALTERED TO P25 & P24.
C 30-8-93 TAM FIXINGS ALTERED TO P24.



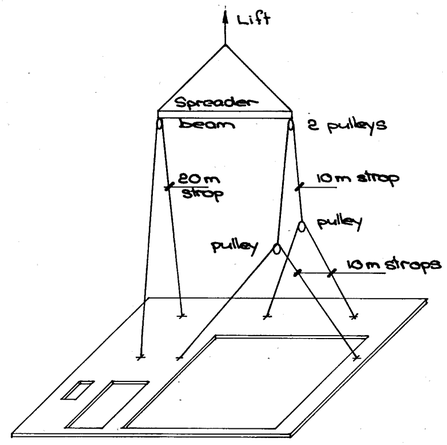


PANEL 26

PANEL 27



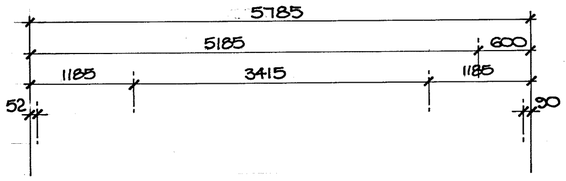
LIFTING DIAGRAM – PANELS 26, 33, & 36

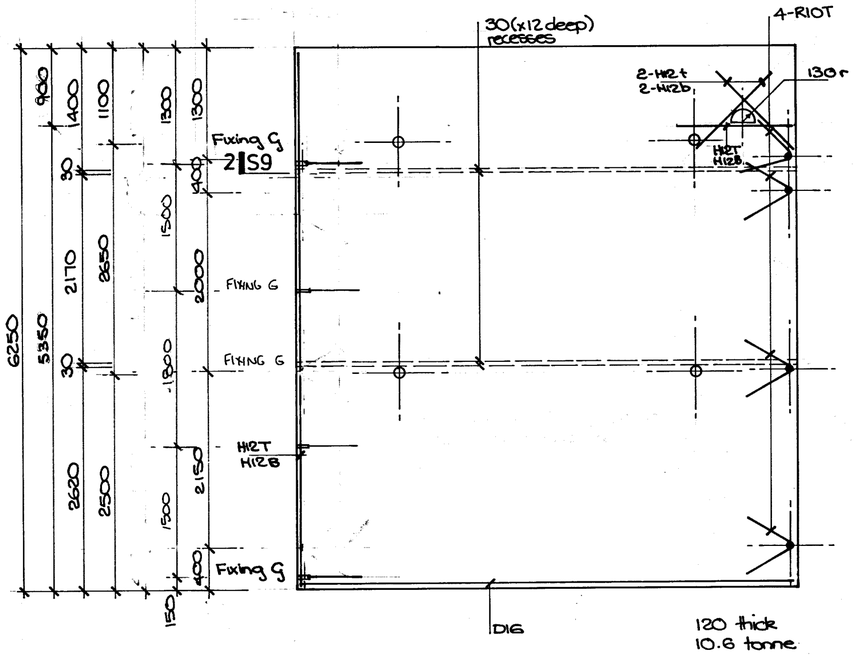


LIFTING DIAGRAM – PANEL 27

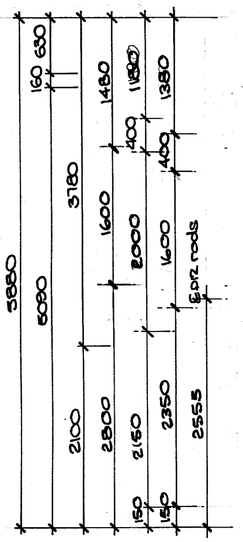
Refer to sheet S3 for notes

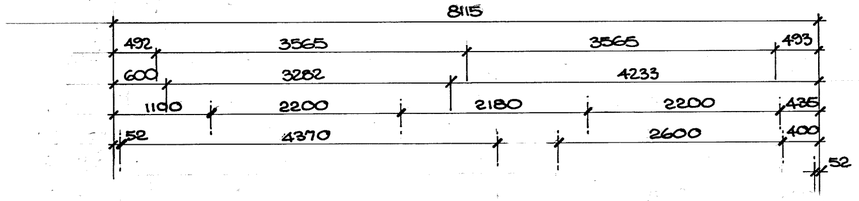
DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH	DRN	C.P.C	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 26 & 27	SHEET	FILE
	DES			JUNE 1993	1:50		S12	4860
	CKD							

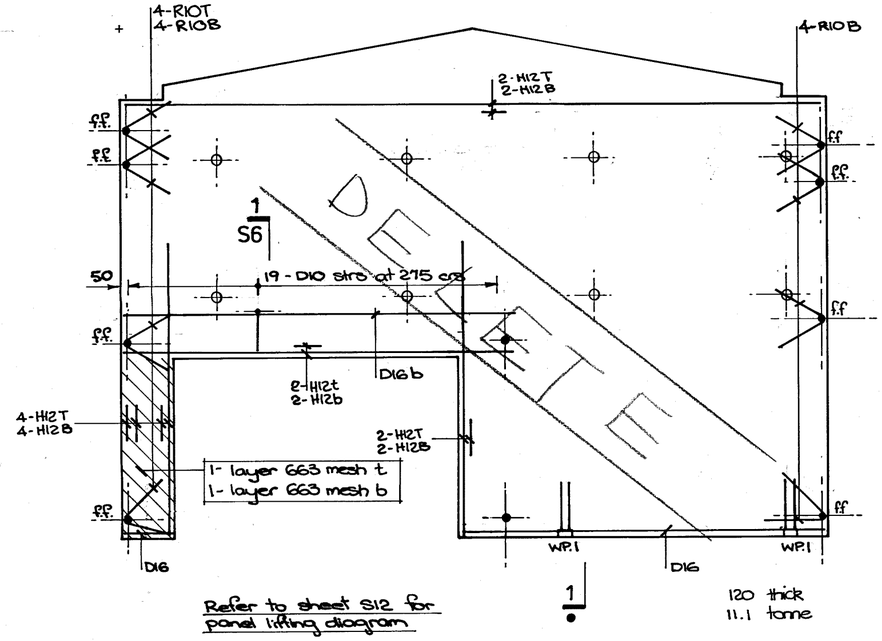




PANEL 28

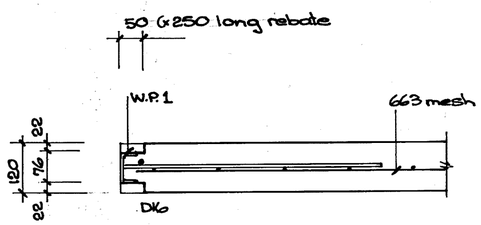






Refer to sheet S12 for panel lifting diagram

PANEL 33

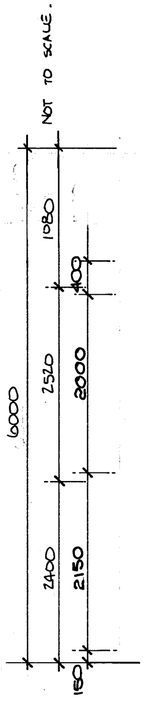


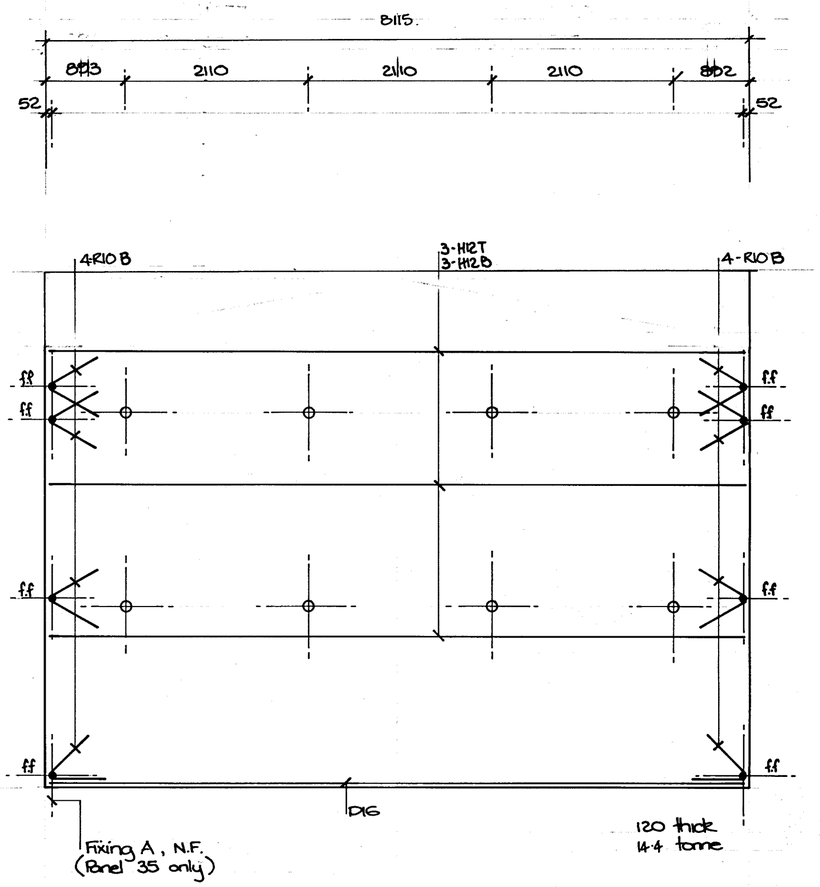
1

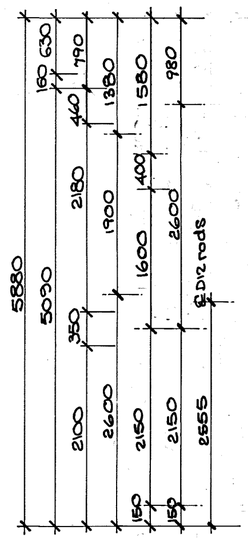
Refer to sheet S3 for notes

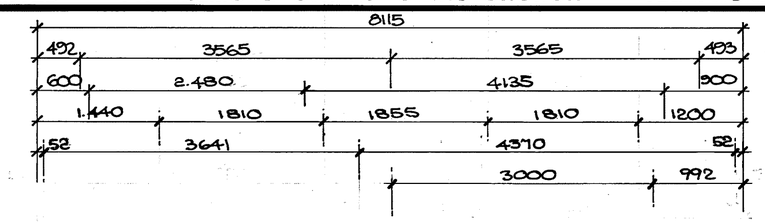
DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH	DRN CPC DES CKD	APPROVED	DATE JUNE 1993	SCALES 1:50	PRECAST CONCRETE PANELS 28 & 33	SHEET S13[B]	FILE 4860

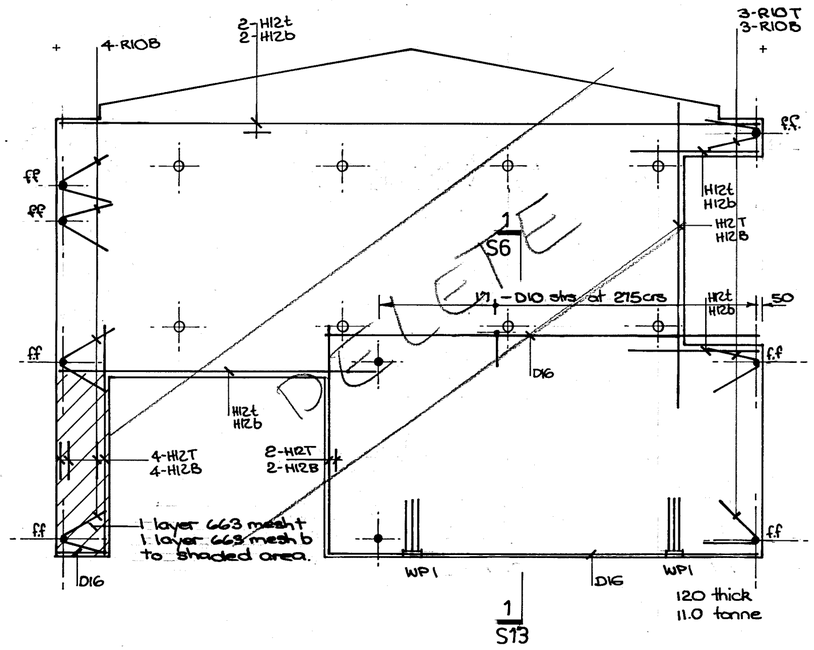
A 28-7-93 Changed D12-400 starters to D10 @ 275
B 11-8-93 PANEL 28 : FIXING G'S ADDED, PANEL 33 : DELETED











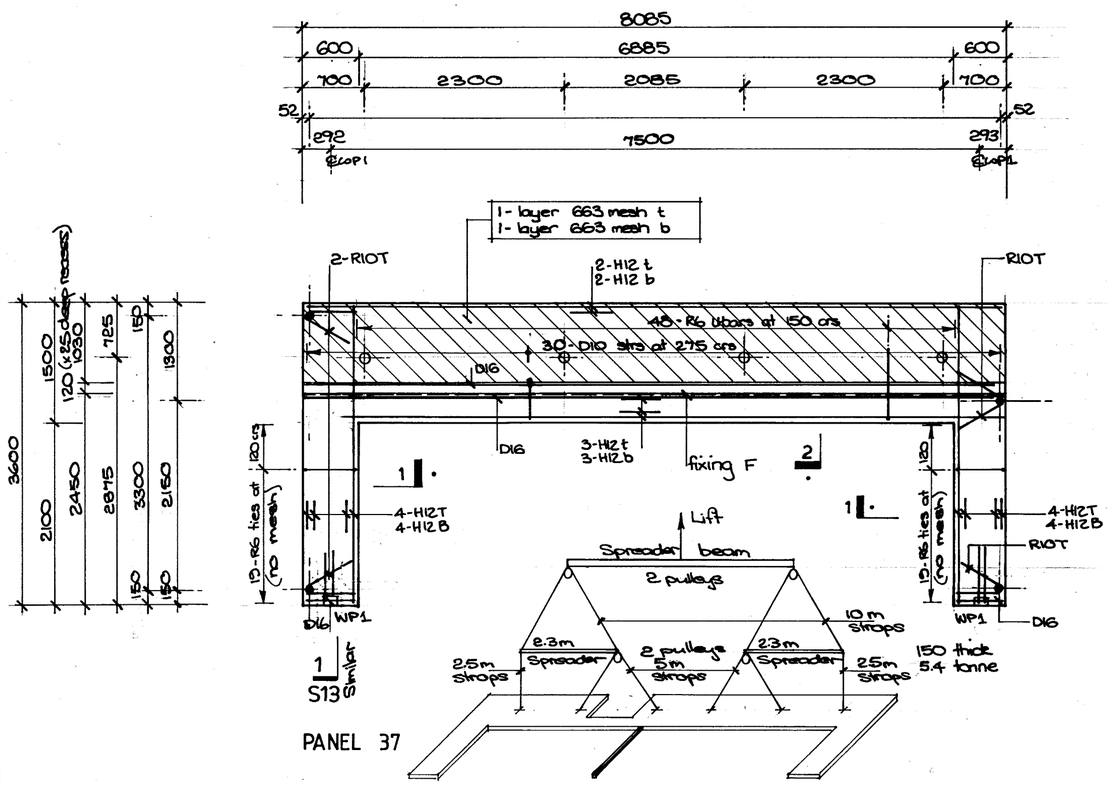
PANELS 34 & 35

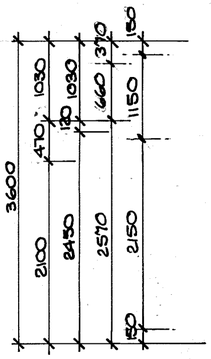
PANEL 36

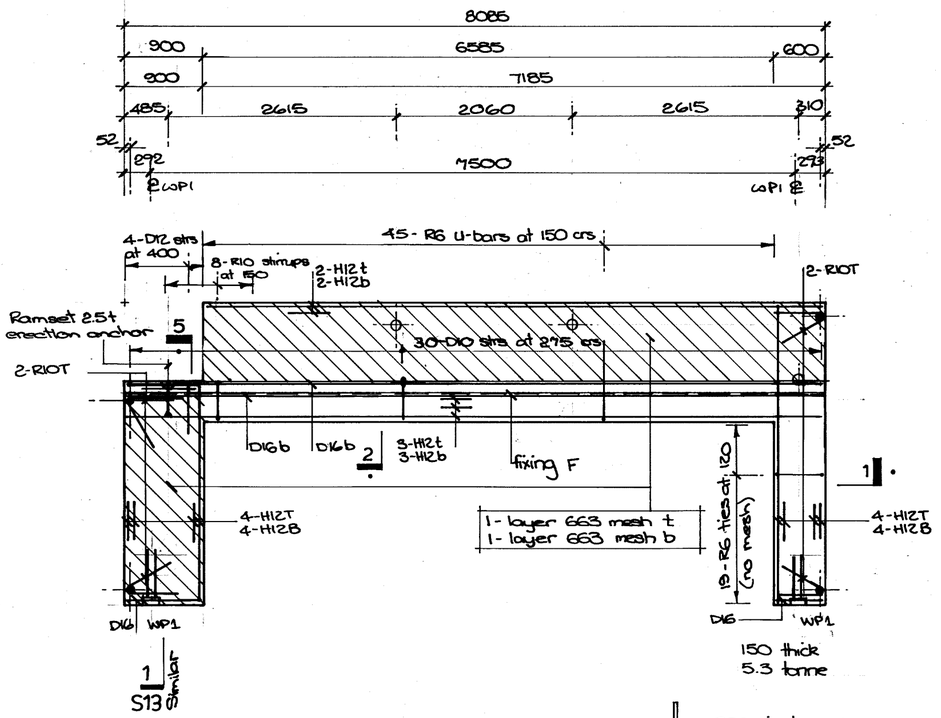
Refer to sheet S3 for notes

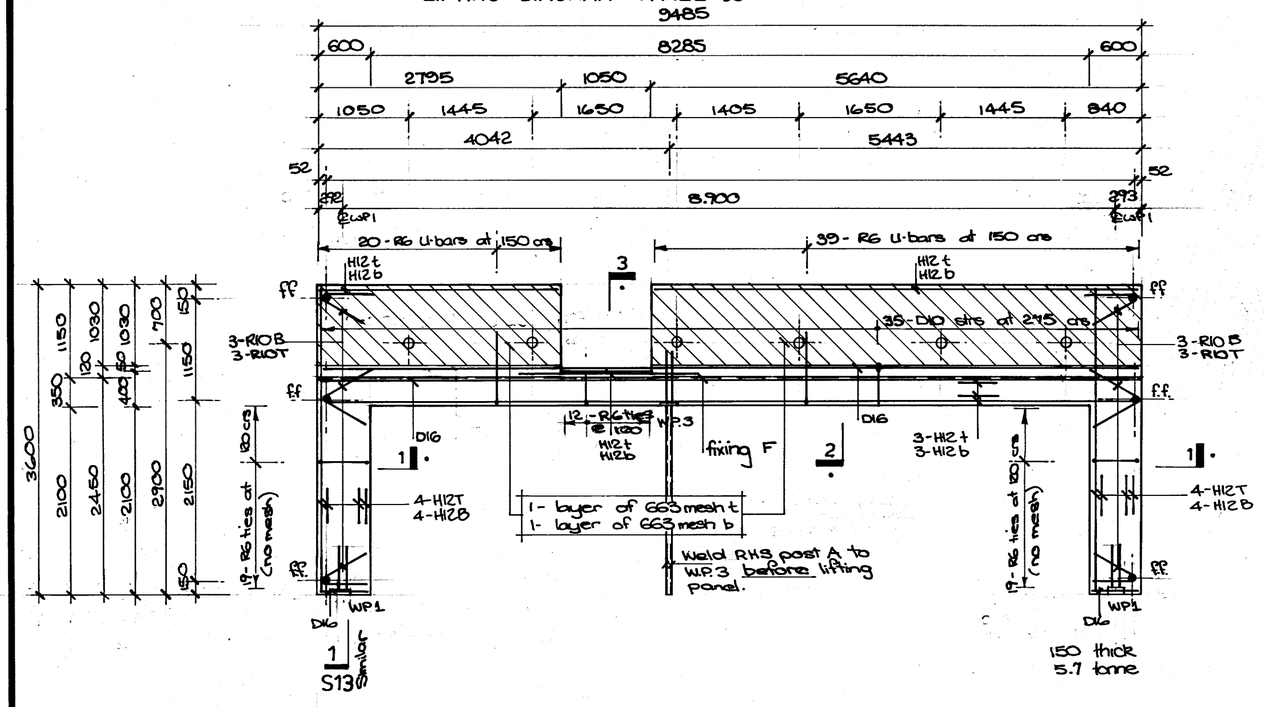
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	C.F.C	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 34 – 36	SHEET	FILE
	DES			JUNE 1993	1:50		S14 B	4860
	CKD							

A 23-7-93 Changed D12-400 starters to D10 @ 275
B 30-8-93 PANELS 34, 35 ALTERED, PANEL 36 DELETED.





