

H A R R I S O N
G R I E R S O N

REPORT TO CANTERBURY EARTHQUAKE RECOVERY AUTHORITY

37 Foremans Road, Islington
Body Corporate 394768

Detailed Engineering Evaluation and Initial Evaluation Procedure (Qualitative Assessment Procedure)



HARRISON GRIERSON CONSULTANTS LIMITED

Document Control Record

Client BODY CORPORATE 394768

Project Detailed Engineering Evaluation

HG Project No. 2150-130358-02

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Document Report to Canterbury Earthquake Recovery Authority

ISSUE AND REVISION RECORD

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Originator

PP 

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Reviewed

.....
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Structural Drawings S1-1 to S4-3 – Andrew Freeman 2006

Site Soils investigation – Andrew Freeman 2006

EXECUTIVE SUMMARY

A Detailed Engineering Evaluation (DEE) has been completed of the multi-unit commercial property at 37 Foremans Road, Islington.

Investigations included limited external and internal inspections; a review of structural drawings, structural specification and site soils report.

The main structural system is concrete tilt-up wall panels in both directions. Each unit is approximately 14 x 24 m and have a small 1st floor office space of 50m².

Panels are held up either by being cast into insitu base cantilevered columns, or by connections to orthogonal tilt panels.

The main damage observed is where orthogonal panels are connected. The top connection has in many cases, strained, causing spalling of concrete covering cast in inserts.

Damage assessed as non-structural includes cracking of the reinforced concrete ground floor slab, which have since been repaired and hairline flexural cracking to buttress columns supporting wall panels.

No significant ground liquefaction has been reported at this site as a result of the February 2011 earthquake and aftershocks and based on the geotechnical reporting from the time of the build, it is though unlikely that liquefaction is a risk.

We have identified the panel connections as a structural element that requires repair. Once repaired, it is our professional opinion that the building would be in essentially the same condition as when built.

As the building was constructed in 2005 it was designed to the current code NZS 1170.5:2004 and so has a rating of 73%NBS. The reasoning is that the building would have been designed to 100% of the code in 2006 (which applied at the time of the Feb 2011 earthquake) but since then the hazard factor has been increased from 0.22 to 0.3, therefore giving a current rating of 73%NBS.

1.0 INTRODUCTION

Harrison Grierson has been instructed by Body Corporate Managers, Thompson Wentworth to produce a Detailed Engineering Evaluation (DEE) report for the building at 37 Foremans Road, Islington.

This report includes a review of structural drawings for the building.

Harrison Grierson's Engineers inspected the building on 5th October 2012.

Harrison Grierson also inspected the building and issued "structural integrity assessments" on 7th October 2010, 8th March 2011, 21st June 2011, and 17th January 2012

2.0 SITE ADDRESS AND DESCRIPTION

The site address is 37 Foremans Road, Islington, Christchurch. The legal description is Lot 2 Deposited Plan 354365.

- The building comprises a total of 7 high stud industrial warehouse type tenancies, each being approx 14 x 24 m giving a total ground floor area of approximately 2400m². Each tenancy has a 'retail' area at the front with a lightweight suspended first floor of around 50m².
- The building is on the Northern side of Foremans road. It is an L layout with 4 units facing North East and 3 South East.



Figure 1: 37 Foremans Road, Islington

3.0 STRUCTURAL SYSTEM

3.1 GRAVITY SYSTEM

The main structural system is 120 & 150mm thick reinforced concrete tilt-up wall panels in both directions, supported by concrete filled augered postholes extending to the natural gravel layer.

Small first floor spaces comprised of steel columns, steel floor beams, timber joists and timber flooring.

The roof is profiled steel sheet on DHS on steel rafters.

3.2 LATERAL SYSTEM

Longitudinal and Transverse lateral resistance is by means of precast exterior and inter-tenancy walls and columns.

Precast panels are held up either by being cast into insitu base cantilevered columns, or by connections to orthogonal tilt panels.

Panels are connected to orthogonal panels with steel brackets at three levels.

Insitu columns are tied into slab at ground level, and extend approximately 4m below grade to embed 500mm into competent gravels. The columns are suitably detailed for ductility. It is noted that the ULS deflection of this ductile column will be significantly larger than the corresponding deflection of an orthogonal wall which is inherently stiff and will act in an elastic manner. Where a wall panel is supported on one end by a wall and on the other by a column, the wall will tend to rotate around the stiffer support. This may contribute to the panel to panel cleat damage that is noted later.

4.0 GROUND CONDITIONS

Geotechnical ground investigations at the time of design, show gravels overlain with 3.5-4.5m of non-engineered fill including foundry waste.

It was indicated at time of design that the building platform would be built up with engineered fill in layers totalling around 600mm.

There have been no reports of liquefaction, or of significant settlements in any of the quake events.

Cracking of the slab on grade has occurred and been epoxy filled. This cracking is not considered of structural consequence.



Figure 2: Aerial Photo from 24 Feb 2011

From these observations alone, it is not felt that further geotechnical investigation is required at this time.

5.0 SUMMARY OF OBSERVED DAMAGE

5.1 STRUCTURAL INSPECTIONS

Earthquake damage has been noted by Harrison Grierson in their Structural Integrity Assessments of 7 October 2010, 17 March 2011, and 11 April 2012, following the 4th September, 22nd February, 13th June & 23rd December 2011 earthquake events. The damage noted was as follows;

5.2 INSPECTION – 7TH OCTOBER 2010

- Minor cracking was observed between the concrete tilt slab walls with the concrete column and the concrete floor slab.
- The floor in Unit 7 has been damaged due to the merchandise falling from the storage racks. This damage includes minor chips in the concrete floor and radiating cracks.

5.3 INSPECTION - 17TH MARCH 2011

- Minor historical cracking (from the September 2010 Earthquake event) in the interior gib joins and concrete slabs in various locations.

5.4 INSPECTION - 11TH APRIL 2012

Since our previous inspection, extensive repairs have been done throughout each unit. The concrete panels throughout have had the majority of cracks filled. Every unit has had its floor slab repaired, as there was extensive cracking throughout. Repairs throughout the complex were finished in February, 2012.

Our walk through inspection was of the exterior and interior of the buildings. Items noticed in the inspection are mentioned below:

- Minor leaking in Unit 5, from the roof down the rear panel.
- Minor cracking still remains in some locations around the front panels of most units, mainly around openings.
- Floor slab in Unit 7 has been extensively repaired. Gouged holes from falling products are now all filled in.
- Minor leaking in Unit 7, western corner of the warehouse, from the roof.
- Minor interior damage to stairwell in Unit 7.

5.5 DETAILED INSPECTIONS - 5TH OCTOBER, 2012

A further inspection was carried out on the 5th October 2012. The items noted were as follows;

- Minor flexural cracking near the base of the insitu base cantilevered columns. These cracks are closed, and well distributed indicating a suitable level of reinforcing within the column. The size and nature of the flexural cracking is minor and indicative of very low level of ductile curvature. These columns are clearly designed as base cantilevered columns and have suitable shear steel to confine this expected base hinging.
- Some panel to panel connectors, shown on the plans as Type CT-D are showing signs of distress and cover concrete failures. The uppermost connections in most units have generally lost their fire rated ceramic mortar. (Figure 4.)
- Boundary wall tilt panels have sustained varied minor cracking that has been epoxy injected. It is not clear if this damage is earthquake related.

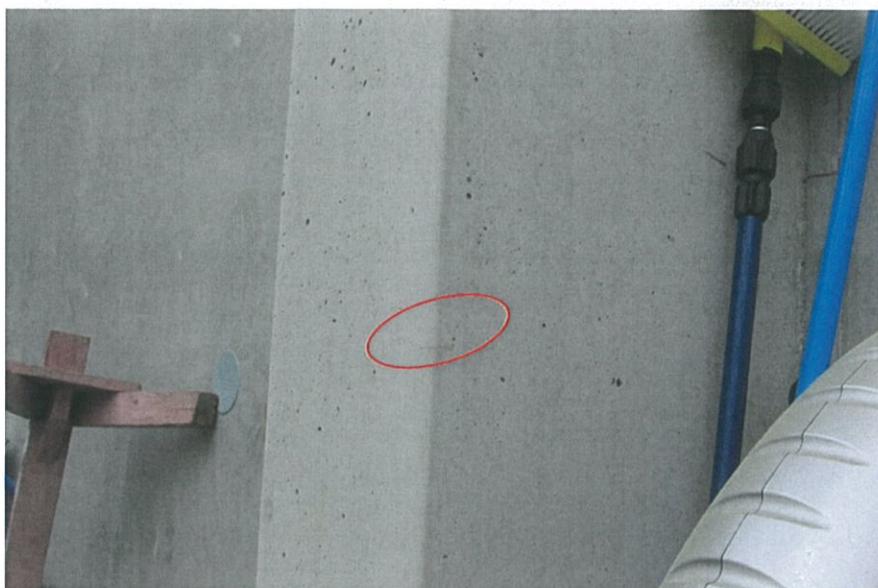


Figure 2: Example of minor flexural cracking noted in columns in unit 6



Figure 3: Cracking of boundary wall panels.

5.6 DAMAGE SUMMARY

The damage to the building has been broken down into three categories; Superficial, Minor & Major. Damage has been summarised below in each category. It is noted that our inspections did not identify all cosmetic or non-structural damage since the focus was on potential structural damage to the building.

Some repairs have already been carried out as mentioned above.

Superficial – and not affecting the building structure			
Damage description	Location	Investigations	Reason for damage
1. As described in section 5 above.			

Minor			
Damage description	Location	Investigations	Reason for damage
2. Minor column cracking	Bottom of columns carrying panel walls. Can be seen within most units.	Visual inspection and structural drawings	Apparent flexural cracking. Well distributed and very fine, closed cracks.
3. Minor boundary wall cracking	Boundary wall to Nth	None	Uncertain if earthquake related.
4. Top panel to panel connectors	Top panel to panel cleat in many locations throughout complex	Hand calculation investigating cleat capacity and possible reason for failure. Proposed replacement cleat	Stiff load path between adjacent panels. Highly loaded cast in and post fixed panel bolts. Cast in inserts with low edge distance effectively spalling cover concrete.

Note: While the damage to panel connectors is listed here as minor, it should remain a priority to repair.

Major			
Damage description	Location	Investigations	Reason for damage
5. Nil			

6.0 SEISMIC LATERAL LOAD RESISTANCE

As the building was constructed in 2005 it was designed to the current code NZS 1170.5:2004 and so has a rating of 73%NBS. The reasoning is that the building would have been designed to 100% of the code in 2006 (which applied at the time of the Feb 2011 earthquake) but since then the hazard factor has been increased from 0.22 to 0.3, therefore giving a current rating of 73%NBS.

No global or local CSW's were identified in our assessment.

It is our opinion that the damage to the connectors will compromise the %NBS of the building until they are repaired. Without a detailed quantitative assessment it is not possible to quantify the percentage reduction, as such we recommend that repairs to these connectors are undertaken immediately to return the building to its pre-earthquake condition.



The “as designed” capacity of this panel to panel connection is checked by hand calculation. While there are many assumptions that can influence the outcome of this analysis, it can be shown that the top connection is the most heavily loaded, and that the post fixed anchors to the cladding panels are at risk. Evidence also shows that the hairpin restraint of the conduit has been flexible enough to spall cover concrete.