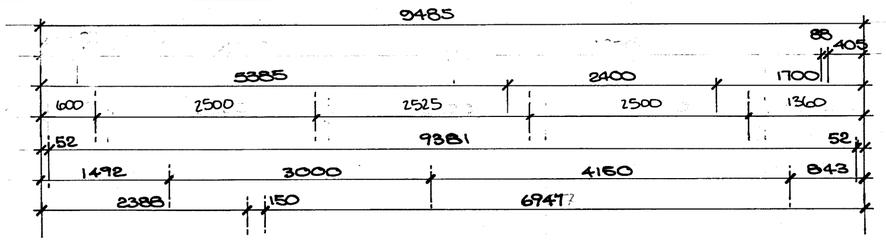


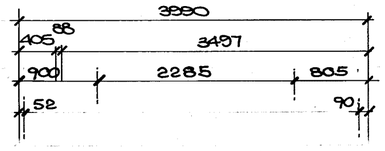


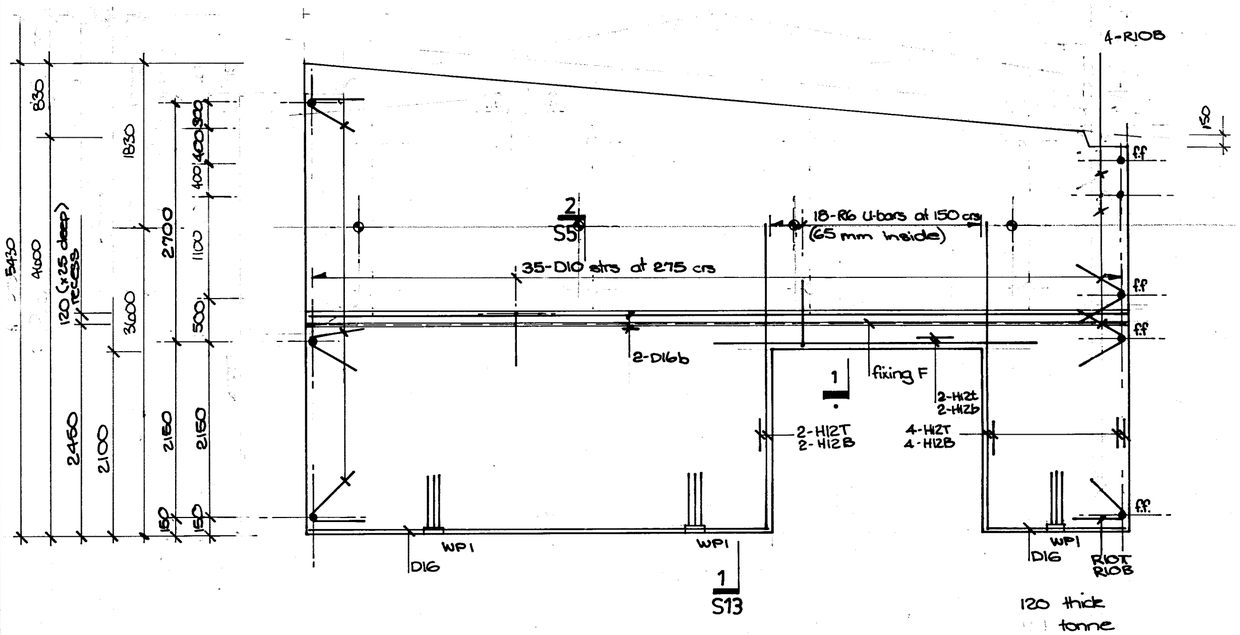
Refer to sheet S for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN CPC / DES / CKD	APPROVED	DATE JUNE 1993	SCALES 1:50	PRECAST CONCRETE PANELS 37 – 39	SHEET S15 A	FILE 4860

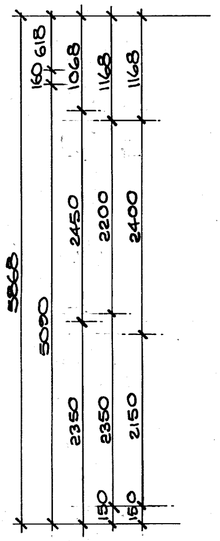
A 23-7-93 Changed D12-400 starters to D10@275

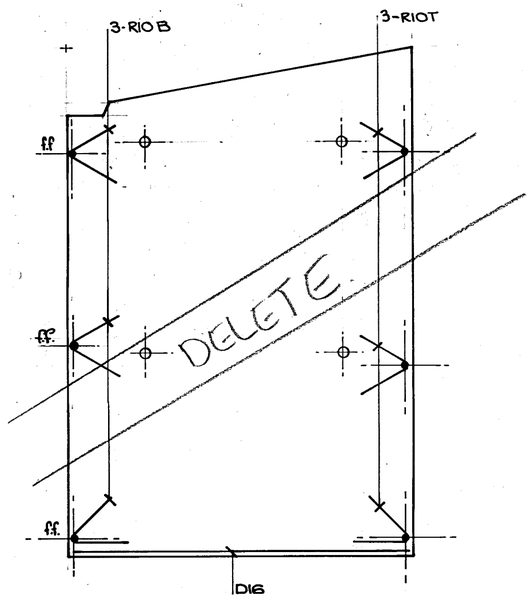






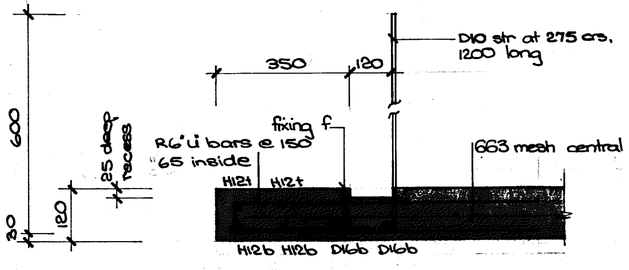
120 thick
tonne





120 thick
6·5 tonne

PANEL 40



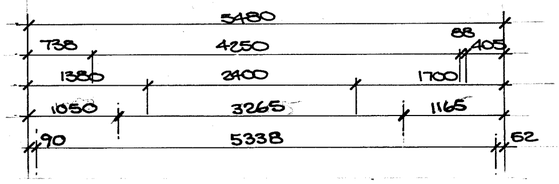
1

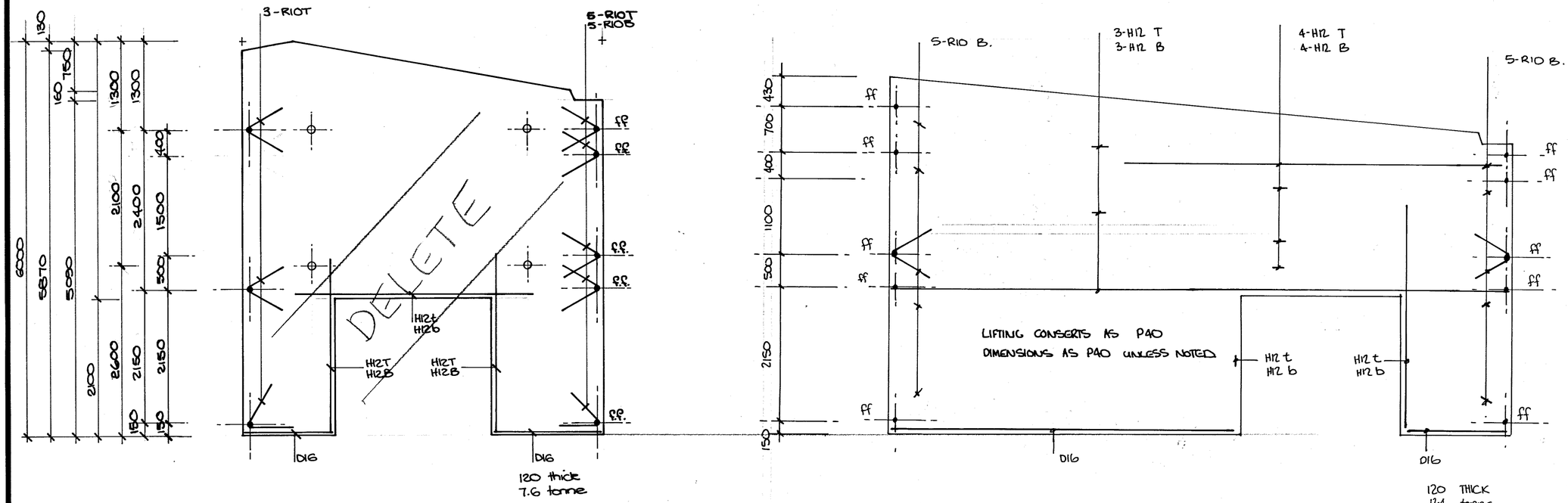
PANEL 42

Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	CRC	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 40 & 42	SHEET	FILE
	DES			JUNE 1993	1:50		S16 A	4860
	CKD							

A 23-7-93 Changed D12-400 starters to D10 @ 275 crs
B 13-8-93 PANEL 40 ALTERED, PANEL 42 DELETED





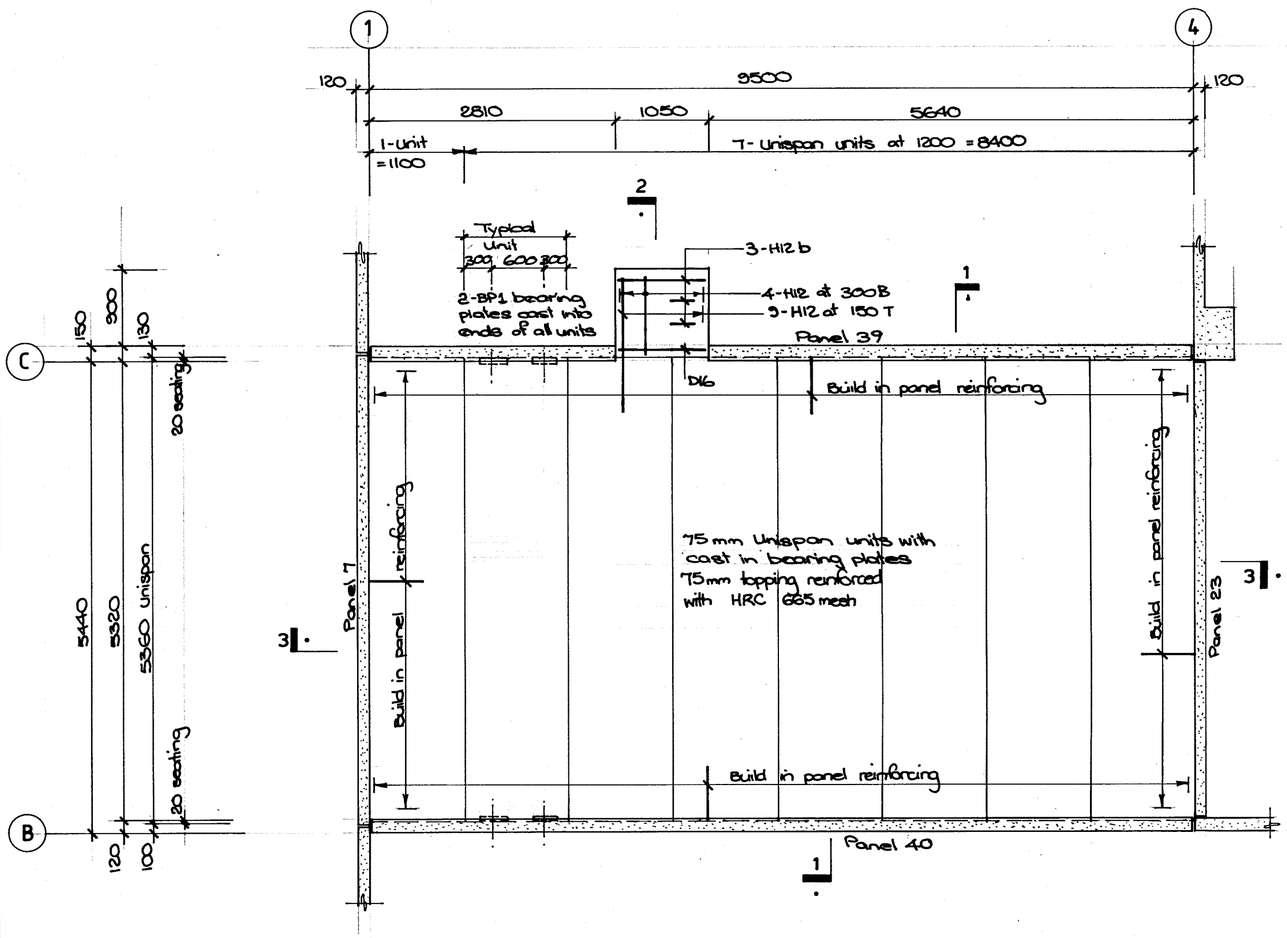
PANEL 41

PANEL 41

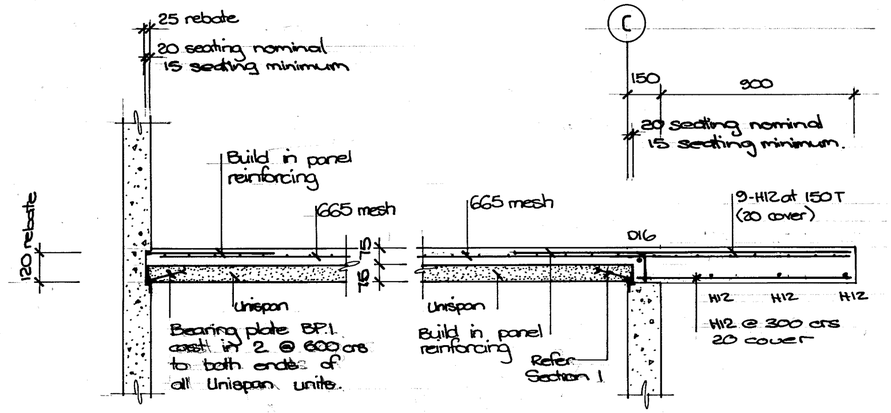
Refer to sheet S3 for notes

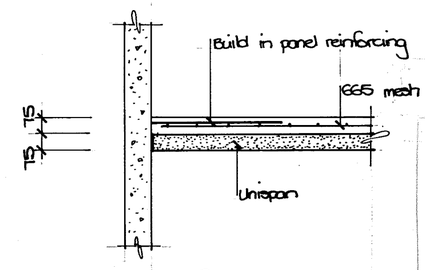
DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH	DRN CRC DES CKD	APPROVED	DATE JUNE 1993	SCALES 1:50	PRECAST CONCRETE PANELS 41	SHEET S17A	FILE 4860

A 23-7-93 PANEL 41 REDRAWN



MEZZANINE FLOOR PLAN GRIDS B - C



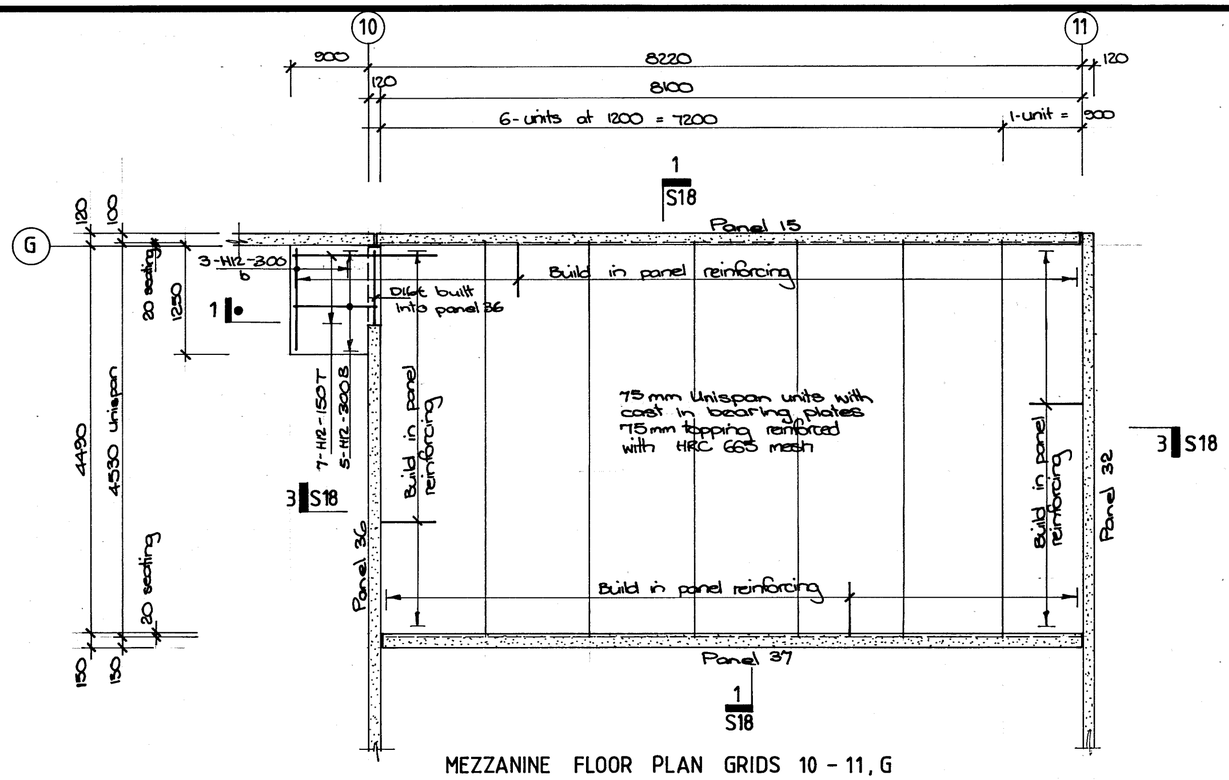


NOTES

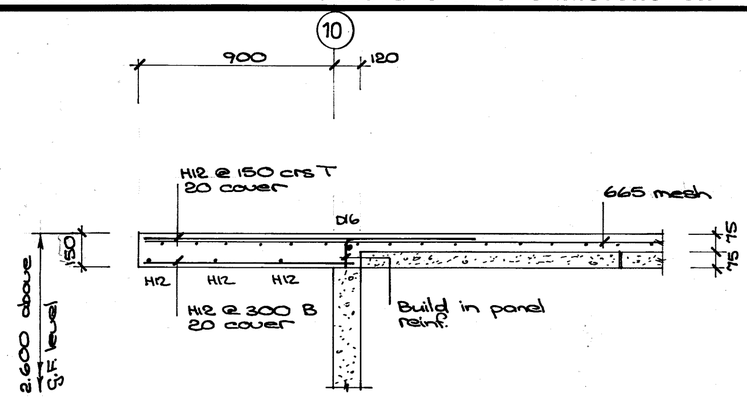
- Contractor to verify all dimensions on site BEFORE commencing works.
- All materials and workmanship to comply with the New Zealand Building Code.
- These drawings to be read in conjunction with the Architectural drawings.
- Refer Architects drawings for all nibs, holes, rebates etc.
- Use 75mm Unispan flooring system with 75mm min cast insitu topping where shown.
- Prestressed floor unit specification:-
  - All concrete construction is to be in accordance with the New Zealand Building Code.
  - Minimum concrete strength is to be 42 MPa at 28 days.
  - Use 5-10.9 dia stressing strands per 1.2m wide unit, load at transfer 72 kN/strand. Strand centre line 30, above soffit.
  - Prop at support and 1 row at mid point.
- Design parameters are as follows:
  Loads : Live load 3.0 kPa
  Superimposed dead load 0.5 kPa
  Fire Rating : ½ hour
  Deflection : Maximum precamber 5.0mm
  Maximum long term deflection 5.0mm.
  (less allowance for precamber)
- Where precast units are designed to be installed with a precamber, topping is to be cast with a matching precamber.
- Topping concrete strength is to be a minimum of 25 MPa at 28 days. The maximum slump is 100mm.
- Topping is to be reinforced throughout with 665 mesh. Lap all mesh a minimum of 2 cross wires, but no less than 225mm.
- All flooring systems to be propped in accordance with manufacturers specifications.