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Upon reinstallation, all fire stop mortar should be reinstated.

8.0 BUILDING CONSENT

With reference to Christchurch City Council Earthquake Prone Buildings policy, the building has a structural strength over 33% of the Building Code, therefore this policy does not apply. A building consent is not required for buildings with minor structural damage, as these repairs are exempt from building consent under Schedule 1 (a).

9.0 SUMMARY

The commercial building at 37 Foremans Road, Islington, scores highly in the IEP grading procedure, but has suffered damage to steel brackets fixing intersecting wall panels.

10.0 LIMITATIONS

This report is for the use by client only for the stated purpose, and should not be used or relied upon by any other person or entity or for any other project or purpose. This report is based on our interpretation of the Initial Evaluation Procedure (IEP) process described by the New Zealand Society for Earthquake Engineering (NZSEE) recommendations titled Assessment and Improvement of the Structural Performance of buildings in Earthquakes dated June 2006. Our assessment is based principally on the information found for the building in council archives and a visual inspection. This report should be read in conjunction with the IEP worksheets and other appendices. No responsibility is accepted for the accuracy of information supplied by the Client or obtained from third party sources such as council archives and relied on for our report. The IEP process is intended as a coarse screening procedure for earthquake prone buildings and the outcome of the procedure is not intended as a definitive building rating, but to be used as a preliminary guide only. A more detailed assessment is needed if the information in this report is intended to be relied upon for any other purpose.

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Location

Building Name: 39 Foremans Rd

Unit

No: Street

37 Foremans Rd, Islington

Building Address: Unit 1-7

Legal Description: Lot5 DP76397

GPS south: 43

GPS east: 172

Building Unique Identifier (CCC):

Reviewer: Andy Reid

CPEng No: 1010170

Company: Cameron Gibson and Wells Ltd

Company project number: 13530

Company phone number: 03 548 8259

Date of submission: 24/10/2012

Inspection Date: 5/10/2012

Revision: 1

Is there a full report with this summary?: yes

Site

Site slope: flat

Soil type: mixed

Site Class (to NZS1170.5): D

Proximity to waterway (m, if <100m):

Proximity to cliff top (m, if <100m):

Proximity to cliff base (m, if <100m):

Max retaining height (m):

Soil Profile (if available): 1m pitrun over 2-3m non eng fill over gravels

If Ground improvement on site, describe:

Approx site elevation (m): 34.00

Building

No. of storeys above ground: 2

Ground floor split?: no

Storeys below ground: 0

Foundation type: bored cast-insitu concrete piles

Building height (m): 8.50

Floor footprint area (approx): 2500

Age of Building (years): 7

single storey = 1

Ground floor elevation (Absolute) (m): 34.00

Ground floor elevation above ground (m): 0.20

if Foundation type is other, describe:

height from ground to level of uppermost seismic mass (for IEP only) (m): 8.5

Date of design: 2004-

if so, when (year)?

And what load level (%g)?

Brief strengthening description:

Gravity Structure

Gravity System: load bearing walls

Roof: steel framed

Floors: other (note)

Beams: steel non-composite

Columns: cast-insitu concrete

Walls: load bearing concrete

rafter type, purlin type and cladding describe sylem

UB rafters, DHS purlins with corrugate

beam and connector type

Timber floors on steel post & beams

typical dimensions (mm x mm)

#N/A

Lateral load resisting structure

East-west

Lateral system along: concrete shear wall

Ductility assumed, μ : 3.00

Period along: 0.40

Total deflection (ULS) (mm): 10

maximum interstorey deflection (ULS) (mm): 10

North-south

Lateral system across: concrete shear wall

Ductility assumed, μ : 3.00

Period across: 0.40

Total deflection (ULS) (mm): 10

maximum interstorey deflection (ULS) (mm): 10

note total length of wall at ground (m): 80

wall thickness (m): 120-150

estimate or calculation?: estimated

estimate or calculation?: estimated

note total length of wall at ground (m): 80

wall thickness (m): 120-150

estimate or calculation?: estimated

estimate or calculation?: estimated

Separations:

north (mm):

east (mm):

south (mm):

west (mm): 100

leave blank if not relevant

Non-structural elements

Stairs: timber

Wall cladding: precast panels

Roof Cladding: Metal

Glazing: aluminium frames

Ceilings: none

Services (list):

describe supports

unknown

thickness and fixing type

120-150mm spanning between columns

describe

0.4mm trimdeck

Available documentation

Architectural: partial

Structural: full

Mechanical: none

Electrical: none

Geotech report: partial

original designer name/date

Noel Strez

original designer name/date

Andrew Freeman

original designer name/date

original designer name/date

Andrew Freeman

Damage

Site performance:

Settlement: none observed

Differential settlement: none observed

Liquefaction: none apparent

Lateral Spread: none apparent

Differential lateral spread: none apparent

Ground cracks: none apparent

Damage to area: none apparent

Describe damage:

notes (if applicable):

notes (if applicable):

notes (if applicable):

notes (if applicable):

notes (if applicable):

Building:

Current Placard Status: green

Damage ratio: 30%

Describe (summary): Upper panel connectors damaged

Damage ratio: 30%

Describe (summary): Upper panel connectors damaged

Damage?: no

Damage?: no

Damage?: no

Damage?: yes

Describe how damage ratio arrived at: Engineering Judgement

$Damage_Ratio = \frac{(\%NBS(befor\grave{e}) - \%NBS(after))}{\%NBS(befor\grave{e})}$

Recommendations

Level of repair/strengthening required: minor structural

Building Consent required: no

Interim occupancy recommendations: full occupancy

Assessed %NBS before: 104%

Assessed %NBS after: 73%

Along

104% %NBS from IEP below

73%

Across Assessed %NBS before: 104% 104% %NBS from IEP below 73%

IEP

Age of Building (from above):

2004

h_n from above: 8.5m

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building
not required for this age of building

Period (from above):
(%NBS)_{nom} from Fig 3.3:

along 0.4
23.0%

across 0.4
23.0%

Note: 1 for buildings designed prior to 1976 as public buildings, to code at time, use 1.25
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)

1.00
1.0
1.0

Final (%NBS)_{nom}:

along 23%

across 23%

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, Table 3.3:

1.00

Near Fault scaling factor (1/N(T,D), Factor A:

along 1

across 1

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:

0.30
0.8
2.666666667

2.4 Return Period Scaling Factor

Building Importance level (from above):
Return Period Scaling factor from Table 3.1, Factor C:

2
1.00

2.5 Ductility Scaling Factor

Assessed ductility (less than max in Table 3.3):
Ductility scaling factor (if pre-1976):

along 3.00

across 3.00

Ductility Scaling Factor, Factor D:

1.57

Sp:

0.925

Structural Performance Scaling Factor Factor E:

1.08

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

104%

104%

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:

None 1

3.3. Short columns, Factor C:

None 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

None 1

3.6. Other factors, Factor F

For ≤ 3 storeys, max value = 2.5, otherwise max value = 1.5, no minimum
Rationale for choice of F factor, if not 1

Along 1.0

Across 1.0

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

3.7. Overall Performance Achievement ratio (PAR)

1.00

4.3 PAR x (%NBS)_b:

104%

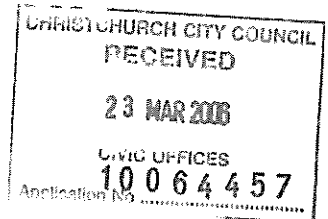
4.4 Percentage New Building Standard (%NBS)_f (before)

104%

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

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

Along		Across
1.0		1.0



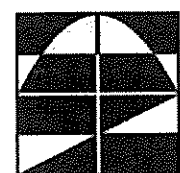
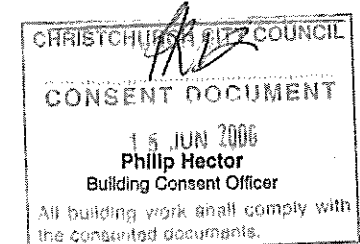
FILE COPY

INDUSTRIAL DEVELOPMENT FOR H & H DAKOTA LTD

39 FOREMANS ROAD - HORNBY
CHRISTCHURCH

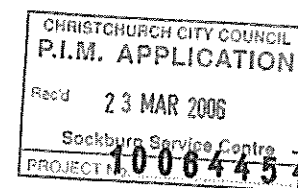
STRUCTURAL DRAWINGS

REFERENCE No. 05170



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0274 794 234 M
andrew@freemansl.co.nz E



DRAWING INDEX:

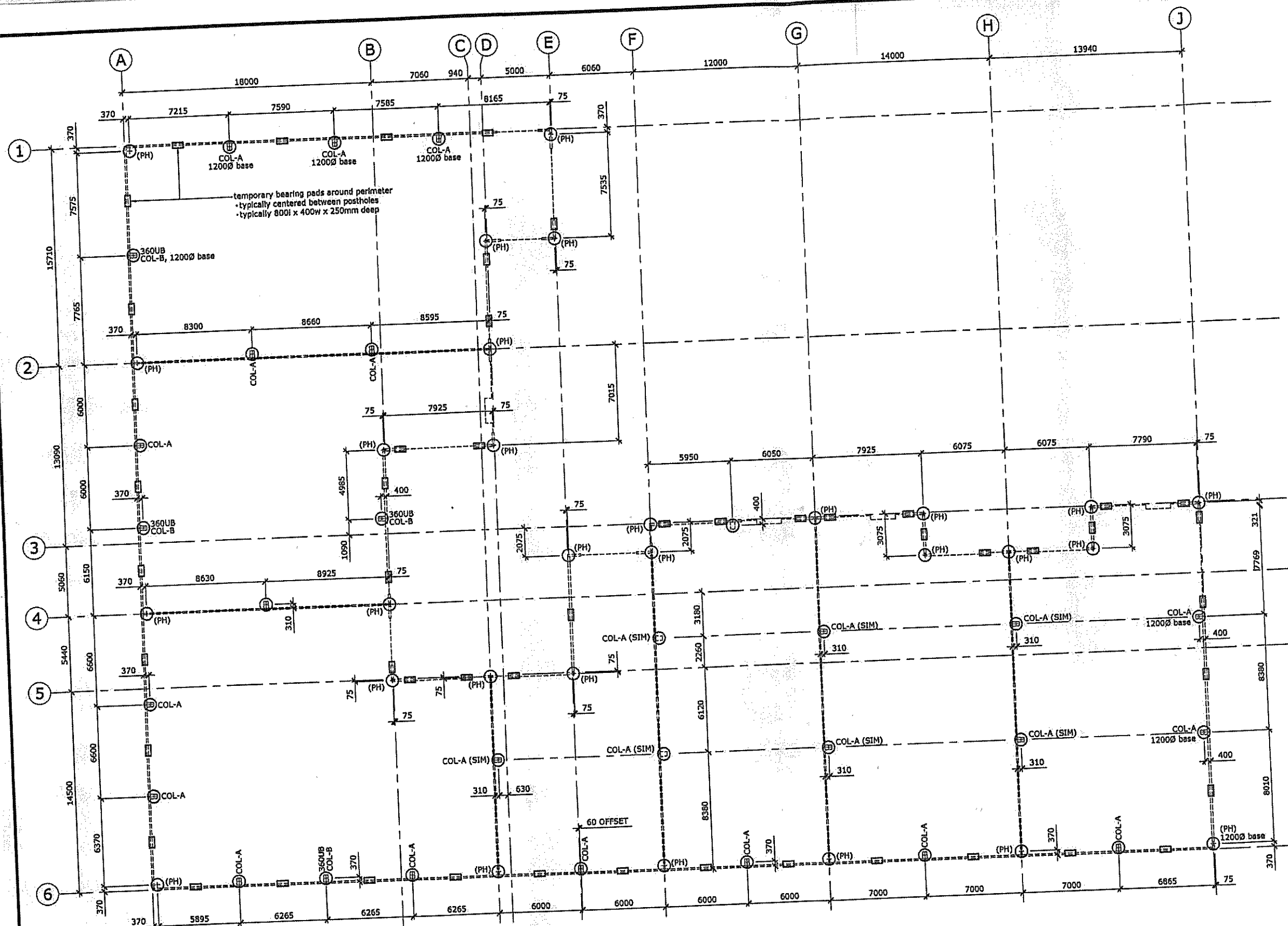
S1-1	POSTHOLE SETOUT
S1-2	SLAB AND FOUNDATION PLAN
S1-3	FOUNDATION DETAILS
S1-4	FOUNDATION DETAILS
S2-1	MEZZANINE FLOOR STRUCTURE
S3-1 - 3-8	CONCRETE WALL PANELS
S3-9	CONCRETE PANEL DETAILS
S4-1	ROOF STEELWORK
S4-2	STEELWORK ELEVATIONS
S4-3	STEELWORK DETAILS
S4-3	LOUVRE AND CANOPY FRAMES

20 MARCH 2006
CONSENT ISSUE

CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
10064457
Application No.

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents.

1	20.03.04	Consent Issue
Issue:	Date:	Amendment:
 FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
POSTHOLE SETOUT		
Job No.:	05170	
Designed:	ARF	DEC 2005
Drawn:	JBM	DEC 2005
Scales:	1:200	
Sheet No.:	S1-1	Issue: 1



POSTHOLE FOUNDATIONS SETOUT PLAN
SCALE 1:200

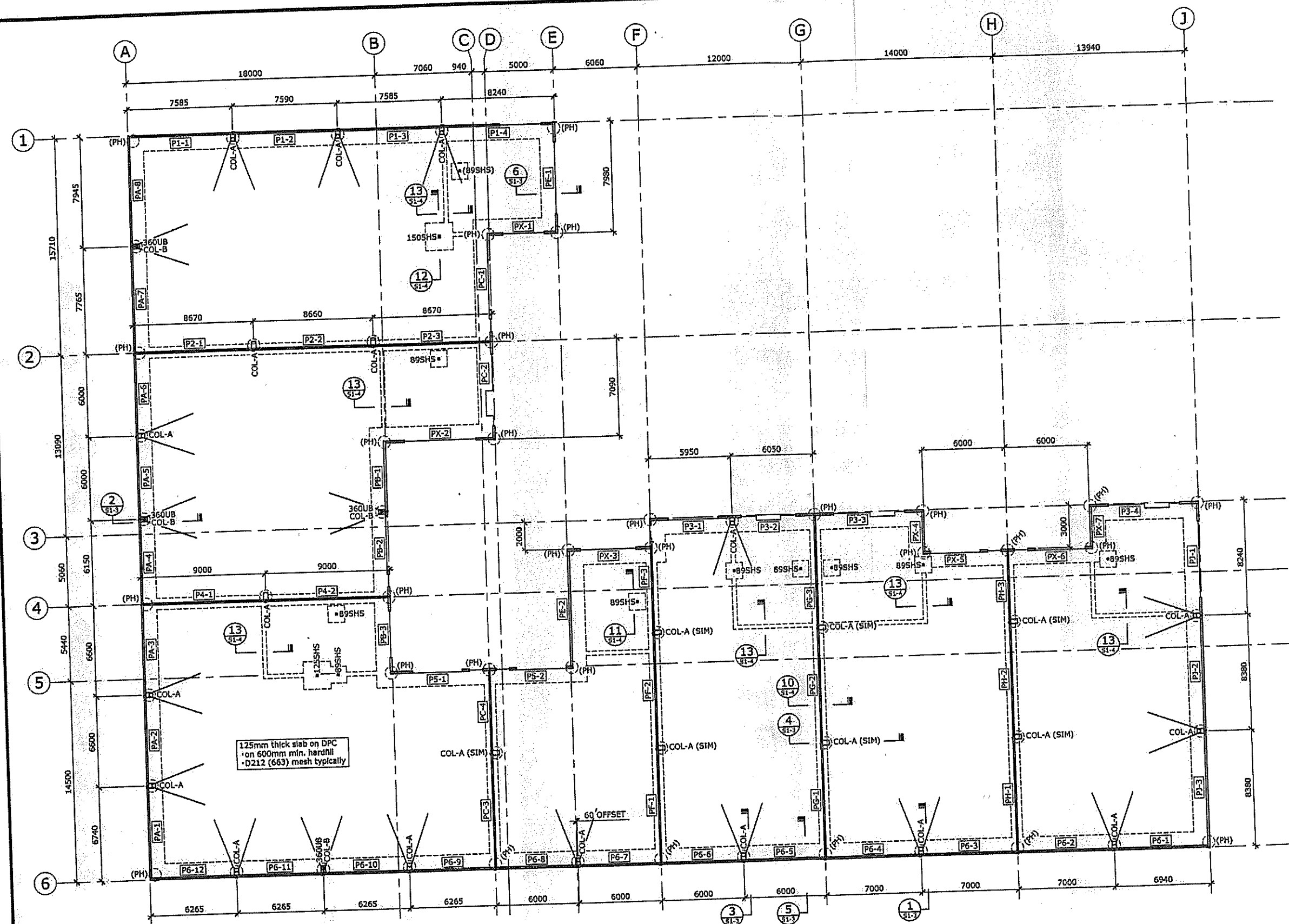
(PH) Indicates a 900Ø augered posthole extending down through the imported fill material to the natural gravel layer - postholes to be a minimum of 950Ø at the base (no reinforcement is required in these postholes)
COL-A Indicates a 900Ø augered posthole with concrete column on top - refer also to details on S1-3

CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CITY OFFICES
100 64 457

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Phillip Hector
Building Consent Officer
All building work shall comply with
the consented documents

- NOTES:**
- check all dimensions on site for setout of foundations and slab, prior to placement of concrete
 - excavate to firm ground for all foundations, removing all topsoil, postholes to bear on natural gravel strata
 - the minimum 28 day compressive strength for the foundations and slab is 25MPa
 - concrete, reinforcement and workmanship to be in accordance with NZS 3109:1997, concrete to be produced in accordance with NZS 3104
 - ground floor slab to be 125mm thick on DPC, on 600mm min. compacted hardfill on existing fill, slab reinforcement to be D212 (663 mesh)
 - contractor to confirm positions of services, sleeves, conduits, and fixing devices to be cast into the ground floor slab, allow to coordinate with other sub-trades not shown on these drawings
 - location and setout of slab construction joints and sawcut joints to be agreed with the Engineer on site, joints to be filled with sealant to the approval of the engineer
- COVER TO REINFORCEMENT:**
- Slab and foundations:
- 75mm to natural ground
 - 50mm to a boxed or DPM face
 - 30mm to an internal face
- Concrete panels:
- 35mm to an external face
 - 25mm to an internal face

1	20.03.06	Consent issue
Issue:	Date:	Amendment:
 FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
SLAB AND FOUNDATION PLAN		
Job No.:	05170	
Designed:	ARF	DEC 2005
Drawn:	JBM	DEC 2005
Scales:	1:200	
Sheet No.:	S1-2	Issue: 1



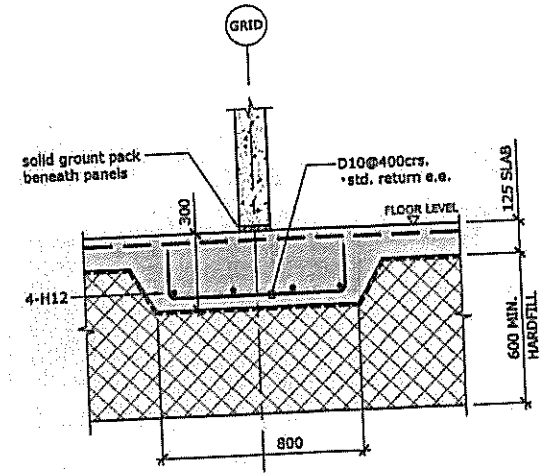
SLAB/FOUNDATION PLAN
SCALE 1:200

(PH) indicates a 900Ø augered posthole extending down through the imported fill material to the natural gravel layer - postholes to be a minimum of 950Ø at the base (no reinforcement is required in these postholes)

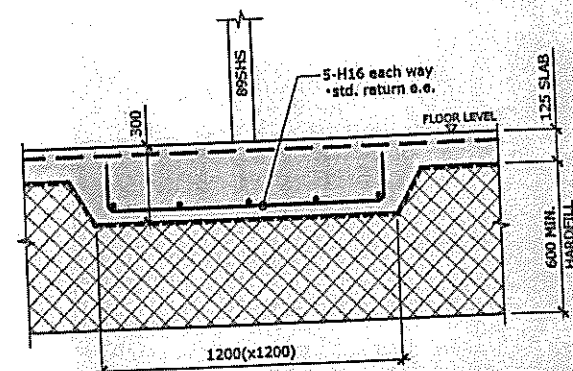
COL-A: indicates a 900Ø augered posthole with concrete column on top - refer also to details on S1-3

Job No.:	05170	
Designed:	ARF	MAR 2006
Drawn:	JBM	MAR 2006
Scales:	1:50 1:20 1:10	
Sheet No.:	S1-3	Issue: 1

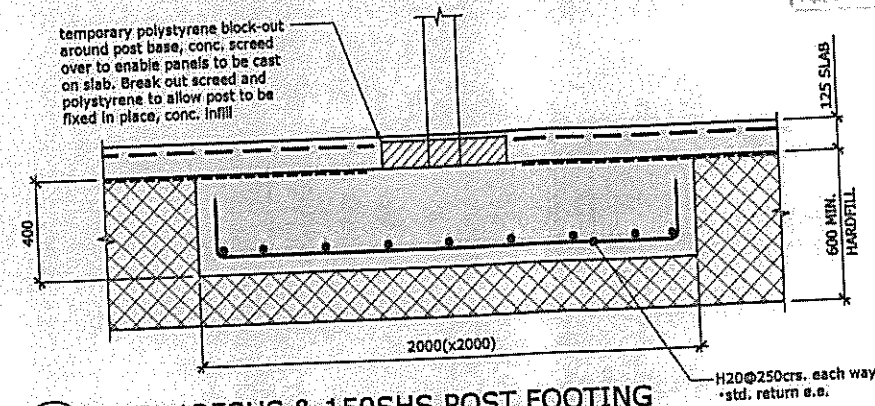
CHRISTCHURCH CITY COUNCIL
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23 MAR 2006
CIVIC OFFICES
10064457
Application No