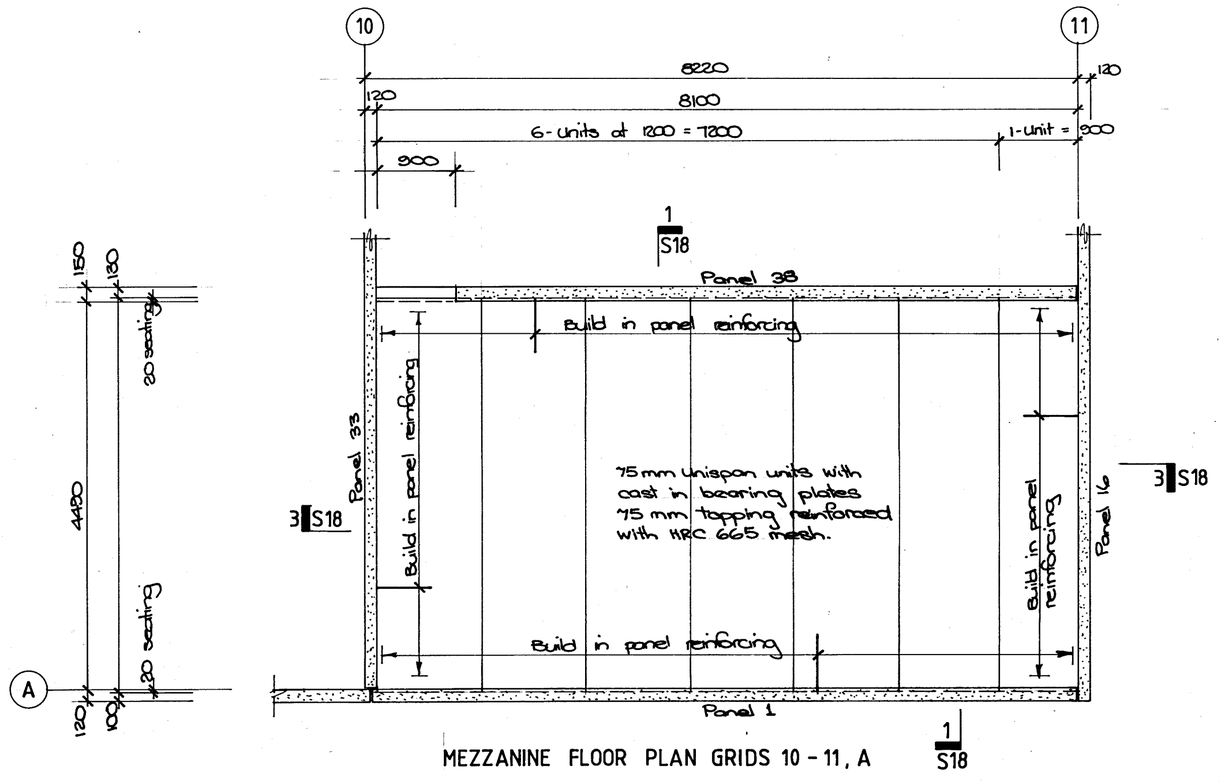
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH

DRN	CRC	APPROVED	DATE	SCALES	MEZZANINE FLOOR PLAN GRIDS B — C & DETAILS	SHEET	FILE
DES			JUNE 1993	1:50 1:10		S18 A	4860
CKD							



MEZZANINE FLOOR PLAN GRIDS 10 - 11, G

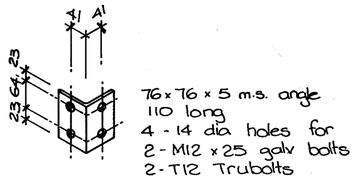




MEZZANINE FLOOR PLAN GRIDS 10 - 11, A

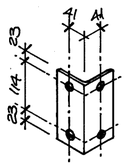
Refer to sheet S18 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN CRC	APPROVED	DATE	SCALES	MEZZANINE FLOOR PLAN GRIDS A & G, 11 — 12	SHEET	FILE
	DES		JUNE 1993	1:50		S19	4860
	CKD						



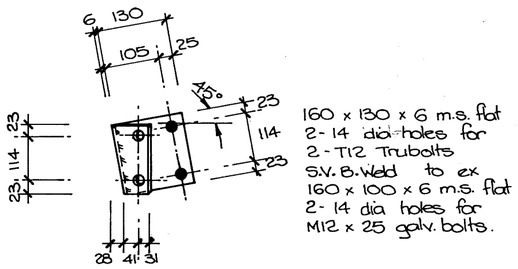
76 x 76 x 5 m.s. angle
110 long
4 - 14 dia holes for
2 - M12 x 25 galv bolts
2 - T12 Trubolts

CLEAT C1 (64 off)



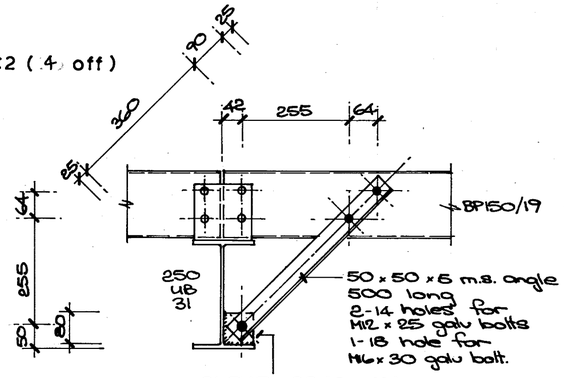
As for cleat C1
except where
shown otherwise

CLEAT C2 (4 off)



160 x 130 x 6 m.s. flat
2 - 14 dia holes for
2 - T12 Trubolts
S.V.B. Weld to ex
160 x 100 x 6 m.s. flat
2 - 14 dia holes for
M12 x 25 galv. bolts.

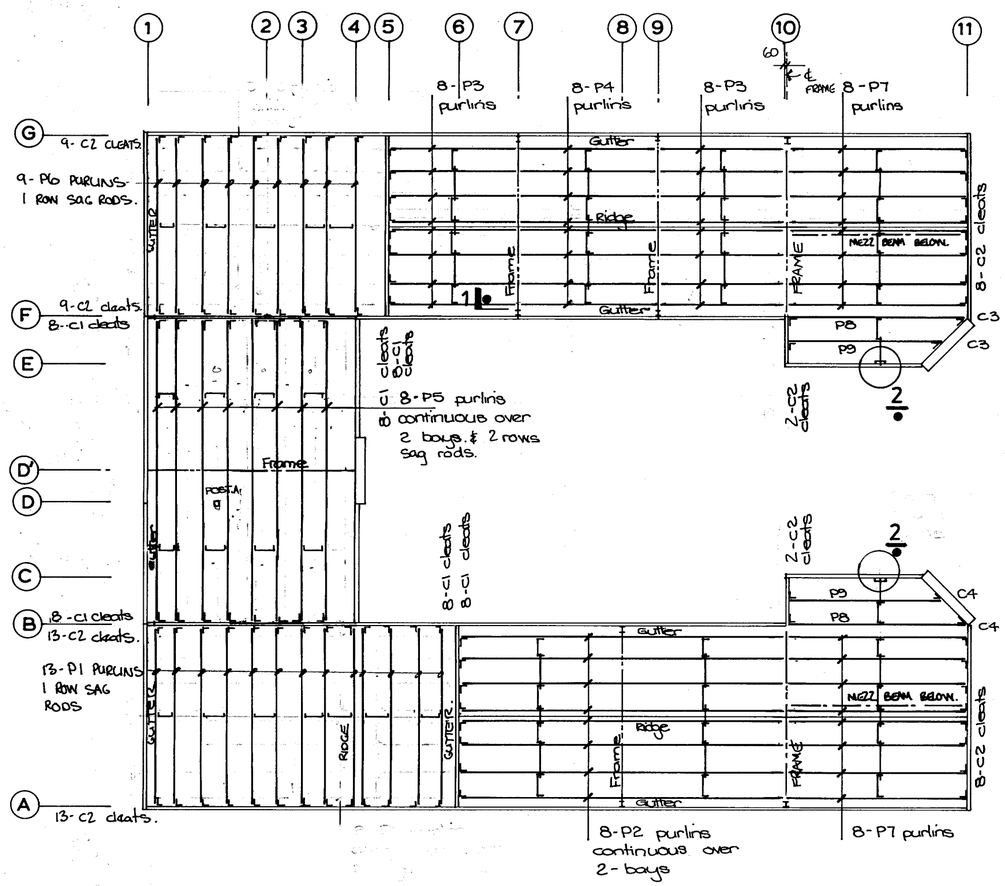
CLEAT C3 (2 off)
CLEAT C4 handed (2 off)



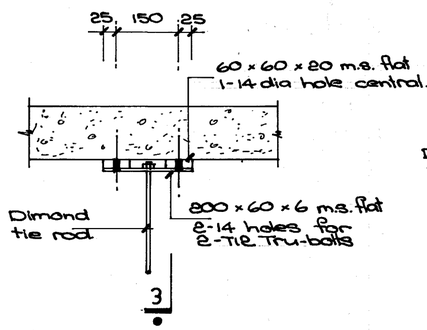
50 x 50 x 6 m.s. angle
500 long
2 - 14 holes for
M12 x 25 galv bolts
1 - 18 hole for
M16 x 30 galv bolt.

CLEAT C6 (9 off)
80 x 70 x 6 m.s. flat
4 f.w.a.r. to U.B.
1 - 18 dia hole

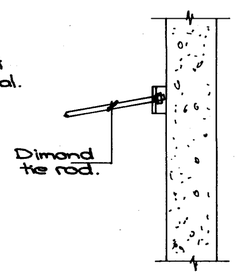
1



FRAMING PLAN



2



3

NOTES:

All materials & workmanship to comply with the N.Z. Building Code.

Contractor to verify all dimensions on site before ordering / fabrication of steelwork.

All purlins to be formed from galvanised 450 MPa steel.

All holes in purlins to be 14 dia punched

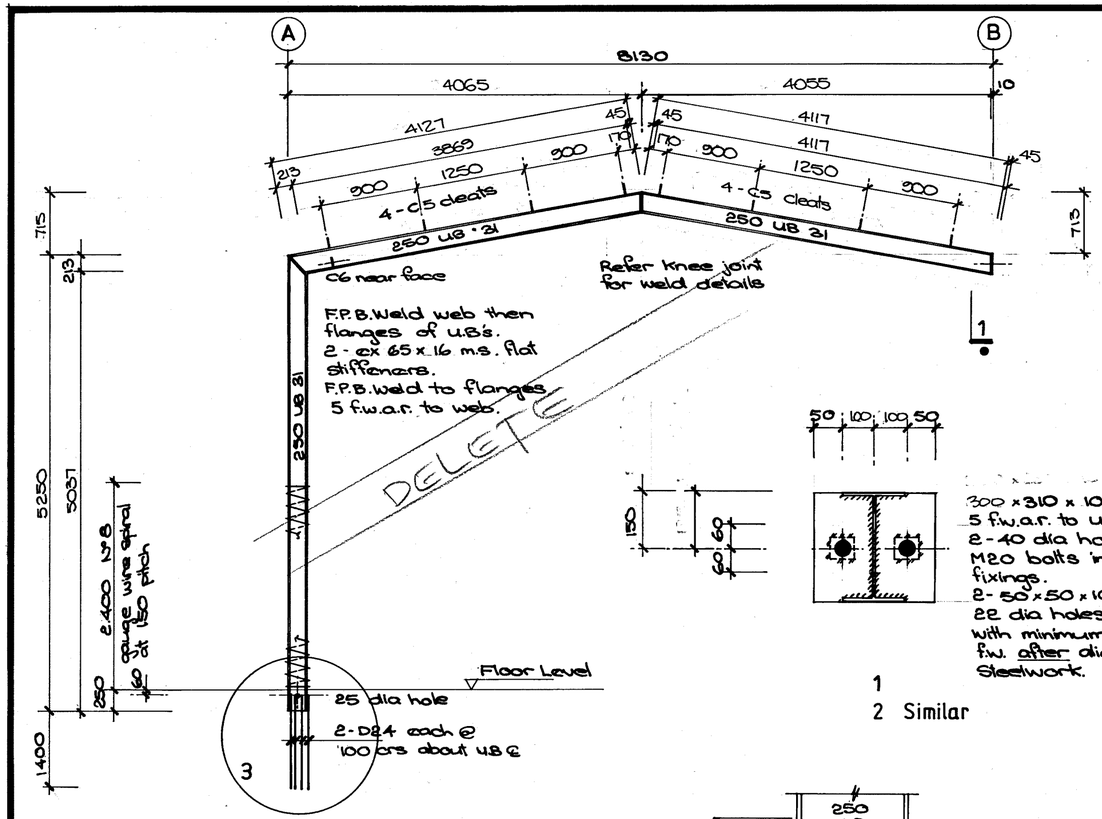
PURLIN SIZES
P2 – P5 BP150/19
P1, P6 – P9 BP 200/25

All purlins braced with Fletcher Dimond galvanised brace channel & tie rod system. (Tie rods only required where noted, units A & C.)

DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH

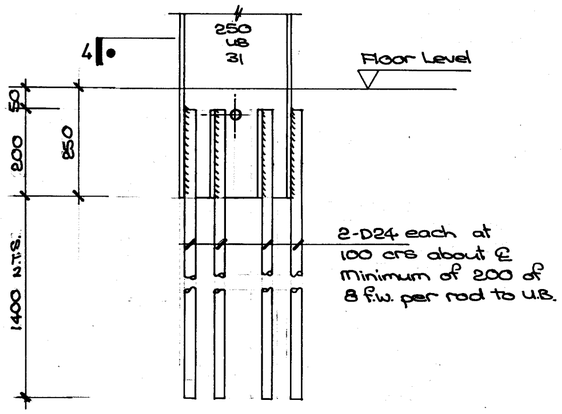
DRN		APPROVED	DATE	SCALES	STEELWORK LOCATION PLAN	SHEET	FILE
DES			JUNE 1993	1:200 1:10		S20[B]	4860
CKD							

A 12-8-93 FRAME ADDED TO LINE 10
B 30-8-93 PURLIN SET OUT ALTERED

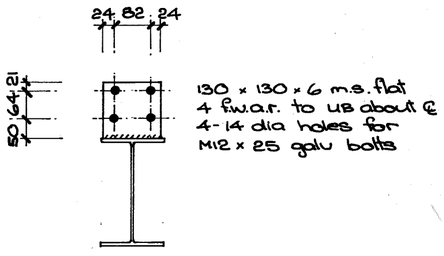


FRAME LINE 3

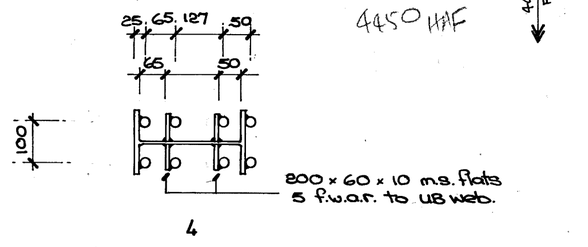
1
2 Similar



3



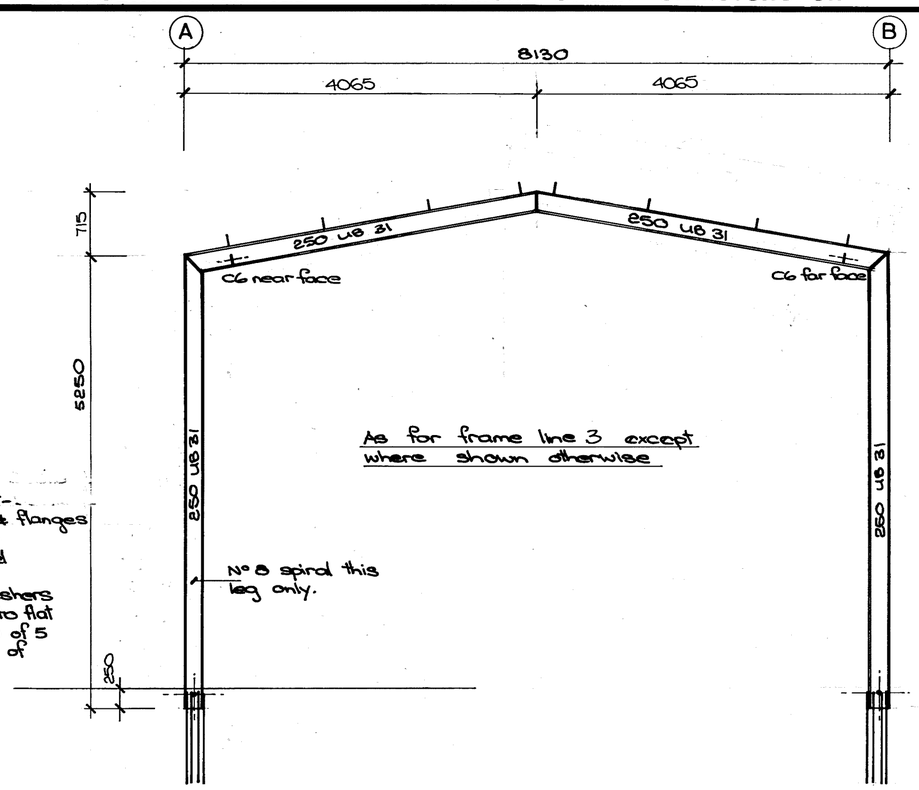
CLEAT C5 (40 off)



4

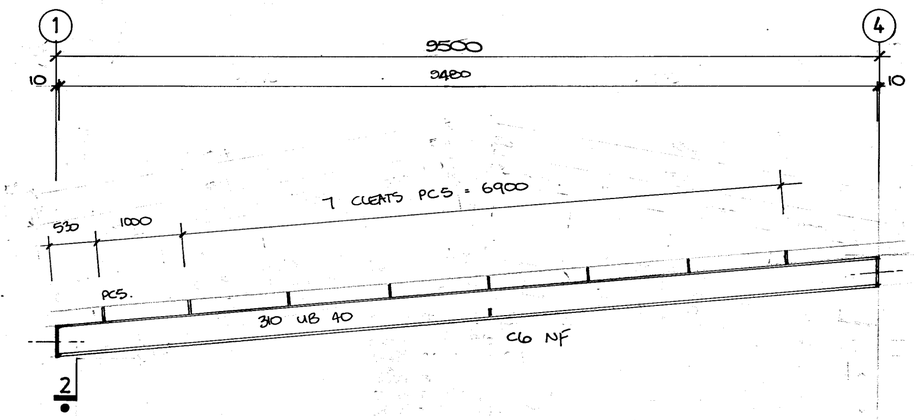
830.