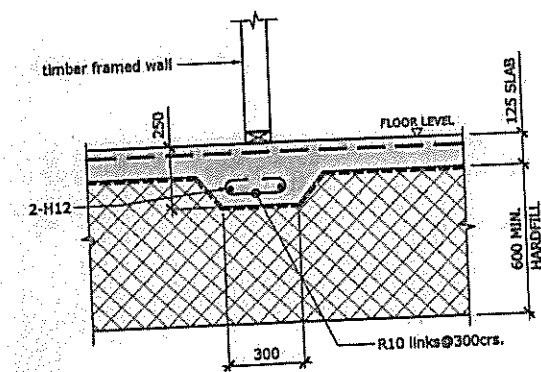
10
S1-2 SCALE 1:20



11 TYP. MEZZANINE POST FOOTING
S1-2 SCALE 1:50



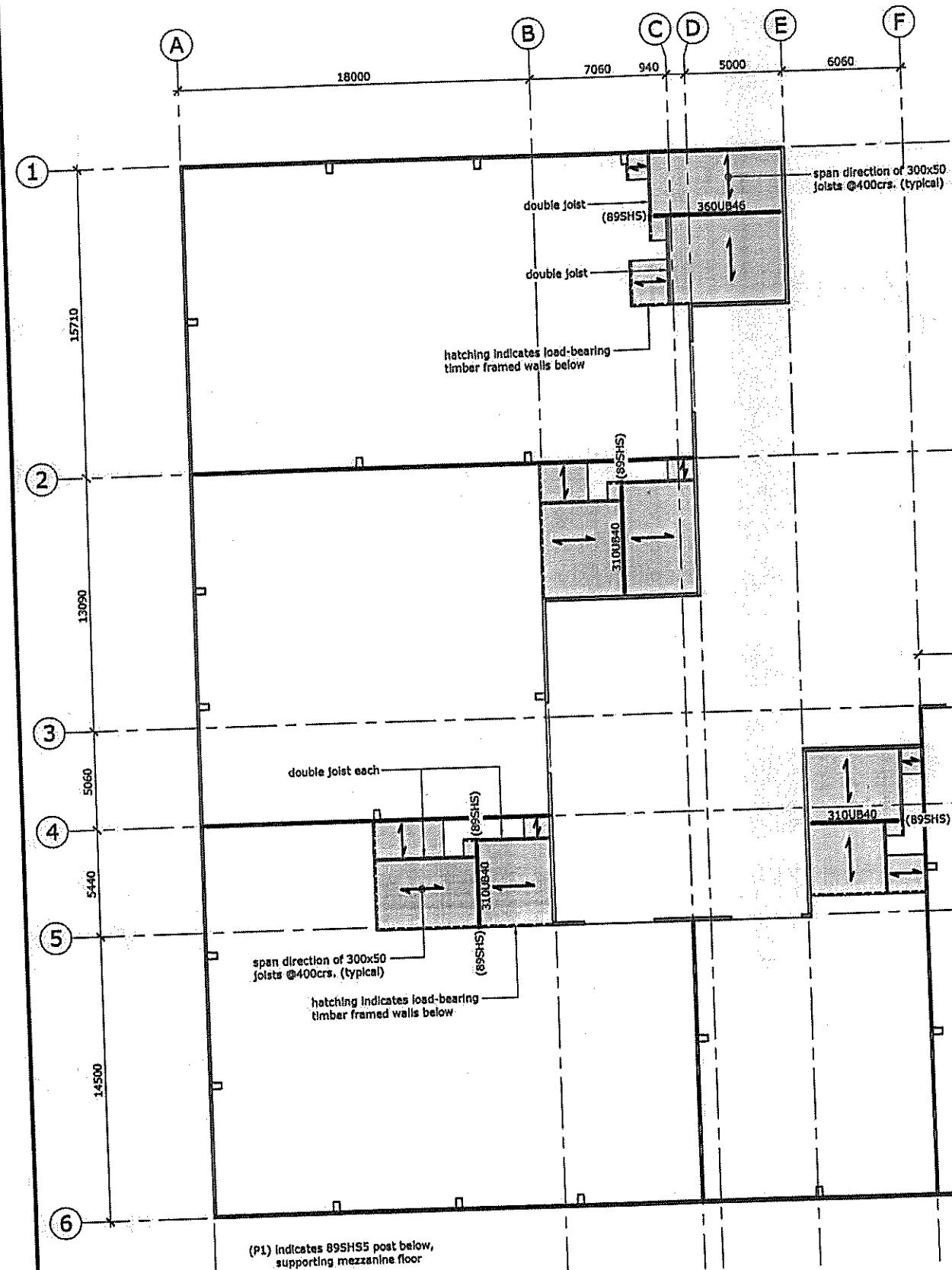
12 TYP. 125SHS & 150SHS POST FOOTING
S1-2 SCALE 1:50



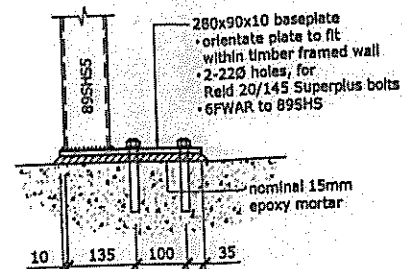
13 LOAD-BEARING TIMBER WALL FOOTING
S1-2 SCALE 1:50

CHRISTCHURCH CITY COUNCIL
CONSISTENT
15 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents.

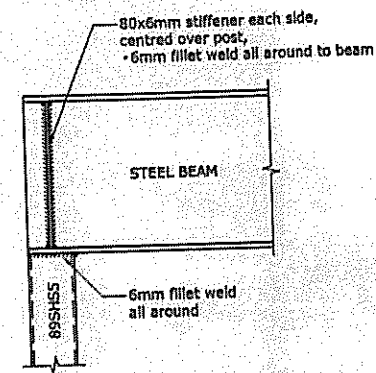
1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
FOUNDATION DETAILS		
Job No.:	05170	
Designed:	ARF	MAR 2006
Drawn:	JBM	MAR 2006
Scales:	1:20	
Sheet No.:	S1-4	Issue: 1



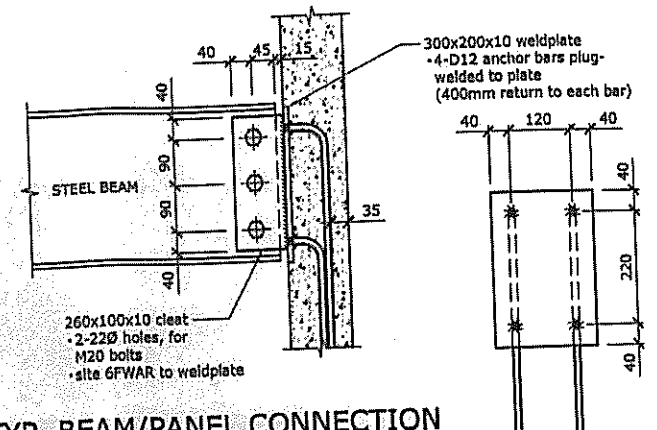
TYP. POST BASEPLATE
SCALE 1:10



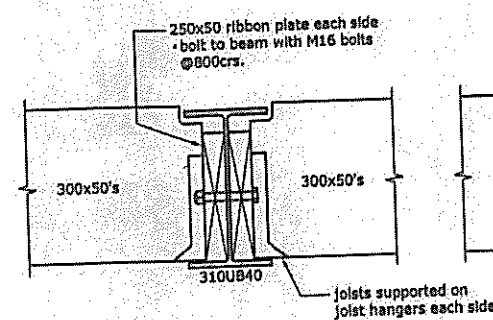
TYP. BEAM/POST CONNECTION
SCALE 1:10



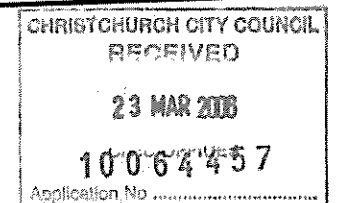
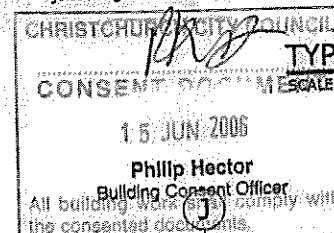
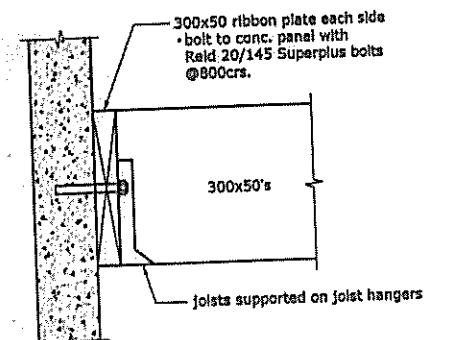
TYP. BEAM/PANEL CONNECTION
SCALE 1:10



TYP. JOIST/BAM CONNECTIONS
SCALE 1:10



TYP. JOIST/CONC. PANEL CONNECTION
SCALE 1:10

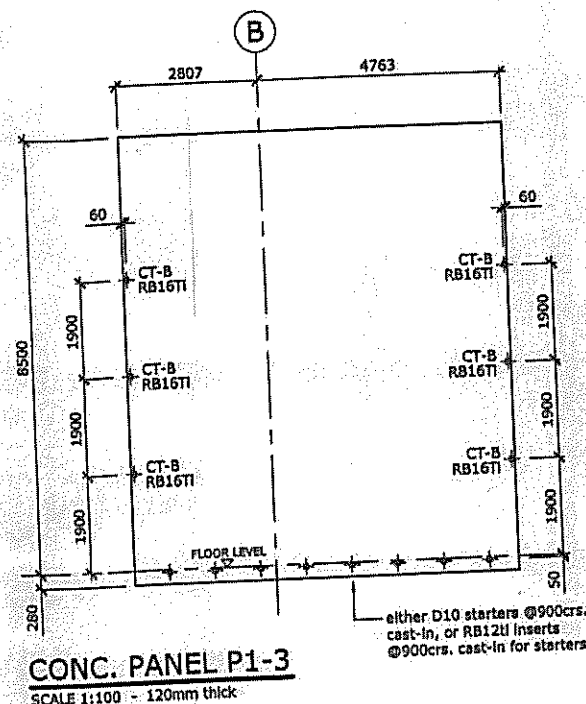
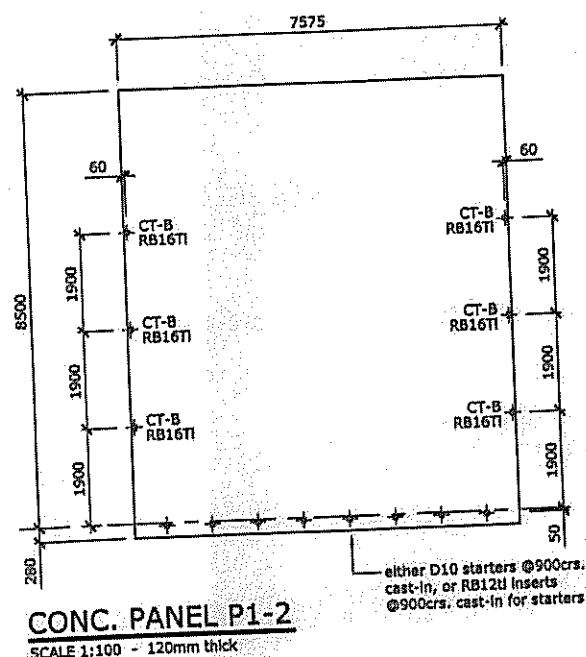
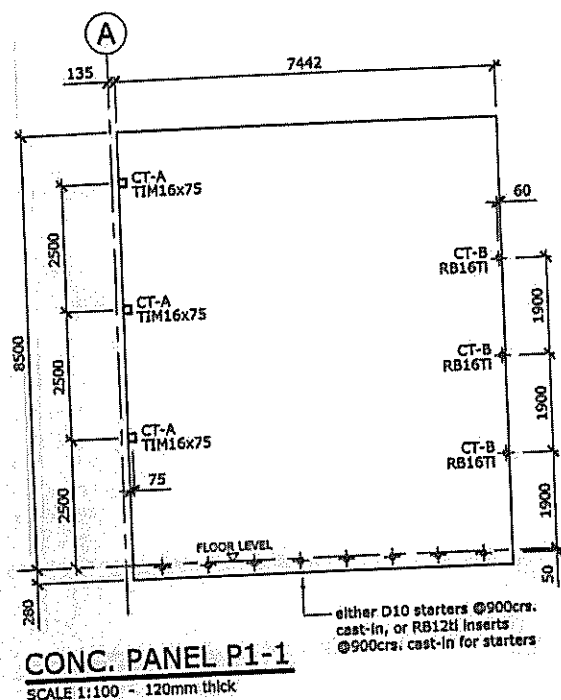


1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansi.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
MEZZANINE FLOOR STRUCTURE		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:200 1:10	
Sheet No.:	S2-1	Issue: 1

MEZZANINE STRUCTURE PLAN
SCALE 1:200

23 MAR 2006

Application No. 10064457



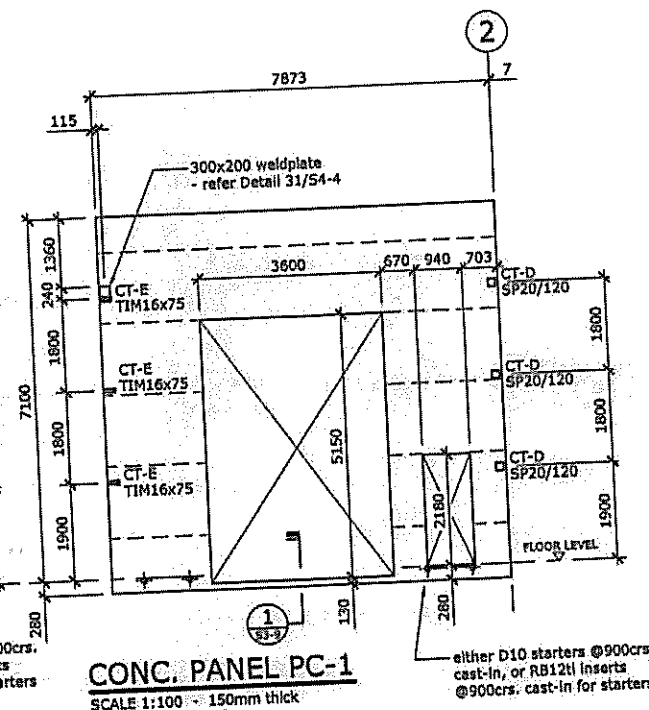
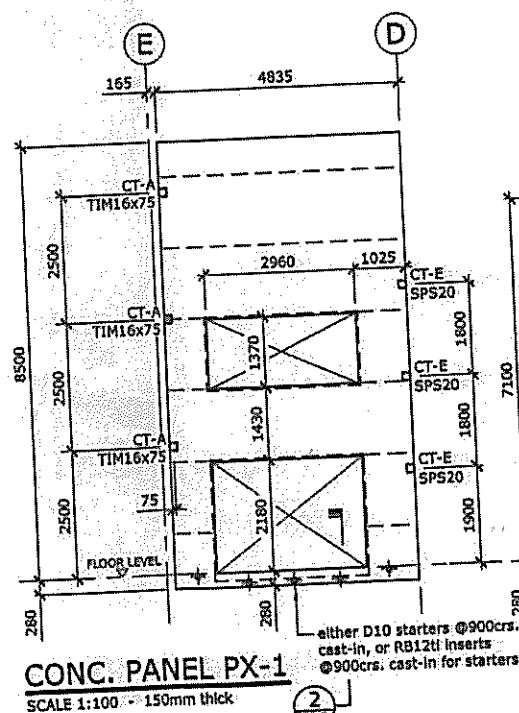
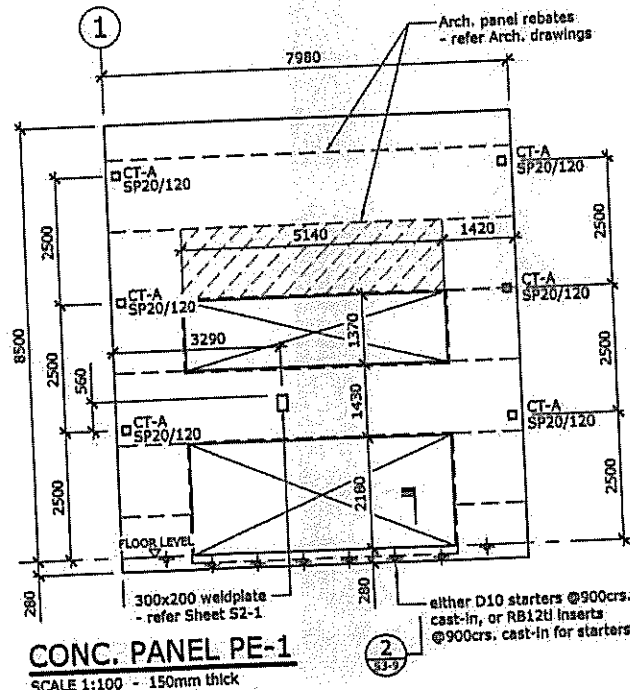
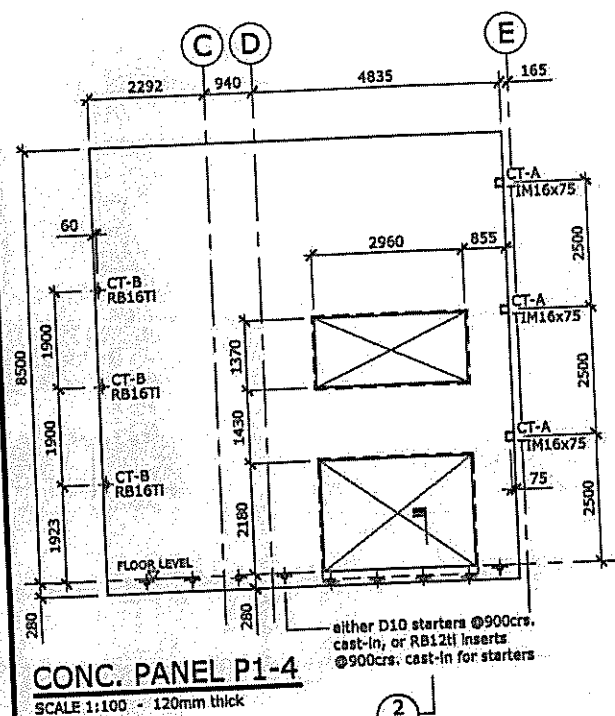
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents.

PANEL NOTES:

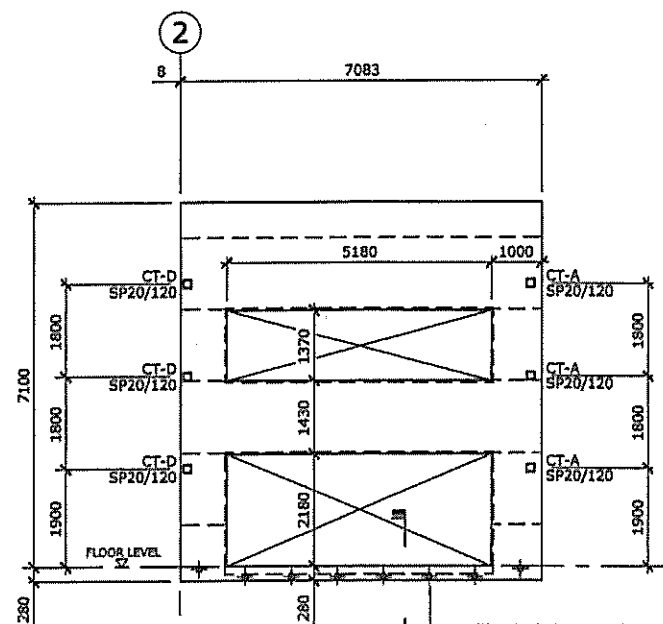
- refer to Arch. drawings for size and location of Architectural rebates. Rebates have been shown indicatively only on structural drawings (Note: Arch. rebates to return around panel ends where applic. to maintain a continuous rebate around corners)
- check all dimensions on site before casting panels
- concrete minimum 28 day compressive strength to be 30MPa; minimum strength at time of lifting is to be 20MPa
- concrete, reinforcement materials and workmanship to be in accordance with NZS 3101
- proprietary fixings and lifting devices to be installed and connected in accordance with manufacturers specifications
- all panel vertical joints are 15mm unless shown otherwise; joint sealants to be as required by the fire engineer and placed in accordance with the manufacturers specifications
- panels to be poured face down with exposed faces having and 'off the form' finish
- panel lifting points have not been shown on the panel elevations, lifting points and lifting sequence to be calculate by the lifting eye manufacturer
- panel propping to be discussed and agreed with the engineer
- reinforcing bars and mesh to be placed centrally in the panel
- 2-H16 trimmer bars are to be lapped at panel corners, 600mm minimum
- refer to sheet S3-9 for panel reinforcement details
- refer to sheet S3-9 for panel fixing details

COVER TO REINFORCEMENT:

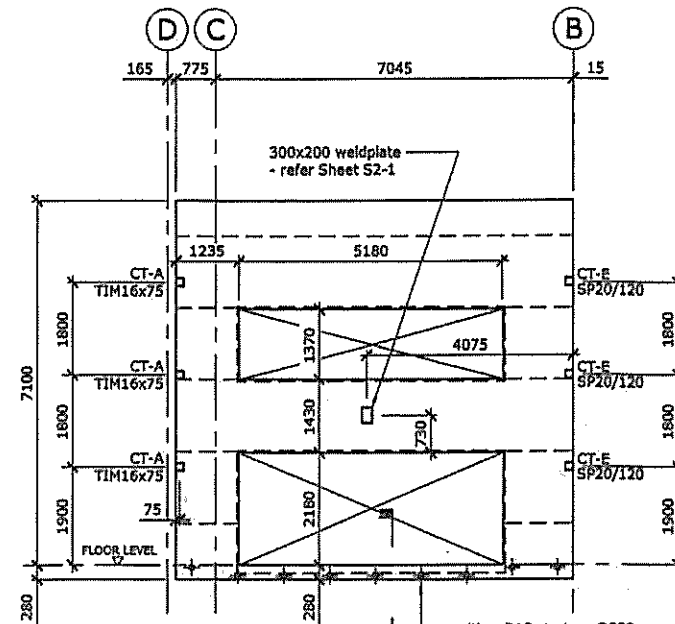
- Concrete panels:
- 35mm to an external face
- 25mm to an internal face