4450 HAF



POST A (1 off)

FRAME LINES 7, 8, & 9

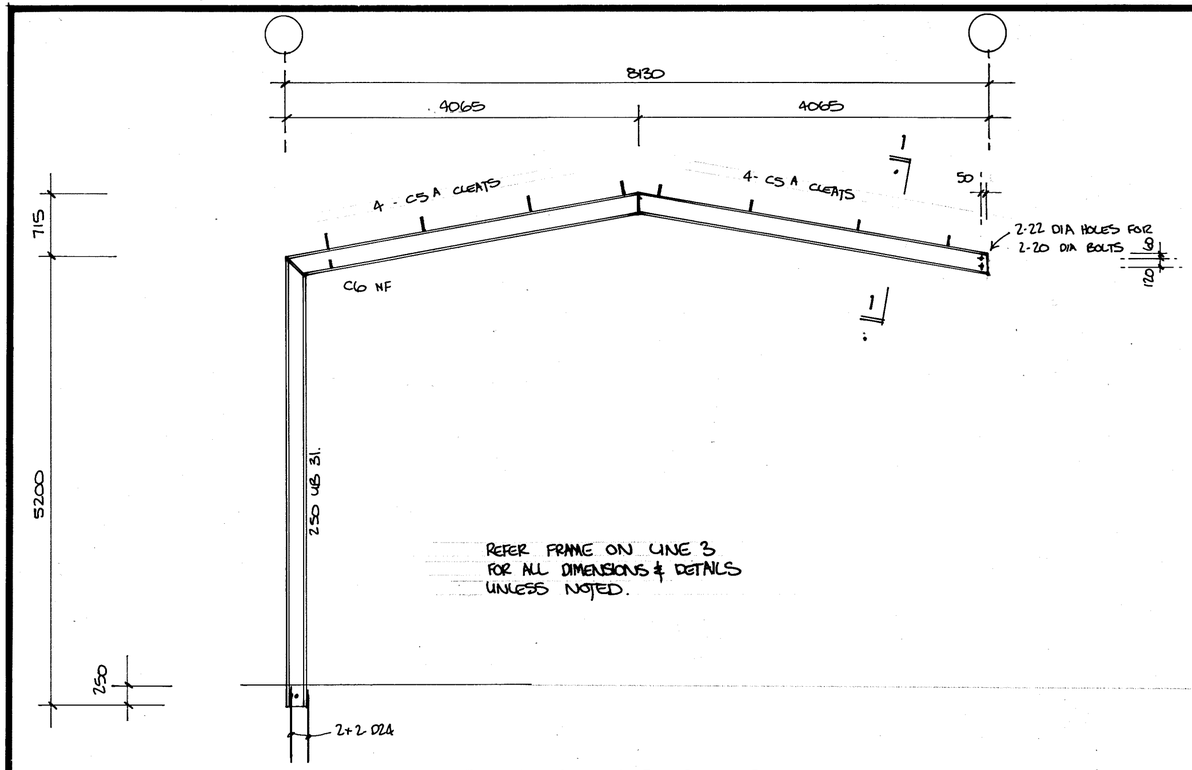


FRAME LINE D'

Refer to sheet S20 for notes

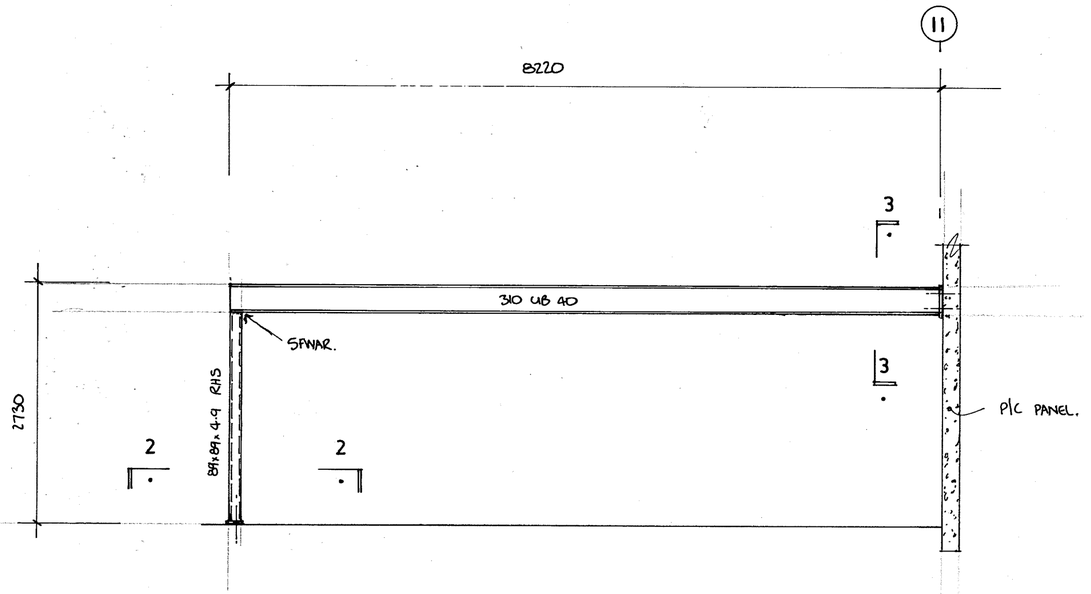
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	W.L.S.	APPROVED	DATE	SCALES	STEELWORK FRAMES	SHEET	FILE
	DES			JUNE 1993	1:50 1:10		S21 A	4860
	CKD							

A 30-8-93 FRAMES 2,3 DELETED, FRAME D' ALTERED

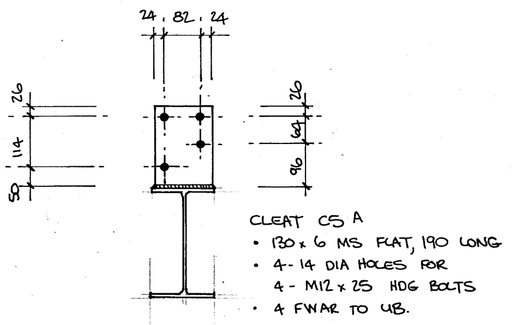


FRAME ON LINE 10, A - B

LINE 10, F - G opp. hand

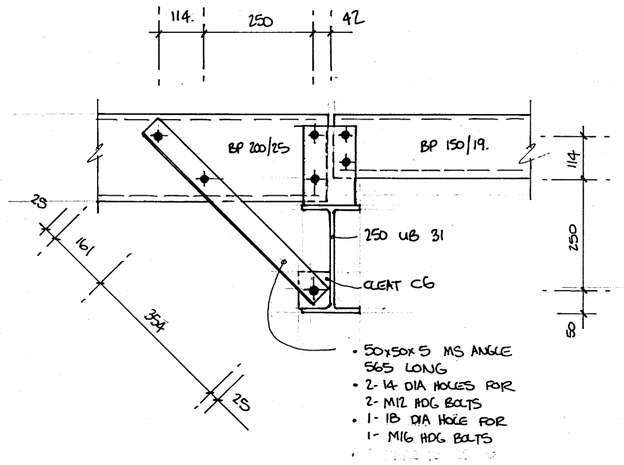


MEZZANINE BEAM 2 OFF



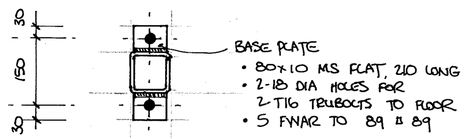
CLEAT C5 A
- 130 x 6 MS FLAT, 190 LONG
- 4- 14 DIA HOLES FOR 4 - M12 x 25 HDG BOLTS
- 4 FWAR TO UB.

1



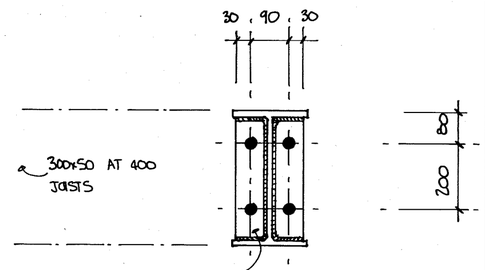
- 50x50x5 MS ANGLE 565 LONG
- 2- 14 DIA HOLES FOR 2- M12 HDG BOLTS
- 1- 18 DIA HOLE FOR 1- M16 HDG BOLTS

FLY BRACE - FRAMES ON LINE 10



BASE PLATE
- 80x10 MS FLAT, 210 LONG
- 2-18 DIA HOLES FOR 2-T16 TRUBOLTS TO FLOOR
- 5 FWAR TO 89 □ 89

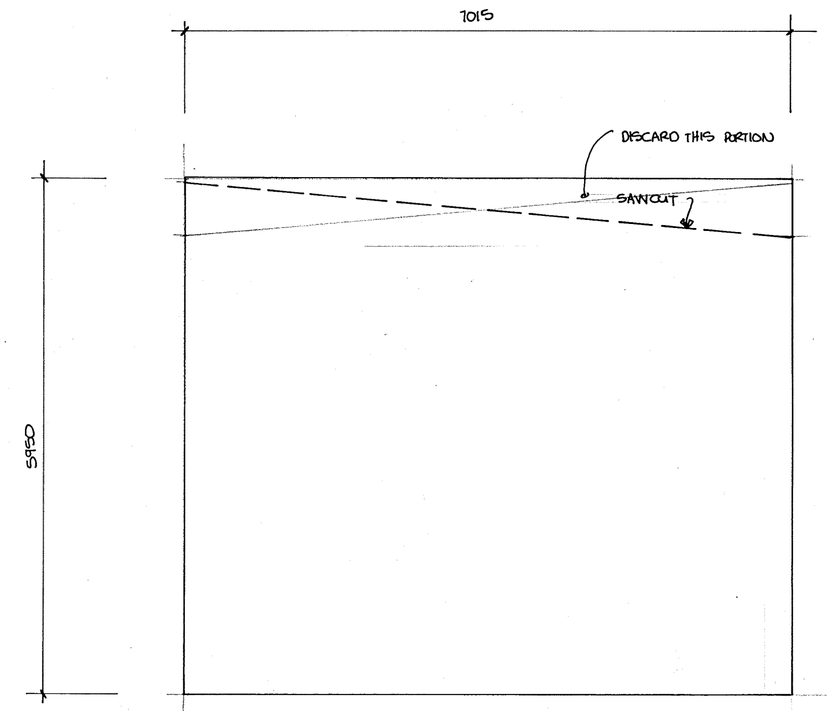
2



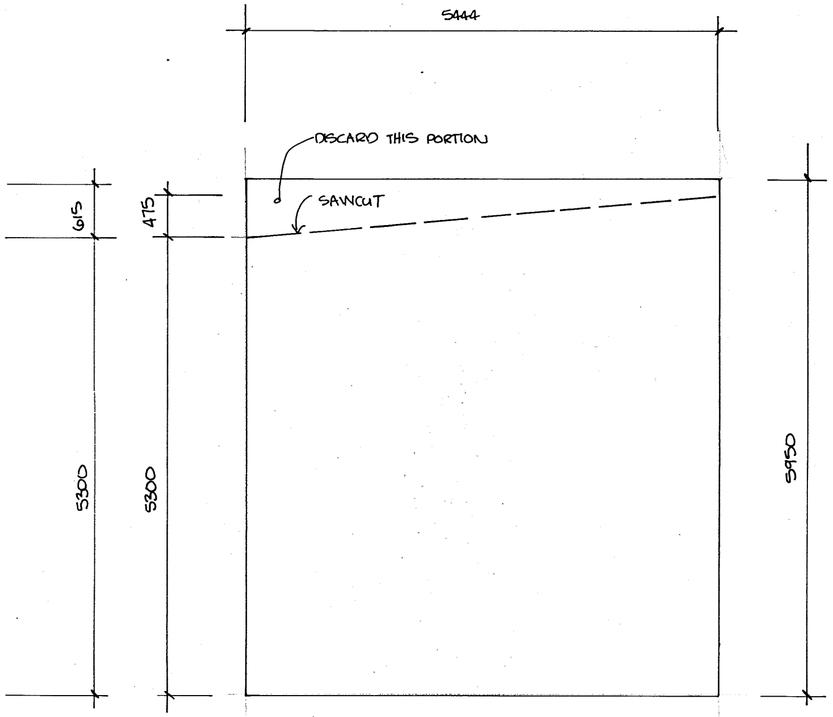
END PLATE
- 150x10 MS FLAT, 310 LONG
- 4-22 DIA HOLES FOR 4- M20 BOLTS TO TAM FIXINGS
- 5 FWAR TO 310 UB

3

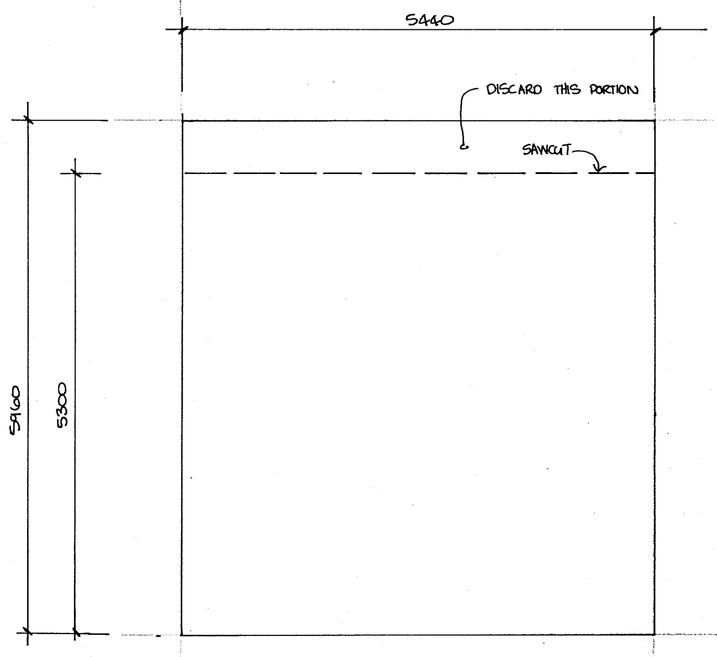
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN / DES / CKD		APPROVED	DATE: JUNE 1993	SCALES: 1:50 1:10	STEELWORK FRAME ON LINE 10, A — B, F — G	SHEET: S22	FILE: 4860



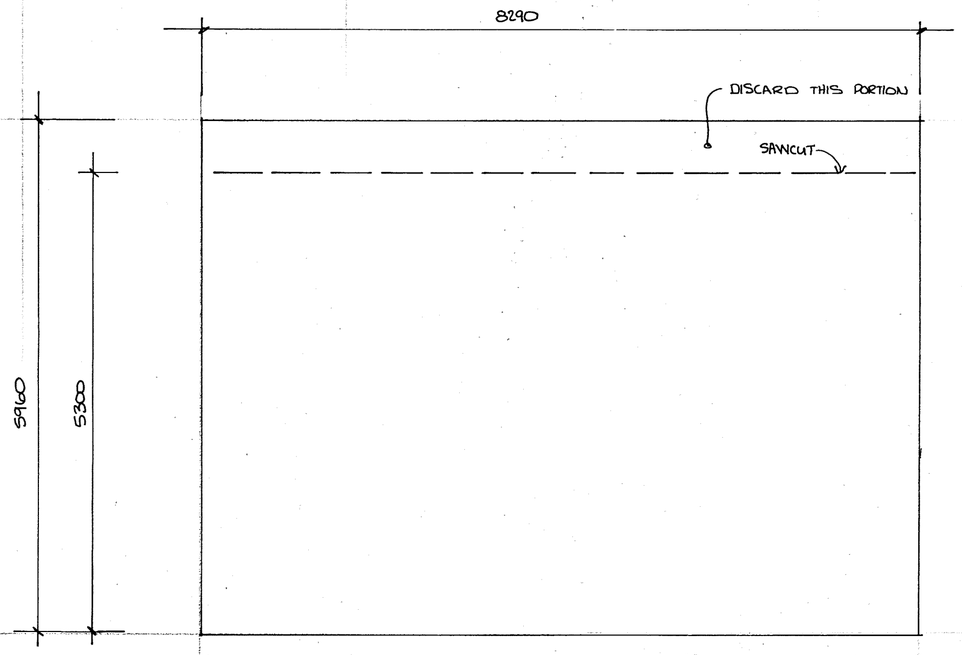
PANEL P5.



PANEL P10



PANEL 7

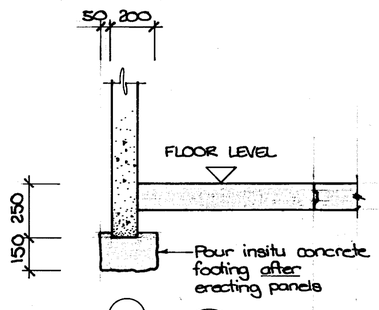


PANEL 8

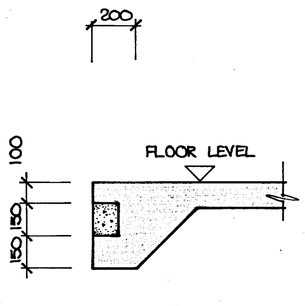
NOTE:
ALTERNATIVE LIFTING DEVICES TO BE ADVISED BEFORE PANELS LIFTED.

DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH

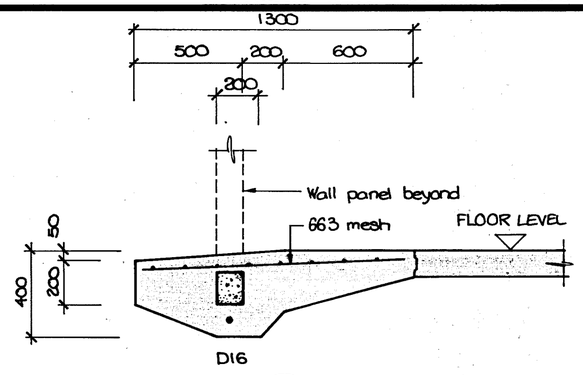
		APPROVED	DATE	SCALES		SHEET	FILE
DRN			19-AUG 1993	1:50	EXISTING PANELS CUT DOWN TO SUIT TRANS POWER REQUIREMENTS	S23	4860
DES							
CKD							



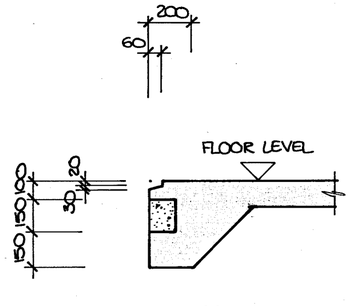
1 / S1



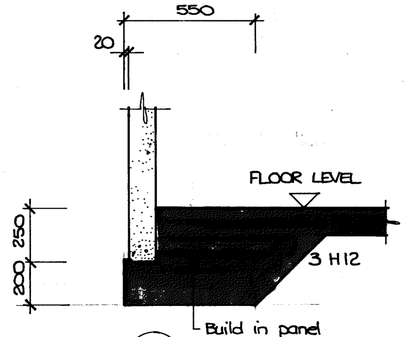
2 / S1



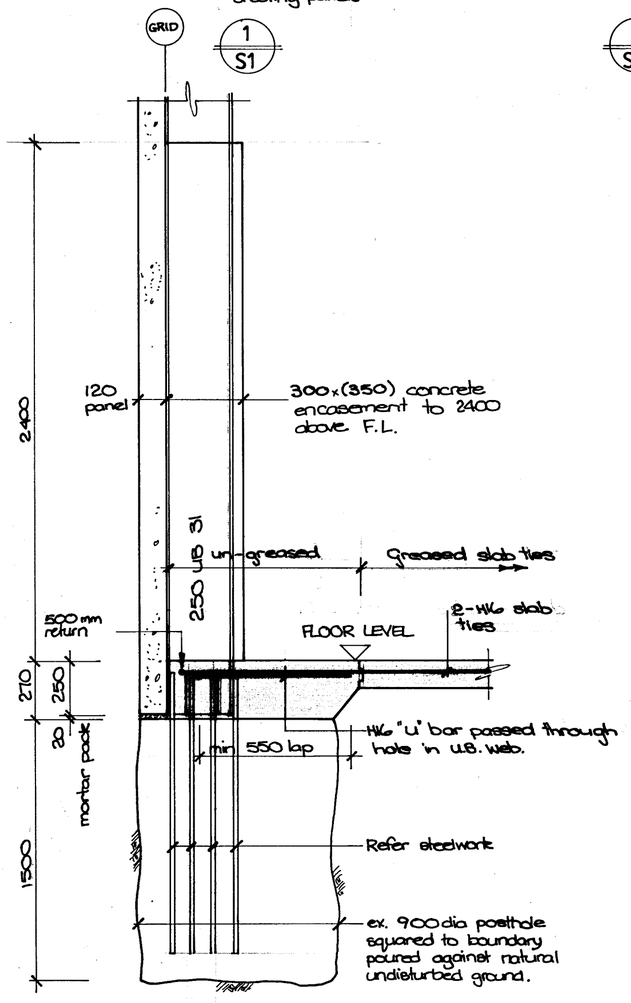
3 / S1



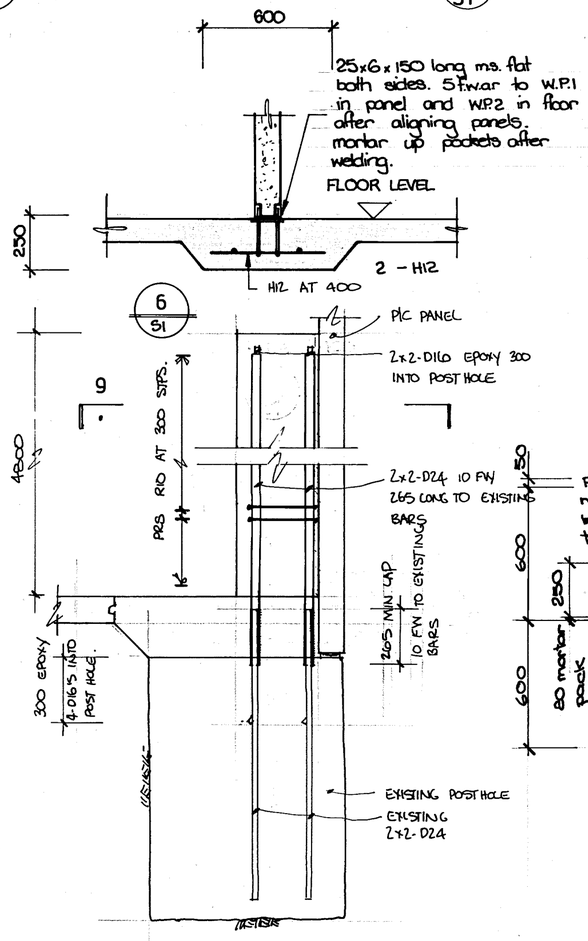
4 / S1



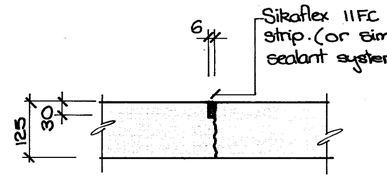
5 / S1



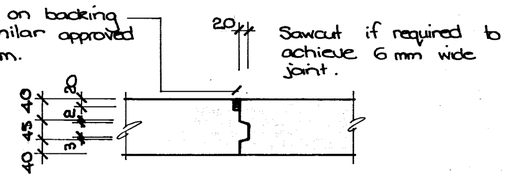
POSTHOLE & COLUMN . A



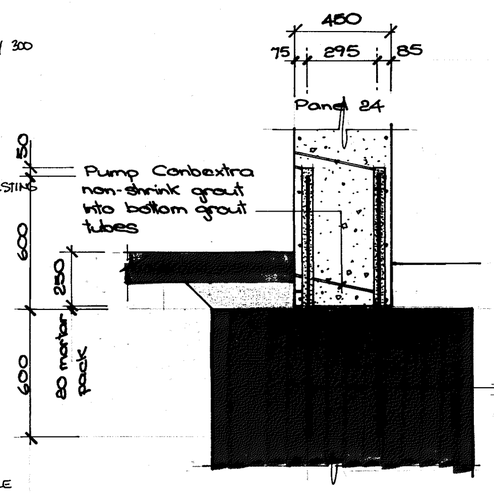
COLUMN X



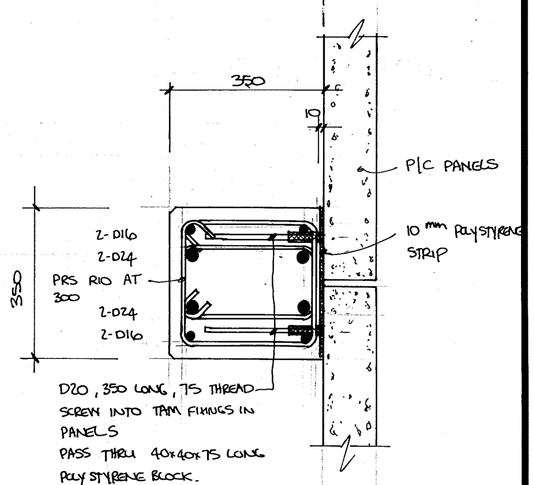
SAWCUT JOINT



FORMED JOINT



8 / S1

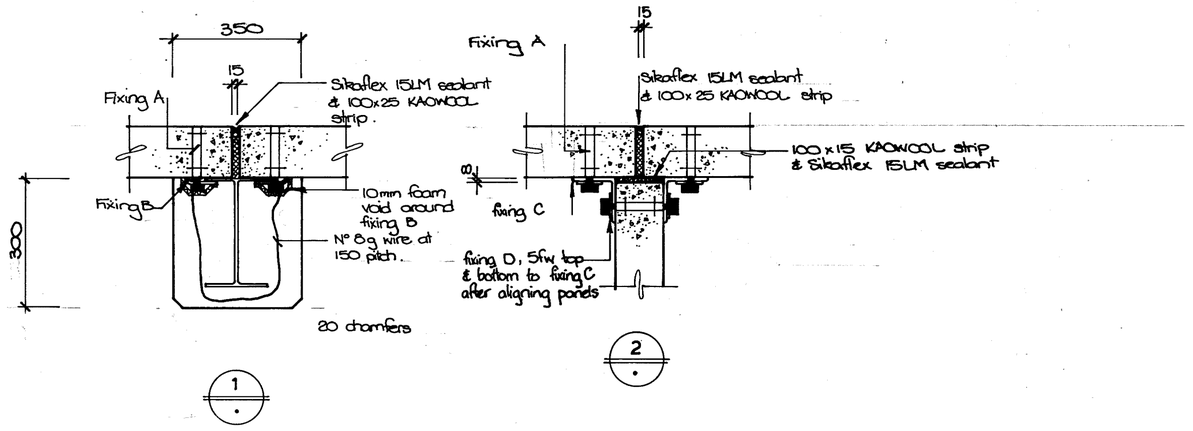


9 / •

Refer to sheet S1 for notes

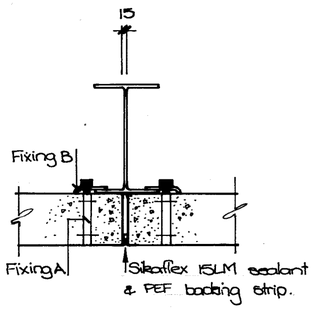
DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN CPC	APPROVED	DATE	SCALES	FOUNDATION DETAILS	SHEET	FILE
	DES		JUNE 1993	1:20 1:10		S2 B	4860
	CKD						

A 20/7/93 Changed starters from D12 to H16, Section 8.
B 30-8-93 COLUMN X AND SECTION 9 ADDED



1

2



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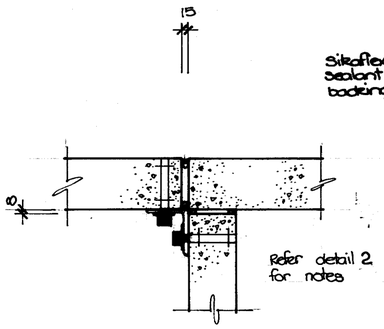

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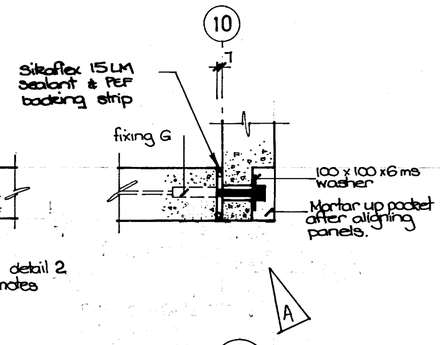

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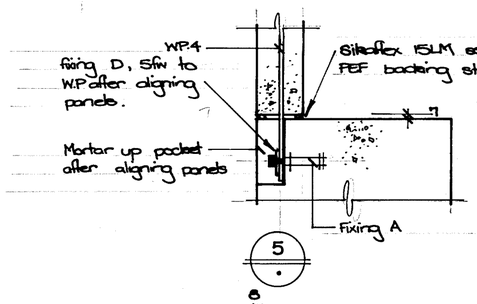

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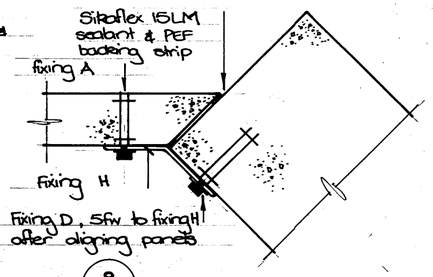
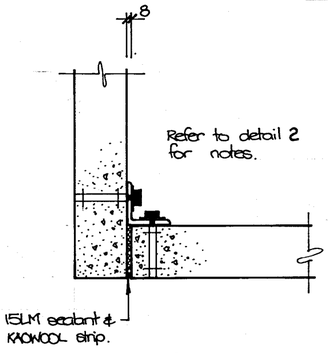
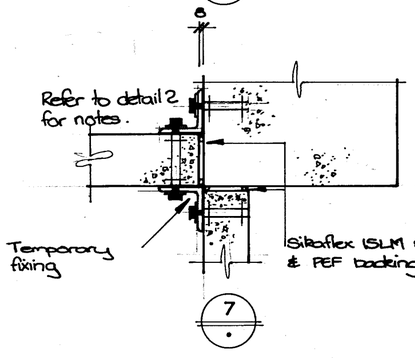


8

Upper & Lower Level



6



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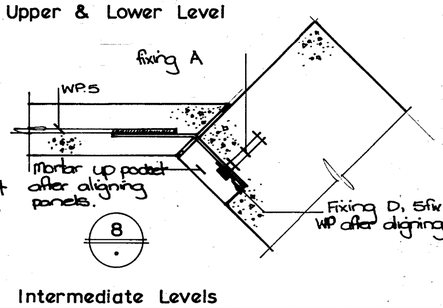
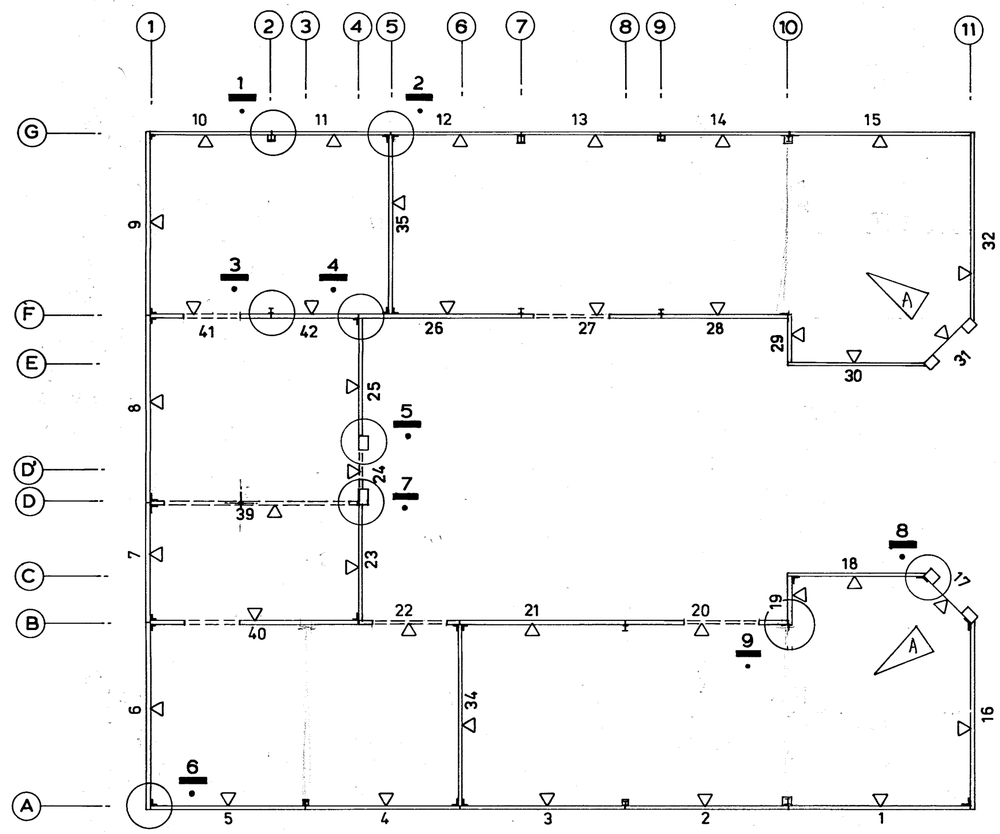


8

Intermediate Levels



PANEL LOCATION PLAN

NOTES

- Contractor to check all dimensions on site before commencing works.
- All panels viewed from inside of building and drawn in the casting position with inside face up. ▽ Denotes the direction that panels have been elevated from on panel elevation sheets. Any changes from this casting pattern must be approved by the Engineer in writing.
- All panels to have 1 layer of 663 mesh in centre of panel. Other reinforcing noted on panels to have covers as noted below.
- Lap all mesh minimum of 2 cross wires but no less than 225mm.
- Concrete strength to be 20 MPa minimum at time of lift.
- Tolerances: Height +0mm, less 6mm; Width +0mm, less 6mm; Thickness +0mm, less 3mm

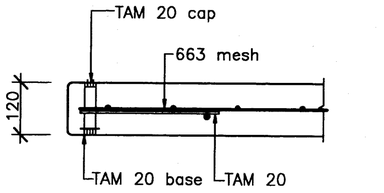
- Legend
  - Denotes Type A fixing on top face unless stated otherwise on panel.
  - Denotes 4 Tonne CONSERT face lifting eye fixing on top face.
  - Denotes 2.5 tonne Ramset erection anchor to be used in accordance with manufacturers specifications. Supply with 1 Rod type 5.
- Suffix (T) Denotes top steel with 20 cover; (t) Denotes top steel with 32 cover; (b) Denotes bottom steel with 42 cover; (B) Denotes bottom steel with 30 cover
- Covers to be maintained past recesses in panels.
- Contractor to ensure panel frees from recess formers during panel erection.

- Exposed Fixing A's on Grid lines 1, A & G to be fire proofed. Refer Specification for details.