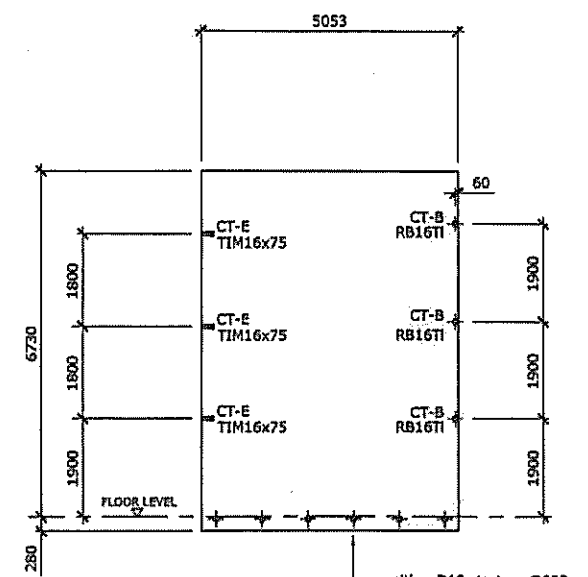
1	20.03.06	Consent issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-1	Issue: 1



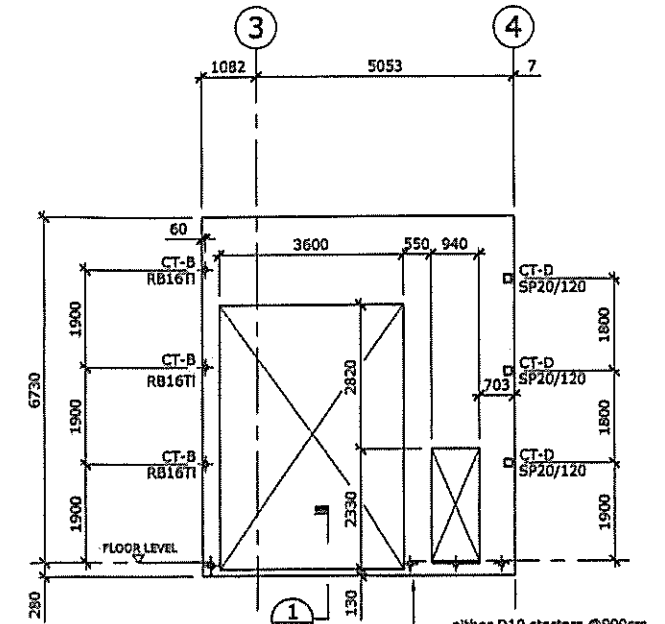
CONC. PANEL PC-2
SCALE 1:100 - 150mm thick



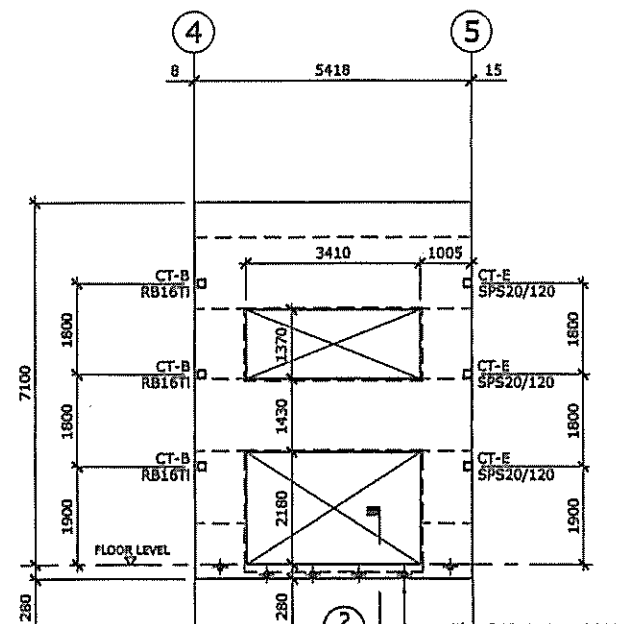
CONC. PANEL PX-2
SCALE 1:100 - 150mm thick



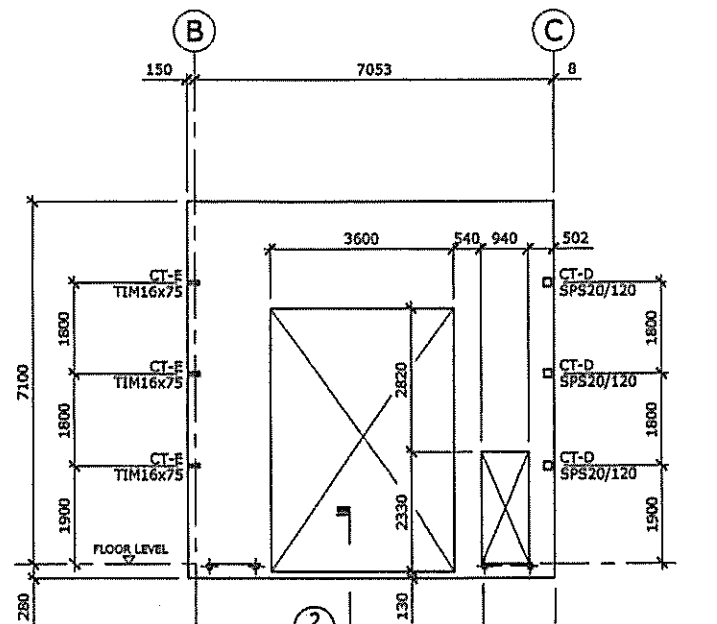
CONC. PANEL PB-1
SCALE 1:100 - 150mm thick



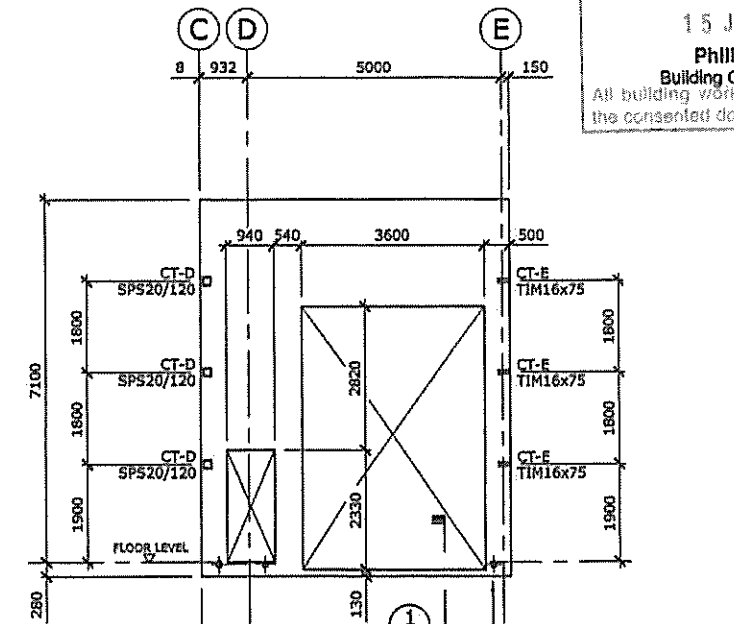
CONC. PANEL PB-2
SCALE 1:100 - 150mm thick



CONC. PANEL PB-3
SCALE 1:100 - 150mm thick



CONC. PANEL P5-1
SCALE 1:100 - 150mm thick

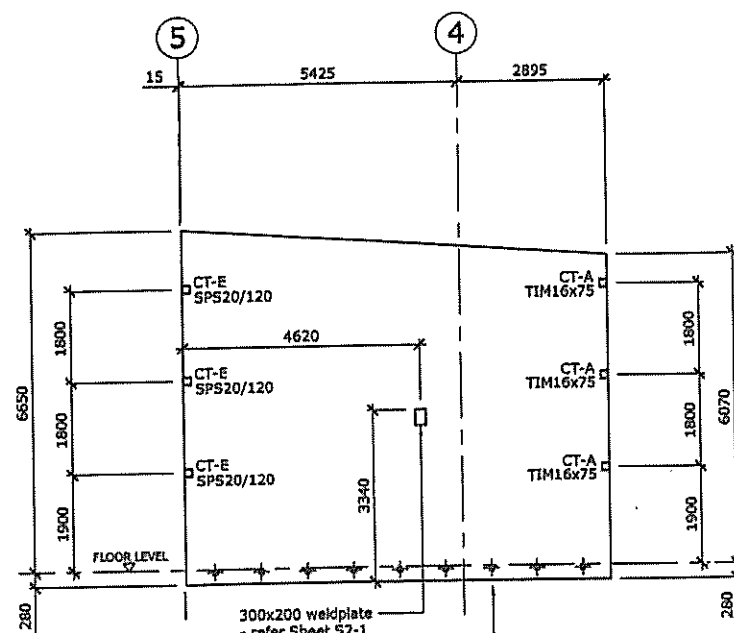


CONC. PANEL P5-2
SCALE 1:100 - 150mm thick

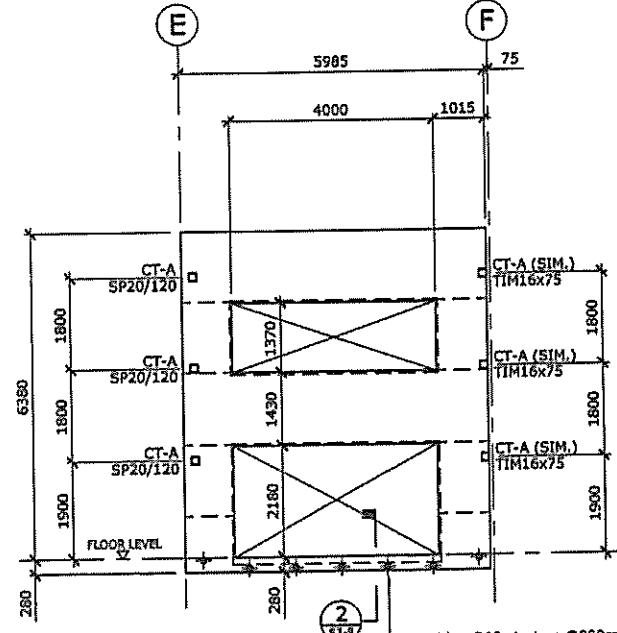
CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIL OFFICES
Application 100.64.45.7

CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIL OFFICES
Application 100.64.45.7