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH

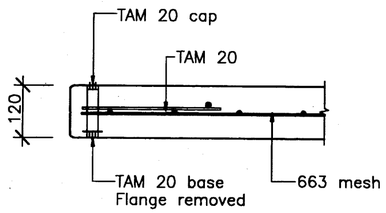
DRN	CPC	APPROVED	DATE	SCALES		SHEET	FILE
DES			JUNE 1993	1:200 1:10	PANEL LOCATION PLAN AND DETAILS	S3A	4860
CKD							

A 11-8-93 PANELS 36, 37, 33 & 38 DELETED



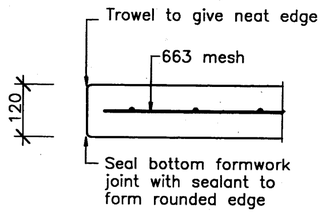
Provide complete with 1 matching Galv. Engineers bolt, 55 long TAM 20 to be supplied by approved manufacturer ONLY

FIXING A : TAM 20 Near Face
(off)

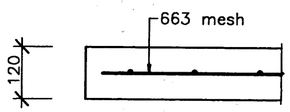


Provide complete with 1 matching Galv. Engineers bolt, 55 long TAM 20 to be supplied by approved manufacturer ONLY

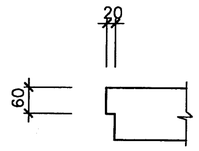
FIXING A : TAM 20 Far Face
(off)



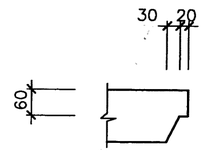
Exposed Edge



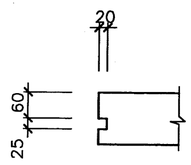
Hidden Edge



JAMB



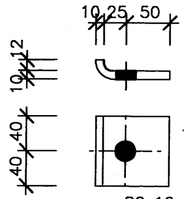
SILL



HEAD

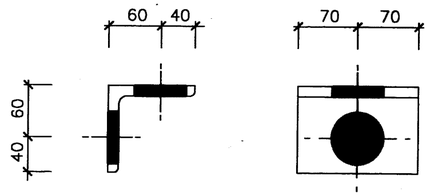
NOTE: Refer panel elevations for reinforcing around windows and doors

TYPICAL PANEL EDGES



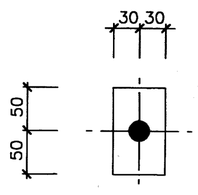
ex 80x10 ms flat
90 long
1–22 dia hole

FIXING B
(off)



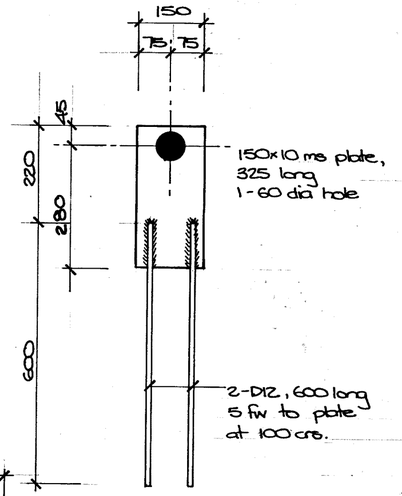
100x100x12 m.s angle
140 long
2–60 dia holes

FIXING C
(off)

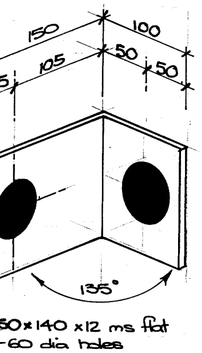


100x60x6 m.s. flat
1–22 dia hole

FIXING D
(off)

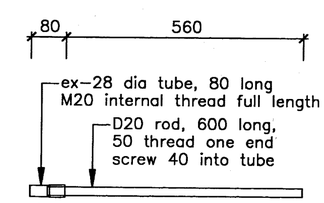


WELDPLATE WP.4
(2 off)

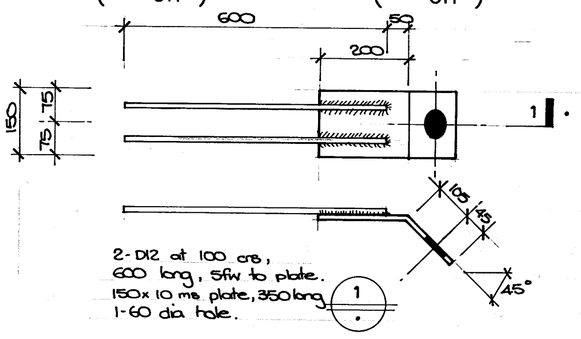


HOT DIP GALVANISE AFTER FABRICATION

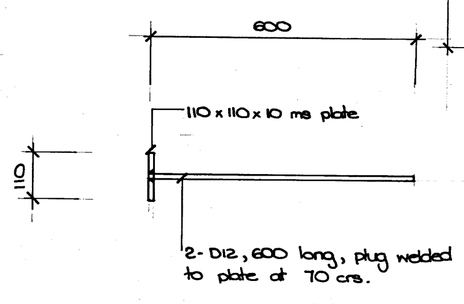
FIXING F
(as required)



FIXING G
(off)

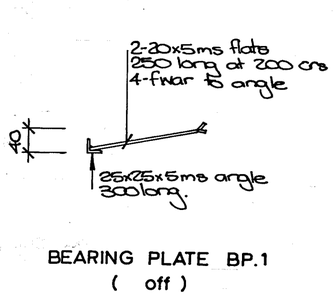


WELDPLATE WP.5
(5 off)

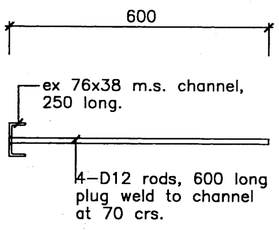


WELDPLATE WP.3
(1 off)

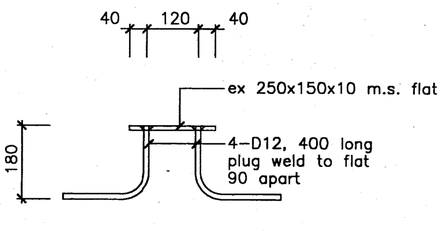
FIXING H
(off)



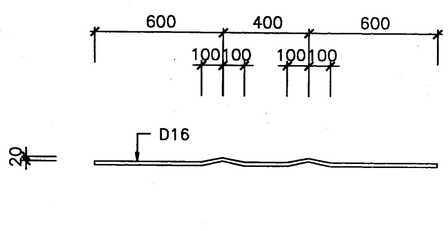
BEARING PLATE BP.1
(off)



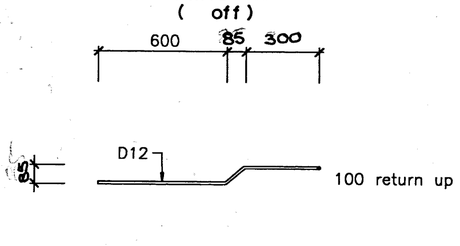
WELDPLATE WP.1
(7 off)



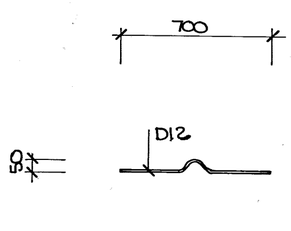
WELDPLATE WP.2
(7 off)



ROD TYPE 1 (off)



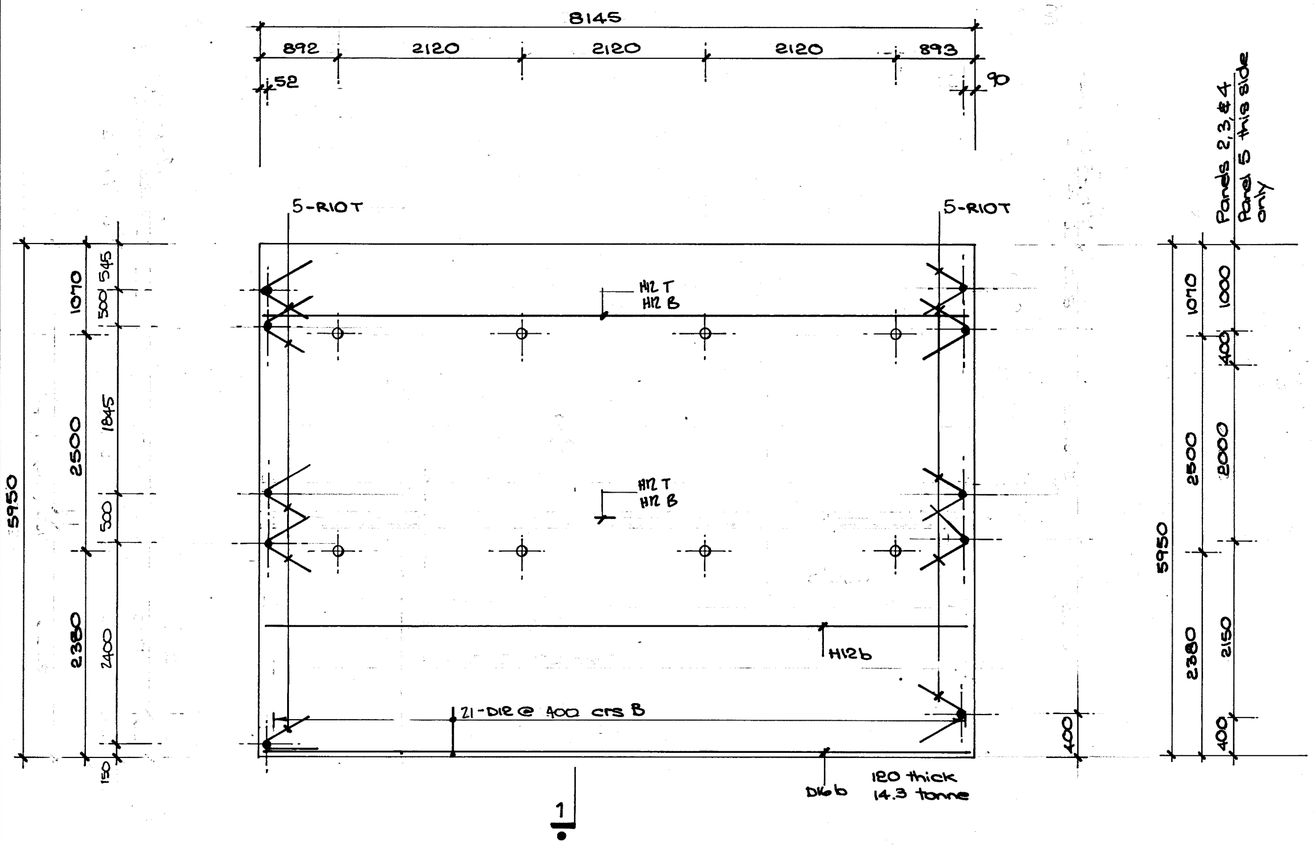
ROD TYPE 2 (off)
ROD TYPE 3 Handed (off)



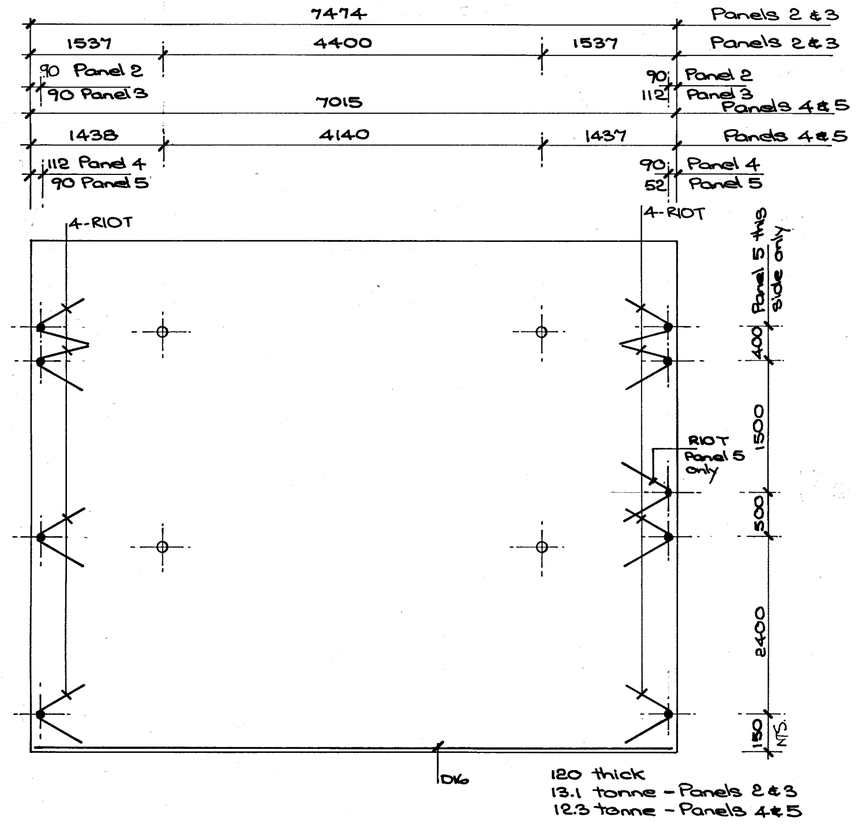
ROD TYPE 5
(off)

DEVELOPMENT – 121 – 123 BLENHEIM ROAD CHRISTCHURCH	DRN CPC	APPROVED	DATE	SCALES	FIXINGS	SHEET	FILE
	DES		JUNE 1993	1:20 1:10		S4 A	4860
	CKD						

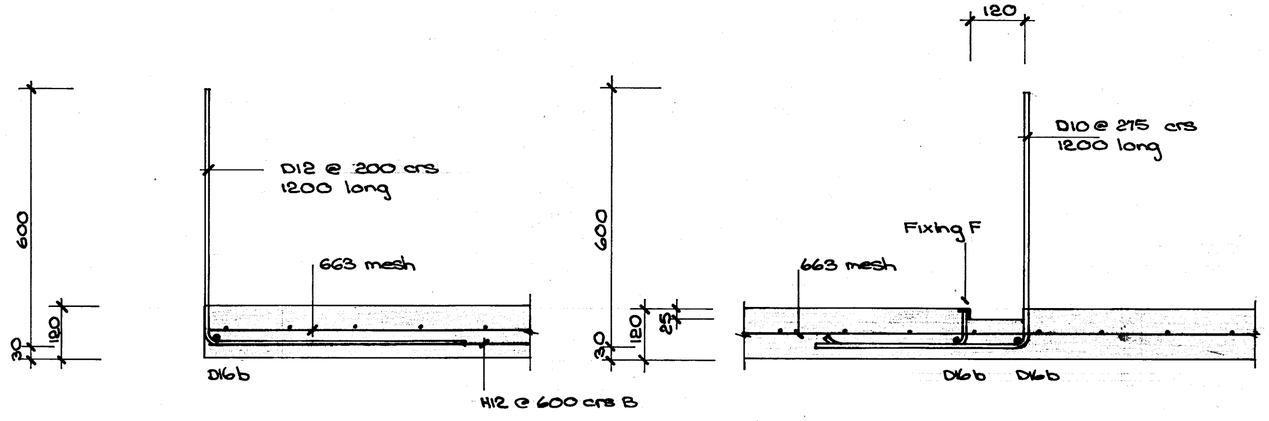
A 12-8-93 WP1 & WP 2 No OFF ALTERED



PANEL 1
PANEL 15 handed



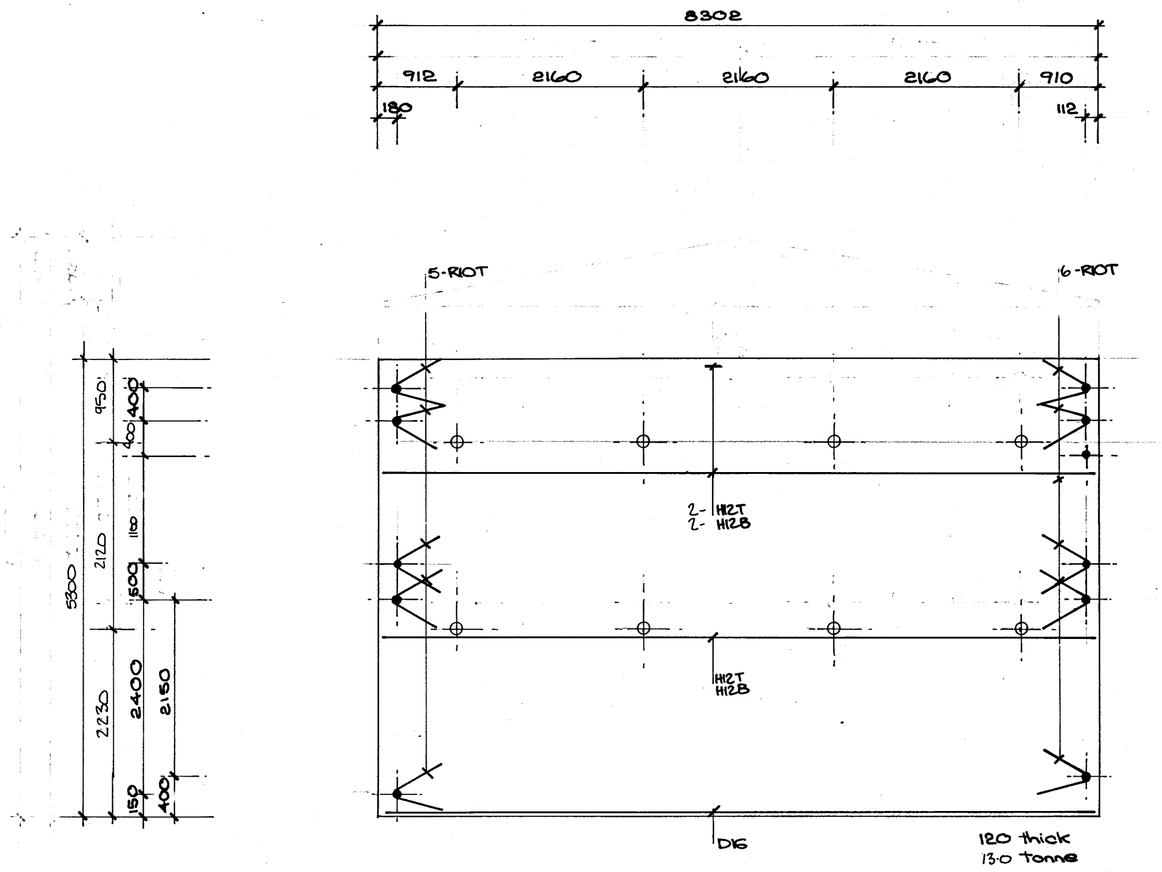
PANELS 2 & 3
PANELS 4 & 5



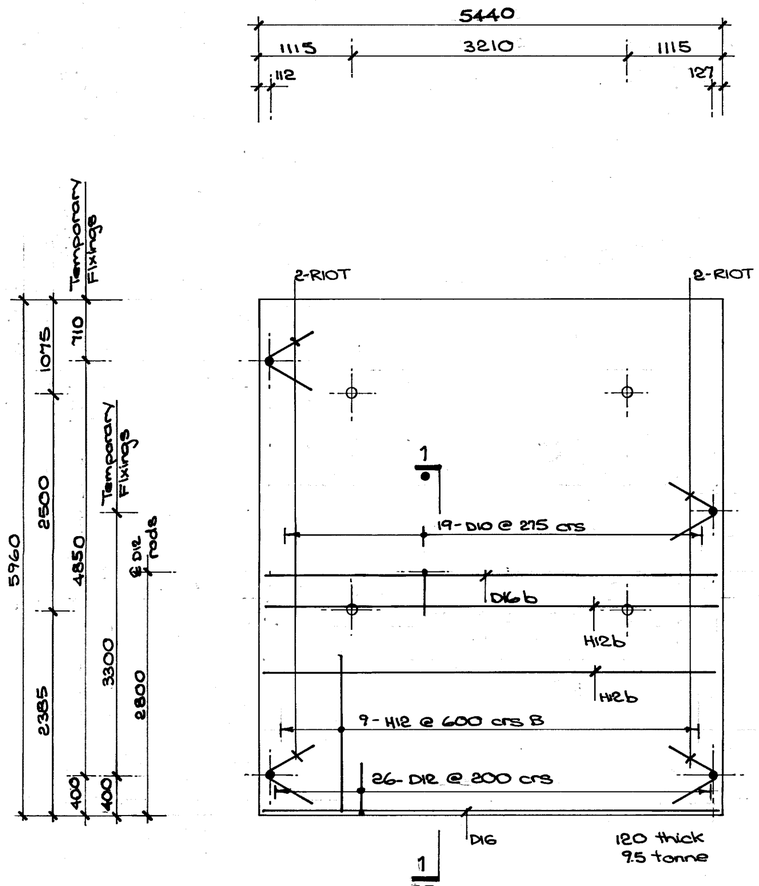
Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	W.L.S.	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 1 — 5 & 15	SHEET	FILE
	DES			JUNE 1993	1:50		S5.B	4860
	CKD							

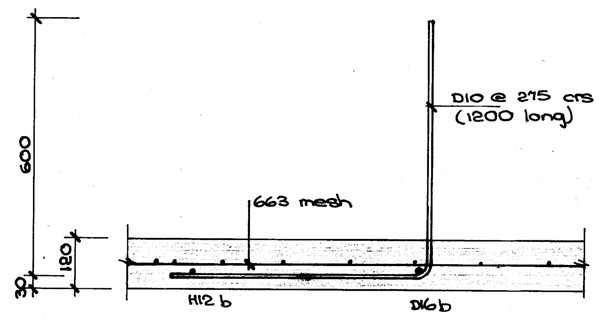
A 23-7-93 Changed D12-400 starters to D10 @ 275
B 11-8-93 PANEL 1, 15 ALTERED



PANEL 6
PANEL 9 handed



PANEL 7

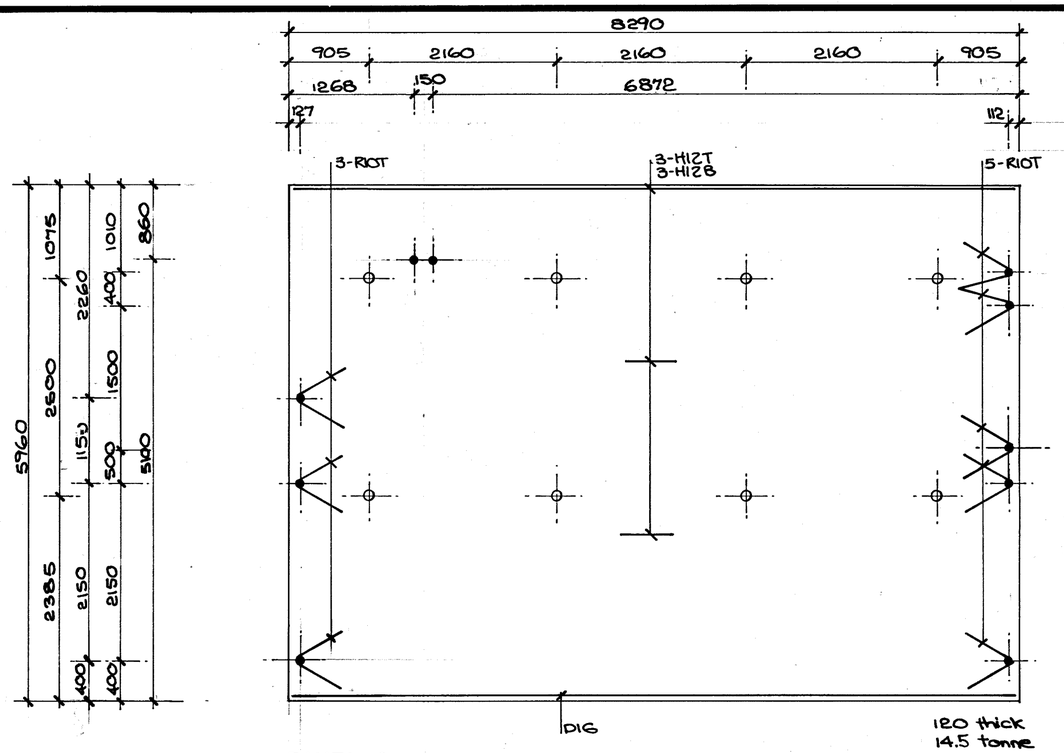


1

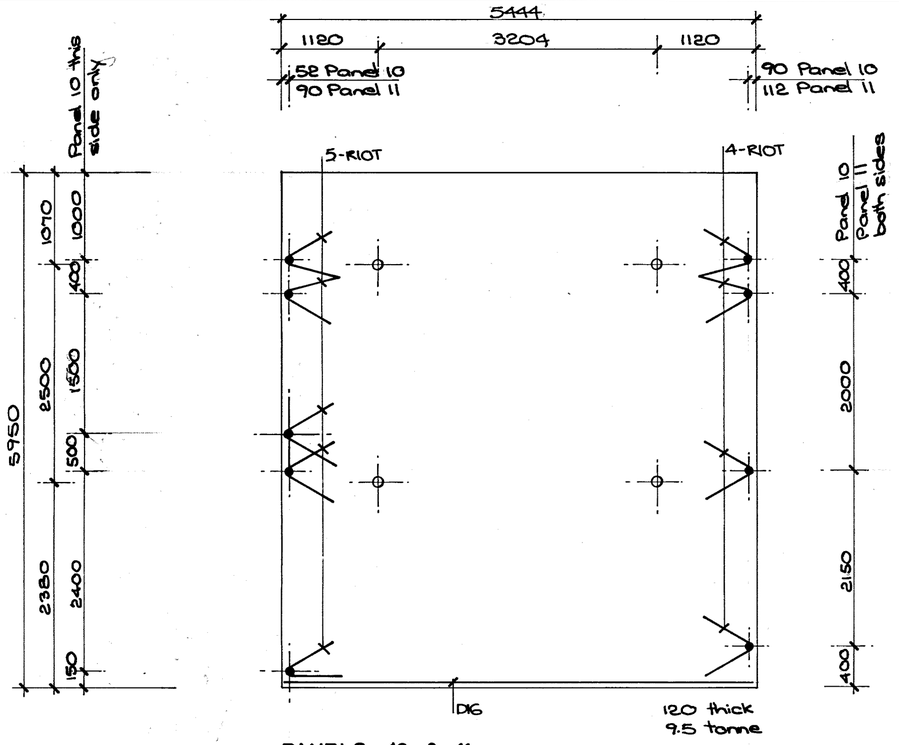
Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN W.L.S. / DES / CKD	APPROVED	DATE: JUNE 1993	SCALES: 1:50	PRECAST CONCRETE PANELS 6, 7 & 9	SHEET: S6.B / FILE: 4860

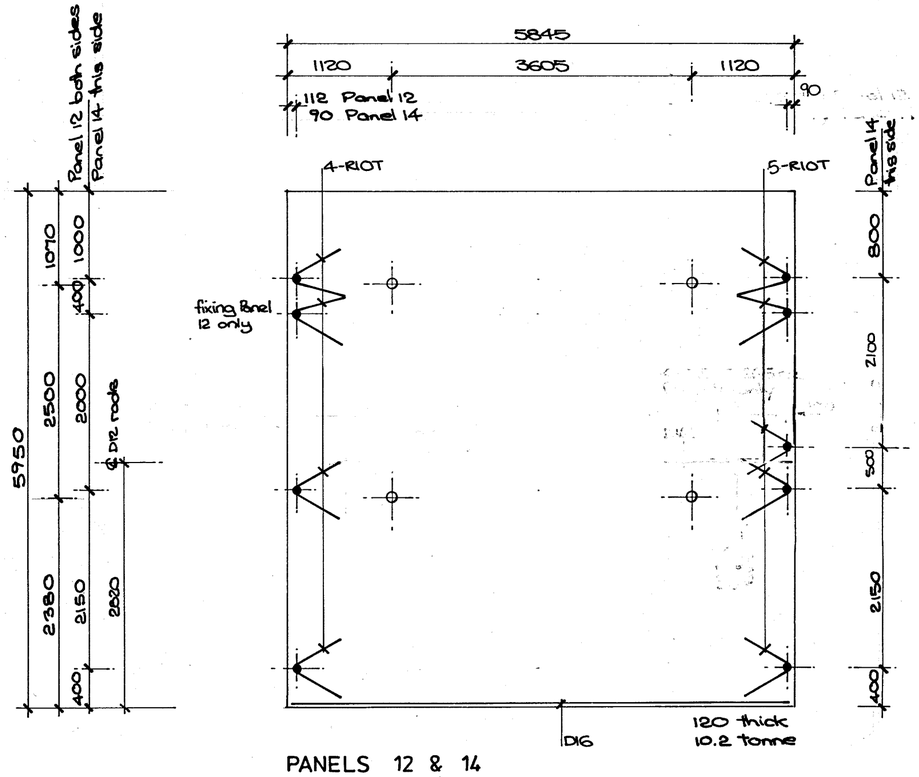
A 23-7-93 Changed D12-400 starters to D10 @ 275
B 19-7-93 PANEL P6, P9 ; ALTERED TO SUIT TRANSPOWER REQUIREMENTS.



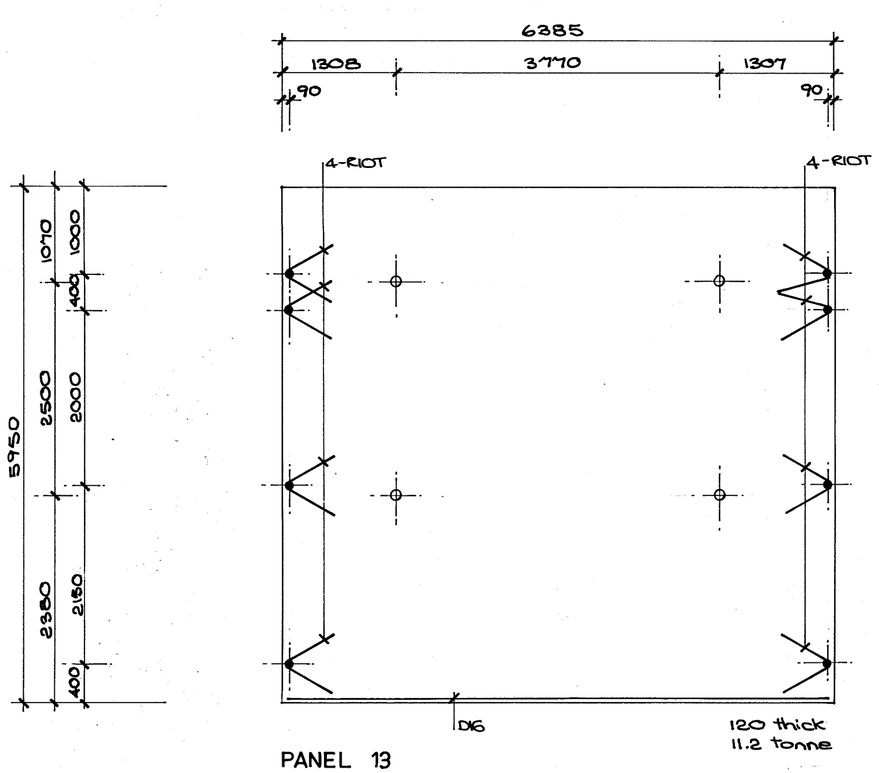
PANEL 8



PANELS 10 & 11



PANELS 12 & 14



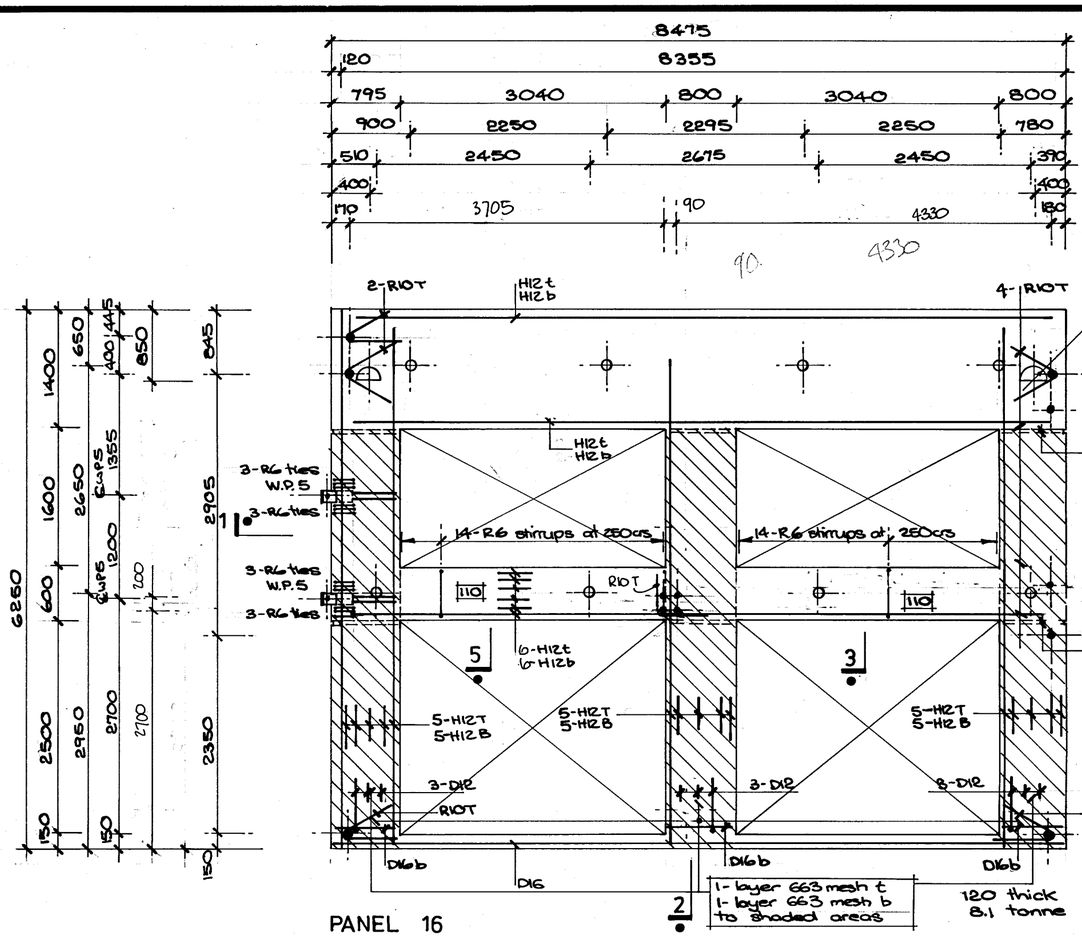
PANEL 13

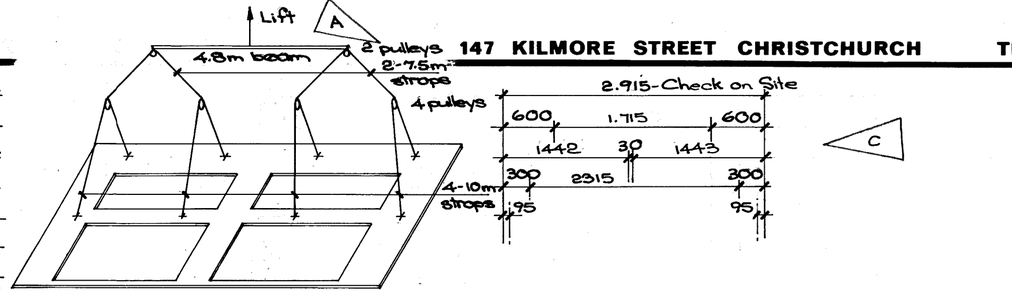
Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN / DES / CKD	W.L.S.	APPROVED	DATE: JUNE 1993	SCALES: 1:50	PRECAST CONCRETE PANELS 8, 10 – 14	SHEET: S7 A	FILE: 4860

A 11-8-93 PANEL P14 ALTERED

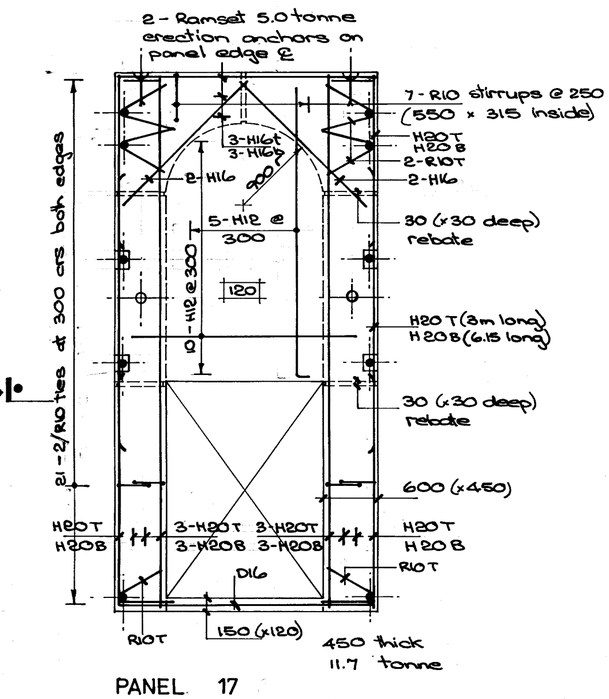
147 KILMORE STREET CHRISTCHURCH TELEPHONE (03) 3660434



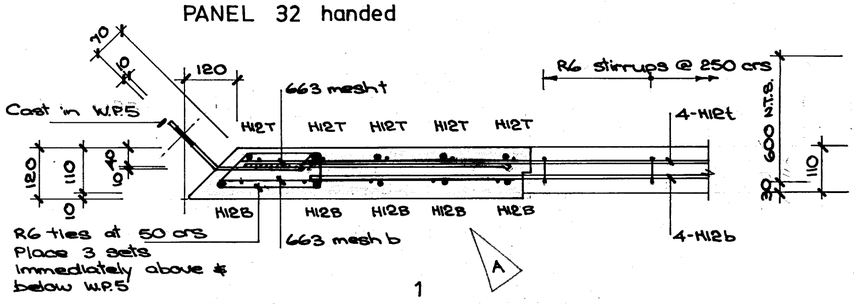


LIFTING DIAGRAM PANEL 16

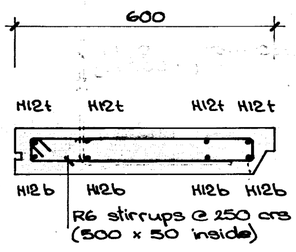
PANEL 16
PANEL 32 handed



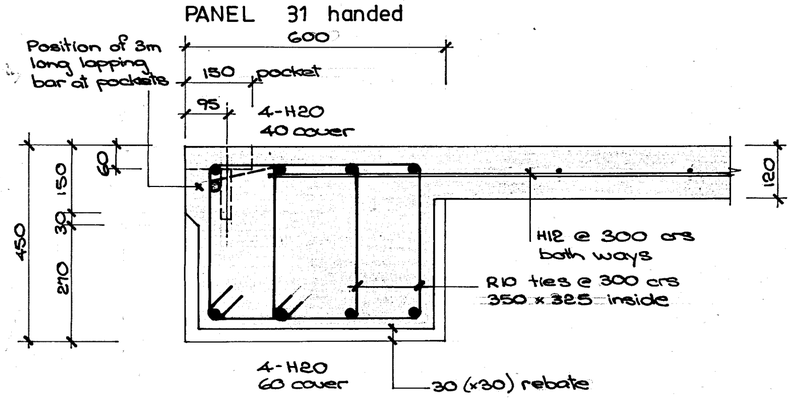
PANEL 17
PANEL 31 handed



1



3
5



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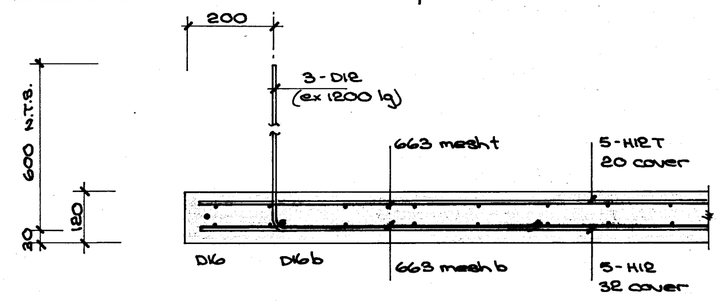