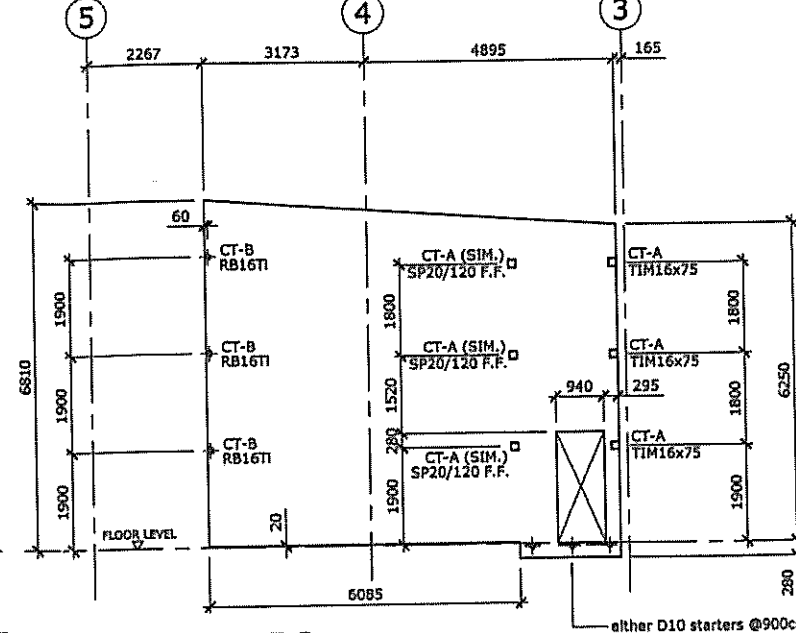
1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL LTD PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBW	JAN 2006
Scales:	1:100	
Sheet No.:	S3-2	Issue: 1



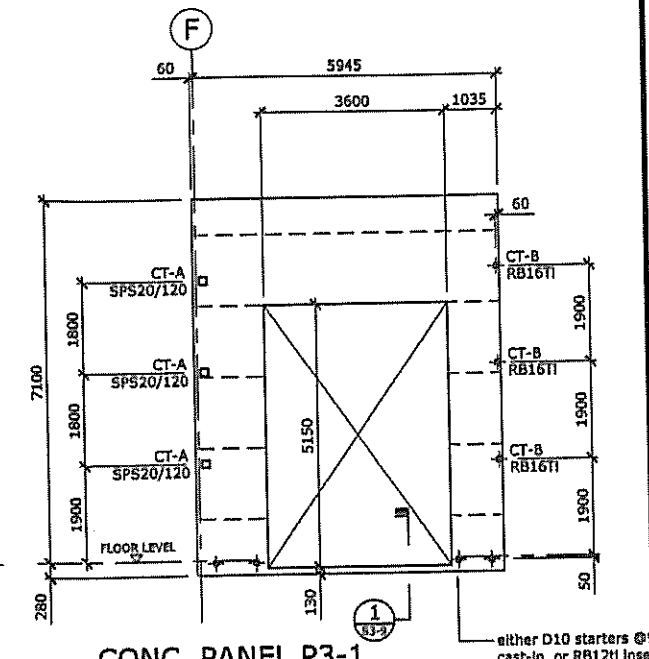
CONC. PANEL PE-2
SCALE 1:100 - 150mm thick



CONC. PANEL PX-3
SCALE 1:100 - 150mm thick

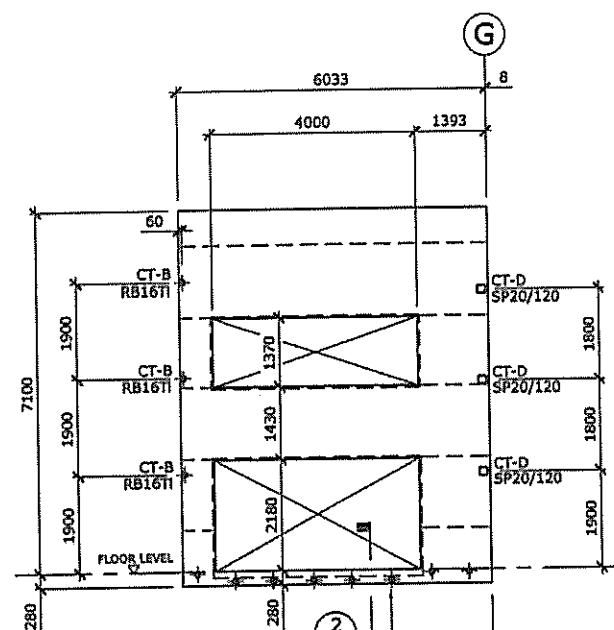


CONC. PANEL PF-3
SCALE 1:100 - 120mm thick

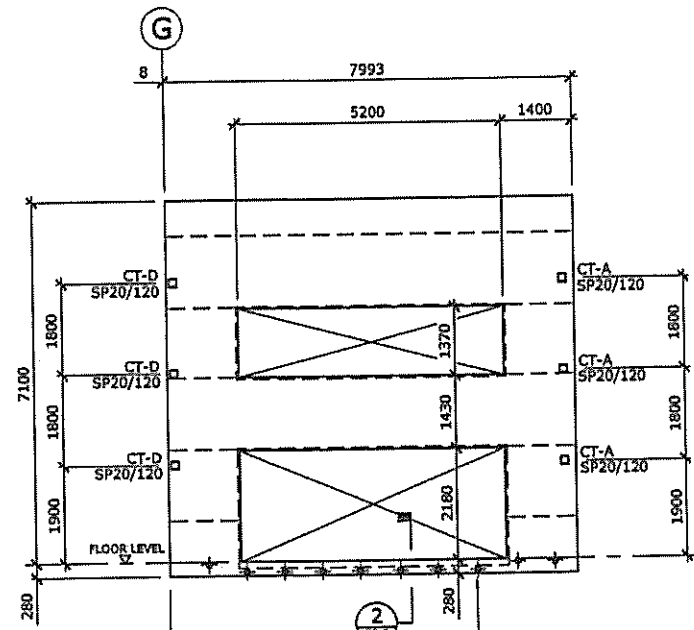


CONC. PANEL P3-1
SCALE 1:100 - 150mm thick

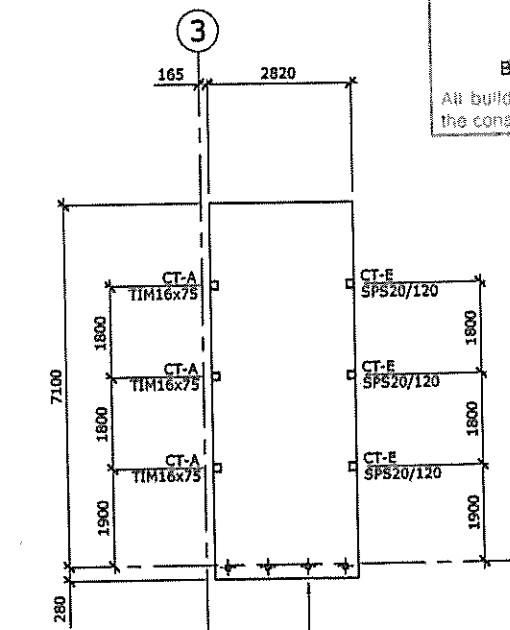
CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIL OFFICES
Application No. 10064457
15 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents



CONC. PANEL P3-2
SCALE 1:100 - 150mm thick

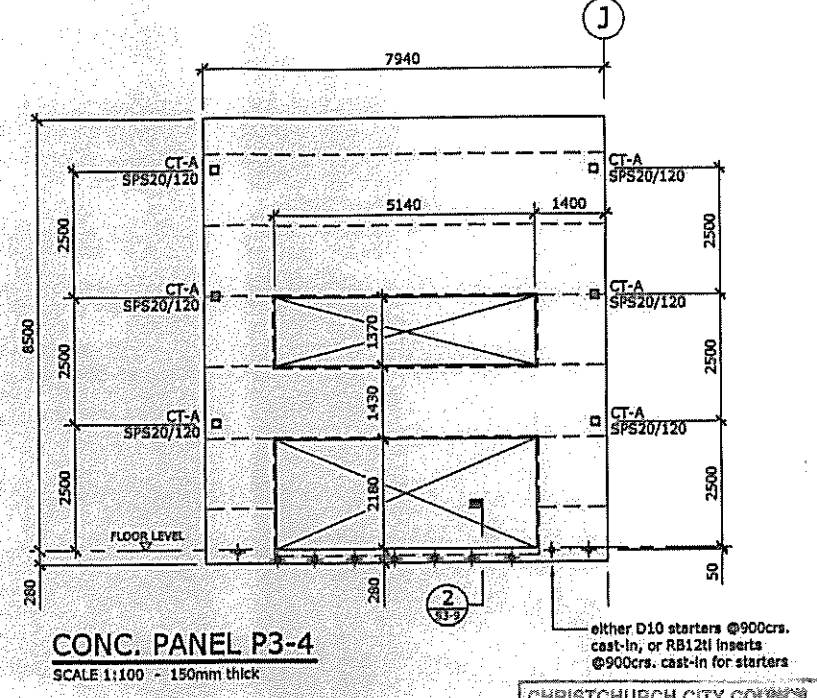
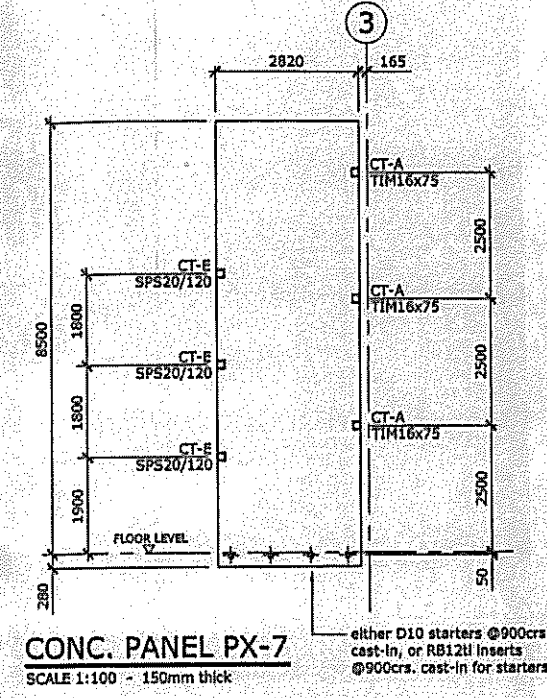
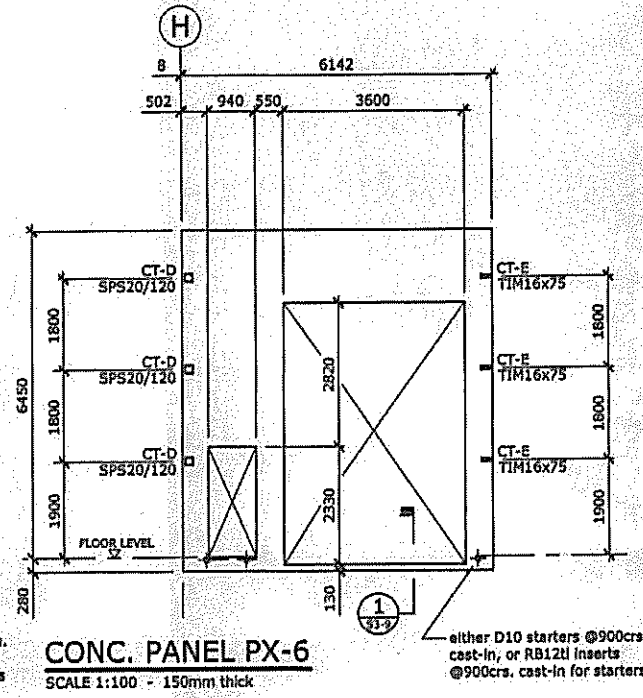
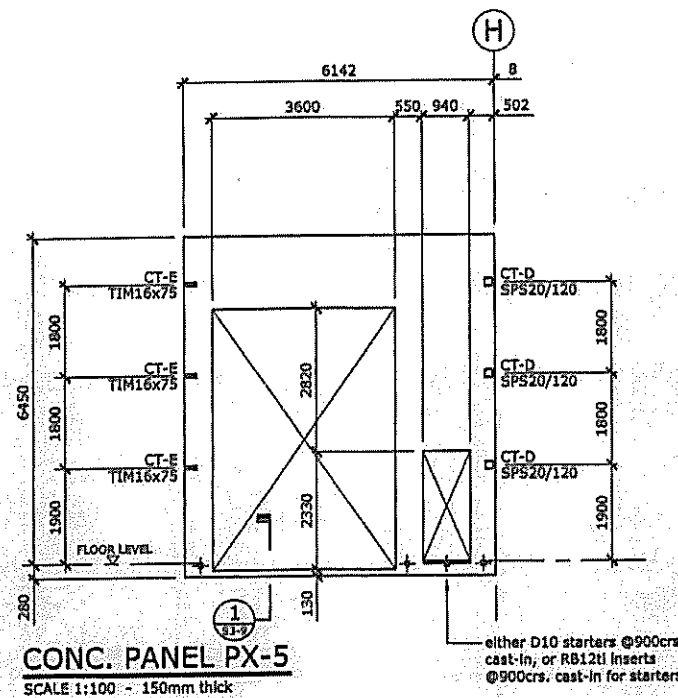