2

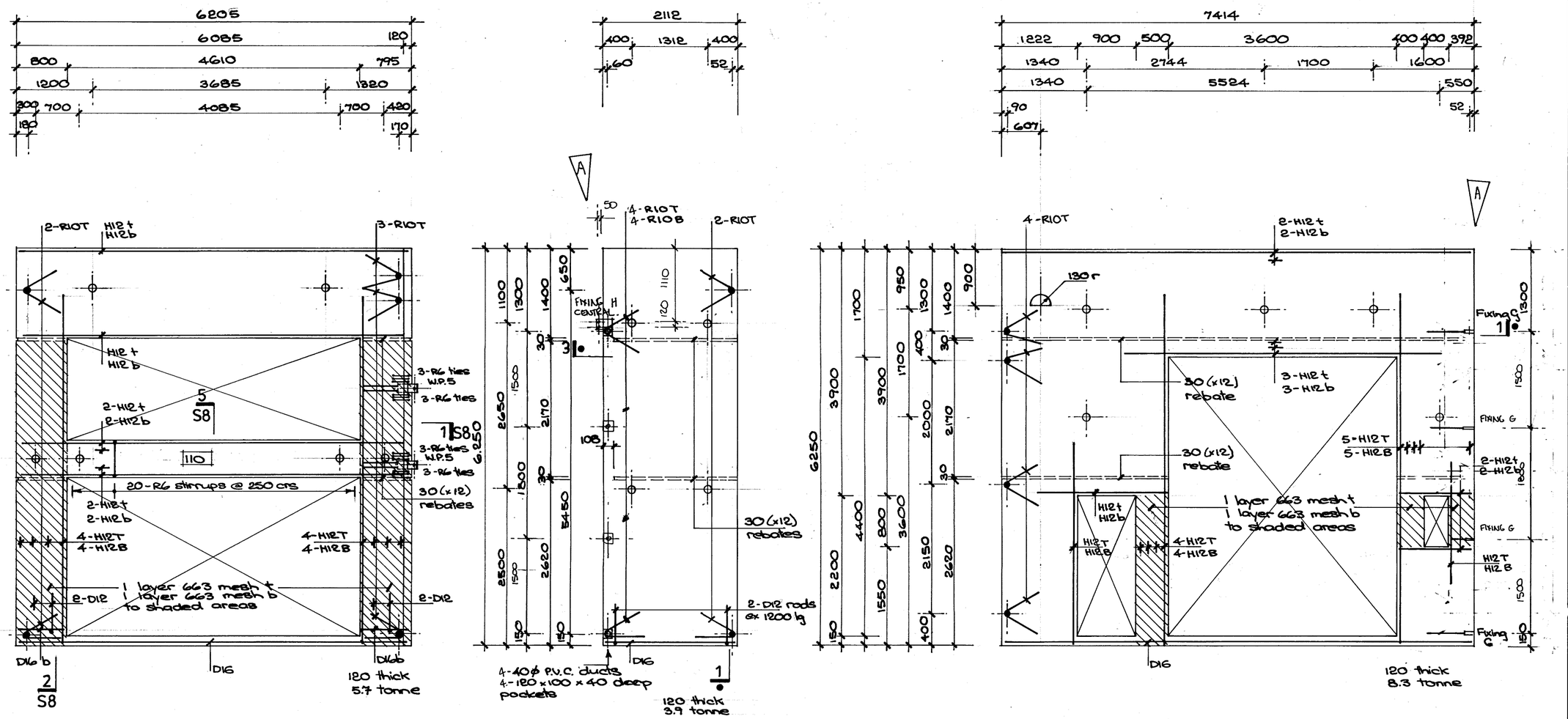
Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	W.L.S.	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 16, 17, 31 & 32	SHEET	FILE
	DES			JUNE 1993	1:50		S8c	4860
	CKD							

C 22/9/93 Decreased width Panels 17 & 31

A 20/1/93 Corrected H12T to H12B on section 1. Changed D12-400 starters to D10 @ 275

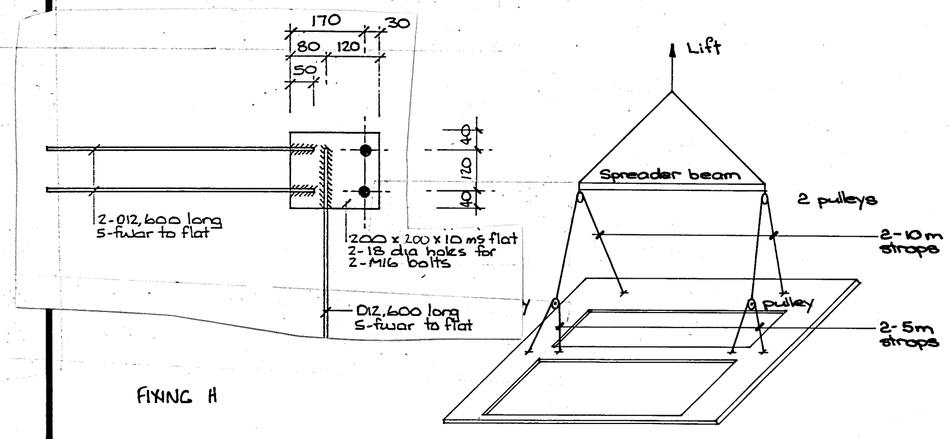
B 11-8-93 PANELS 16, 32 ALTERED, 4 FIXINGS ADDED TO SUPPORT MEZZ FLOOR



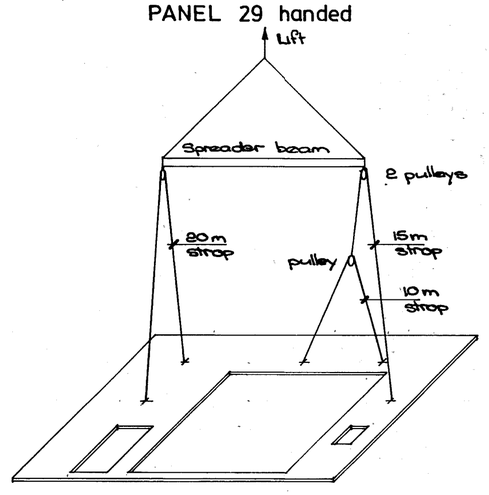
PANEL 18
PANEL 30 handed

PANEL 19
PANEL 29 handed

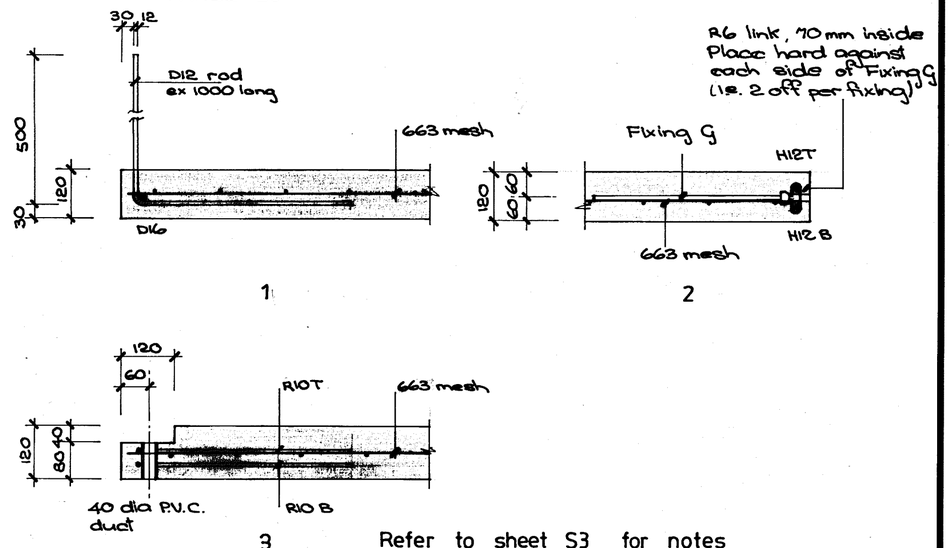
PANEL 20



LIFTING DIAGRAM PANELS 18, 23, & 25



LIFTING DIAGRAM PANEL 20



Refer to sheet S3 for notes

DEVELOPMENT — 121 — 123 BLENHEIM ROAD CHRISTCHURCH	DRN	W.L.S.	APPROVED	DATE	SCALES	PRECAST CONCRETE PANELS 18 — 20, 29 & 30	SHEET	FILE
	DES			JUNE 1993	1:50		S9[A]	4860
	CKD							

A 11-8-93 PANELS 19, 20, 29 : FIXING G'S & POCKETS ADDED, FIXING H ADDED.

Appendix 2

Earthquake Damage Assessment

TM Consultants Ltd.
A. 2/7 Burdale Street.
P.O. Box 8874,
Christchurch 8440,
New Zealand
P. 03 348 6066
F. 03 348 6065
E. info@tmco.co.nz

SITE REPORT

Attn: Paul Brown

SR No : 01
File No : 140073
Date : 13/3/14
Project : 123 Blenheim Rd

POST EARTHQUAKE DAMAGE ASSESSMENT

The building at 123 Blenheim Rd is currently in use as commercial offices and retail shops. It is essentially a concrete tilt panel building with some internal portal frames. A mezzanine first floor level exists in some of the units consisting of unispan concrete slabs.
The Issues arisen from the inspection are:

LOCATION	DAMAGE	RECOMMENDED REPAIR
Foundations:	No damage to the building foundations was witnessed during the site inspection.	No Repair Recommended
Floor:	The floor slab in each unit is within 10-20mm of level. No damage was observed to the mezzanine first floor slab where connected to the concrete wall panels.	No Repair Recommended
Roof:	The roof structure appears in sound structural condition. Purlin connections appear well connected. Weathering of a panel connection where a leak has occurred was observed to the south west corner of the building. **Photo 1.1**	It is recommended that the leak is investigated by a competent roofer.
Walls	Significant cracking of the wall panels has been observed throughout the property. Cracks are typically between 0.1-0.5mm wide. Panel no.5 has displaced horizontally at the mid-span location by approximately 18mm due to out of plane face loading. **Photos 2.1, 2.2, 2.3,2.4** Internal damage has occurred at the junctions where lightweight wall linings have moved relative to the precast panels. **Photos 3.1**	Inject panel cracks between 0.2 to 5mm with Sikadur-52 epoxy or similar. It is recommended this process is monitored to ensure the repair is carried out to a high standard. Patch repair areas internally.
Exterior Surroundings:	No significant damage recorded	No Repair Recommended

Photo 1.1

Photo 2.1

Photo 2.2

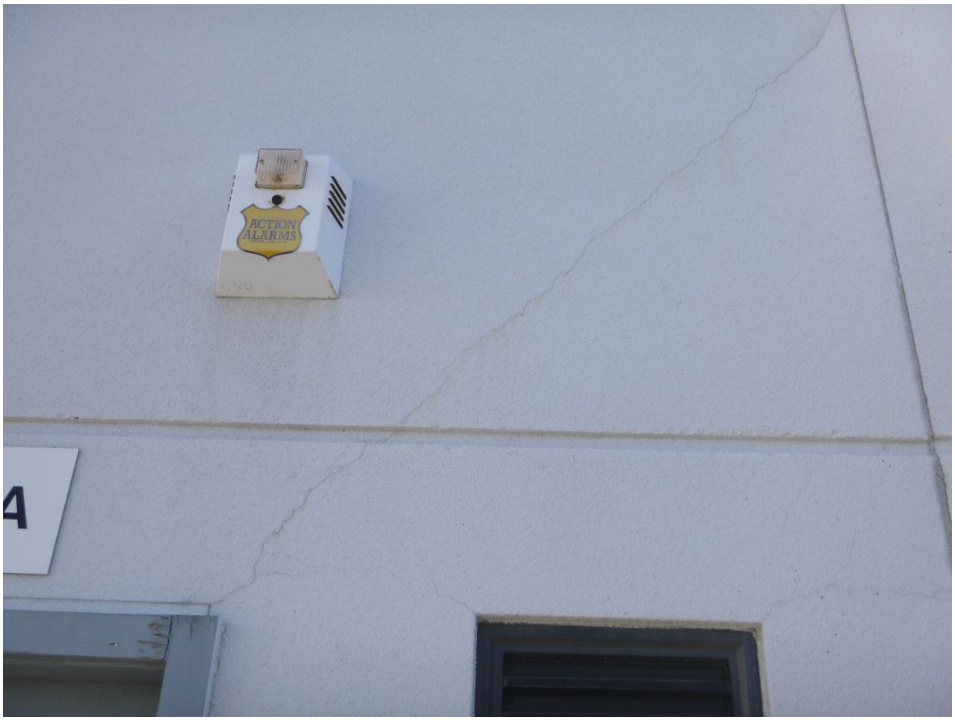


Photo 2.3

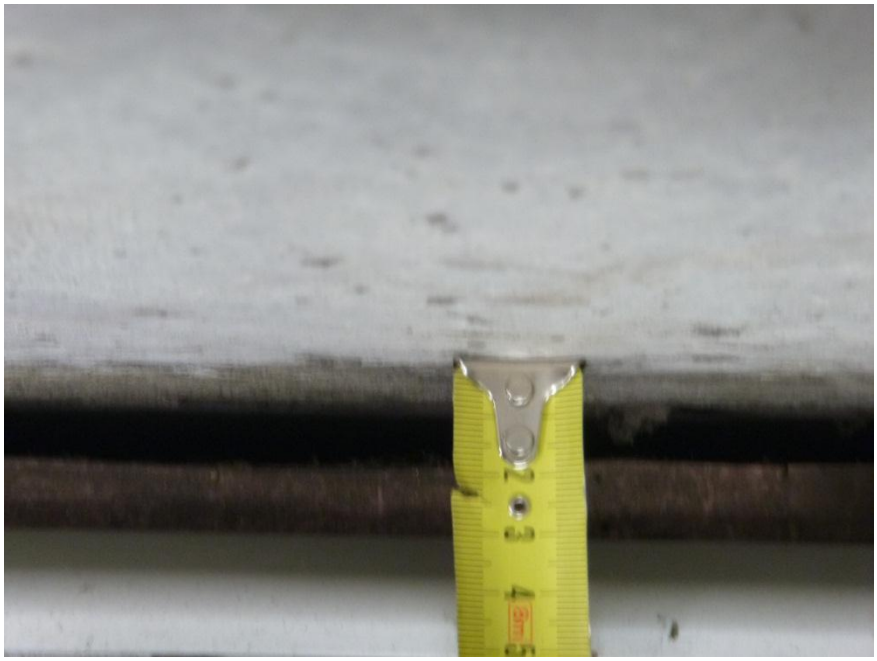


Photo 2.4

Photo 3.1

Signature:

Appendix 3

IEP Standardised Report Form

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:				Reviewer:	Kevin Simcock
	Unit	No:	Street	CPEng No:	67375
Building Address:		123	Blenheim Rd	Company:	TM Consultants
Legal Description:				Company project number:	131336
				Company phone number:	33486066
	Degrees	Min	Sec		
GPS south:	43	32	15.71	Date of submission:	19/03/2014
GPS east:	172	35	59.66	Inspection Date:	Mar-14
				Revision:	2
Building Unique Identifier (CCC):				Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	0
Soil type:	mixed	Soil Profile (if available):	n/a
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):	9.00

Building

No. of storeys above ground:	2	single storey = 1	Ground floor elevation (Absolute) (m):	9.00
Ground floor split?	no		Ground floor elevation above ground (m):	0.00
Storeys below ground	0			
Foundation type:	other (describe)		if Foundation type is other, describe:	Strip footings/post holes/ conc pads
Building height (m):	6.25	height from ground to level of uppermost seismic mass (for IEP only) (m):		
Floor footprint area (approx):	790			
Age of Building (years):	21		Date of design:	1992-2004
Strengthening present?	no		If so, when (year)?	
			And what load level (%g)?	
Use (ground floor):	commercial		Brief strengthening description:	
Use (upper floors):	commercial			
Use notes (if required):				
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	load bearing walls		
Roof:	steel framed	rafter type, purlin type and cladding	
Floors:	precast concrete with topping	unit type and depth (mm), topping	
Beams:	steel non-composite	beam and connector type	
Columns:	structural steel	typical dimensions (mm x mm)	
Walls:	load bearing concrete	#N/A	

Lateral load resisting structure

Lateral system along:	multi-level tilt panel				N-S Direction
Ductility assumed, μ:	1.25		**Note: Define along and across in detailed report!**	note total length of wall at ground (m):	100
Period along:	0.40	####	enter height above at H31	estimate or calculation?	estimated
Total deflection (ULS) (mm):				estimate or calculation?	
maximum interstorey deflection (ULS) (mm):				estimate or calculation?	
Lateral system across:	multi-level tilt panel				E-W Direction
Ductility assumed, μ:	1.25			note total length of wall at ground (m):	55
Period across:	0.40	####	enter height above at H31	estimate or calculation?	estimated
Total deflection (ULS) (mm):				estimate or calculation?	
maximum interstorey deflection (ULS) (mm):				estimate or calculation?	

Separations:

north (mm):		leave blank if not relevant
east (mm):	60	
south (mm):		
west (mm):	100	

Non-structural elements

Stairs:	timber	describe supports	Timber stair supports
Wall cladding:	exposed structure	describe	Exposed panels
Roof Cladding:	Metal	describe	lightweight iron cladding
Glazing:	aluminium frames		
Ceilings:	none		
Services(list):			

Available documentation

Architectural	none	original designer name/date	
Structural	full	original designer name/date	Alan Reay Consultants Limited
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site: (refer DEE Table 4-2)	Site performance:	Excellent	Describe damage:	Very minor settlement
	Settlement:	0-25mm	notes (if applicable):	
	Differential settlement:	0-1:350	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:	moderate to substantial (1 in 5)	notes (if applicable):	

Building:

	Current Placard Status:	green		
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	No Significant Structural Damage
	Describe (summary):			
Across	Damage ratio:	0%	$Damage\_Ratio = \frac{(\%NBS(before) - \%NBS(after))}{\%NBS(before)}$	
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	n/a
CSWs:	Damage?:	no	Describe:	n/a
Pounding:	Damage?:	no	Describe:	n/a
Non-structural:	Damage?:	yes	Describe:	n/a

Recommendations

	Level of repair/strengthening required:	minor structural		Describe:	Cracking to precast panels
	Building Consent required:	no		Describe:	n/a
	Interim occupancy recommendations:	full occupancy		Describe:	Full Occupancy
Along	Assessed %NBS before e'quakes:	73%	#### %NBS from IEP below	If IEP not used, please detail assessment methodology:	Capacity Calculations
	Assessed %NBS after e'quakes:	73%			
Across	Assessed %NBS before e'quakes:	73%	#### %NBS from IEP below		
	Assessed %NBS after e'quakes:	73%			

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): 1992-2004 — h_n from above: m

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

Design Soil type from NZS4203:1992, cl 4.6.2.2:

	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 buildings 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):

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 =k_μ, if pre-1976, fromTable 3.3:		
Ductility Scaling Factor, **Factor D**:	1.00	1.00

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:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1
3.4. Pounding potential — Pounding effect D1, from Table to right		1.0
Height Difference effect D2, from Table to right		1.0
Therefore, Factor D:		1
3.5. Site Characteristics	insignificant	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		

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