CONC. PANEL P3-3
SCALE 1:100 - 150mm thick



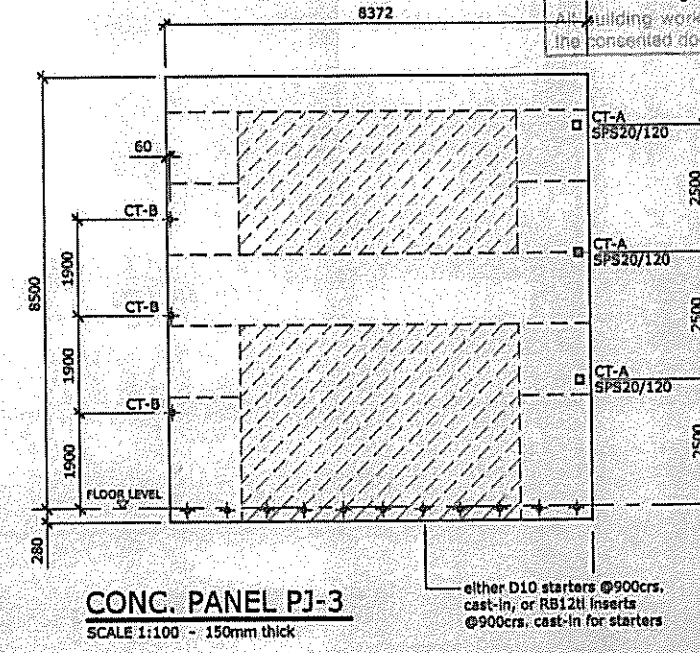
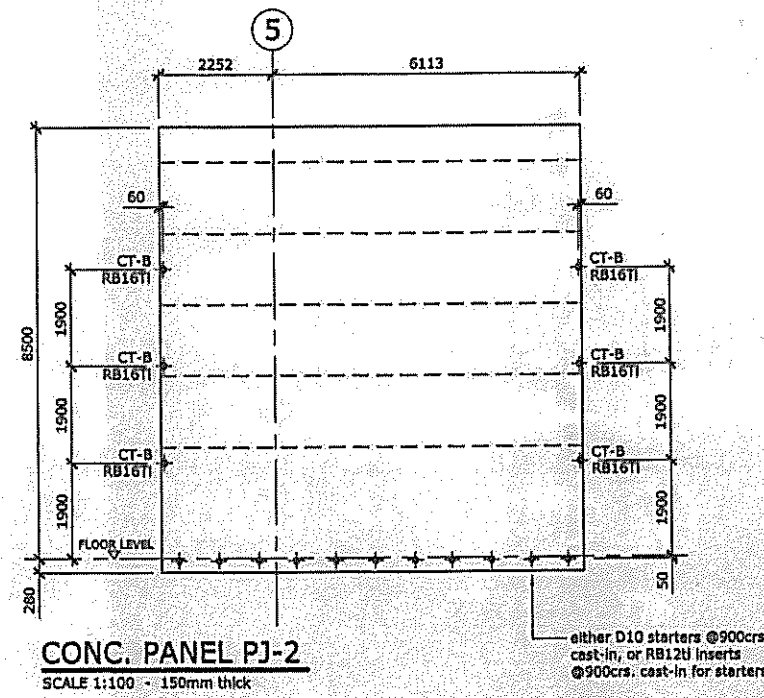
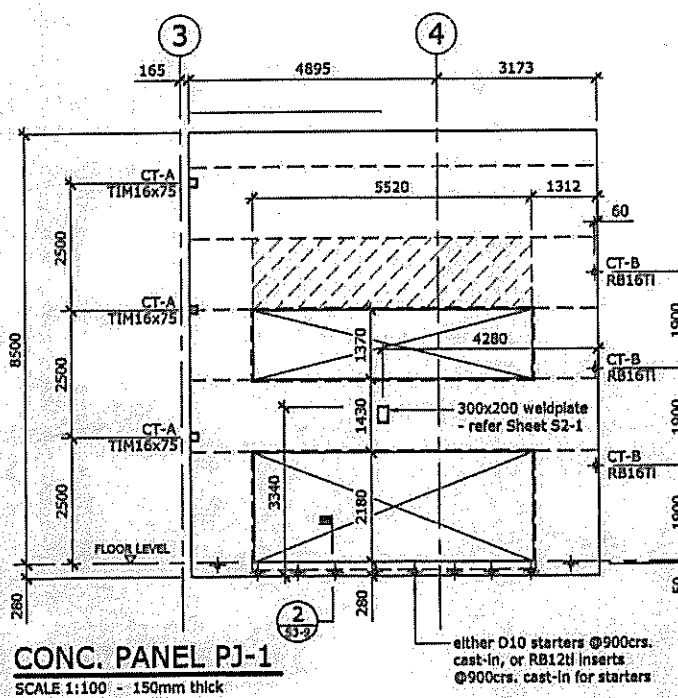
CONC. PANEL PX-4
SCALE 1:100 - 150mm thick

1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-3	Issue: 1

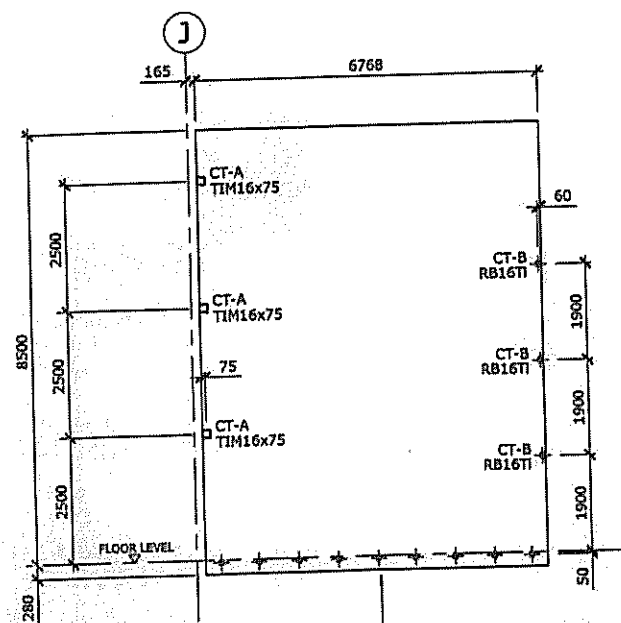


CHRISTCHURCH CITY COUNCIL
15 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents.

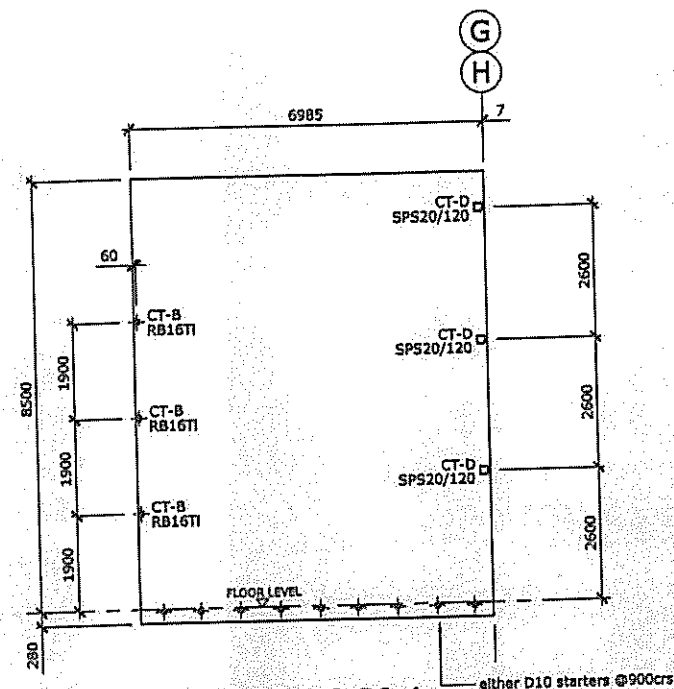
CHRISTCHURCH CITY COUNCIL
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23 MAR 2006
CIVIL OFFICE
Application No 10064457



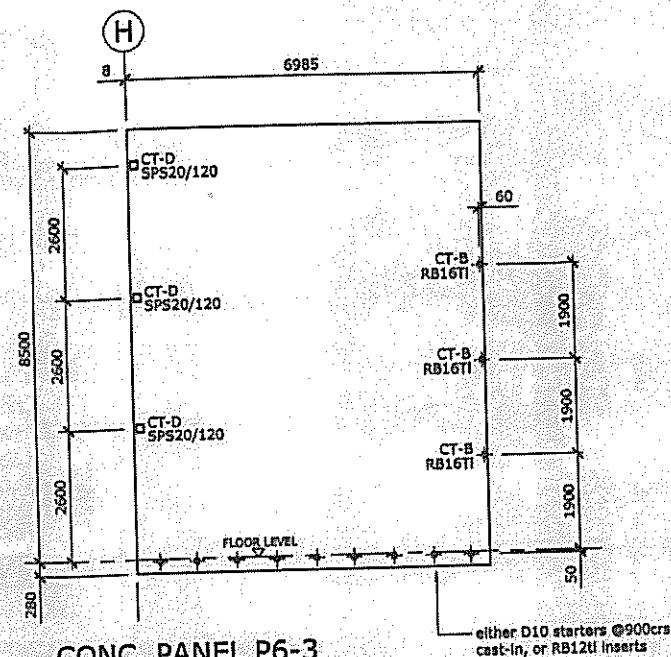
1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-4	Issue: 1



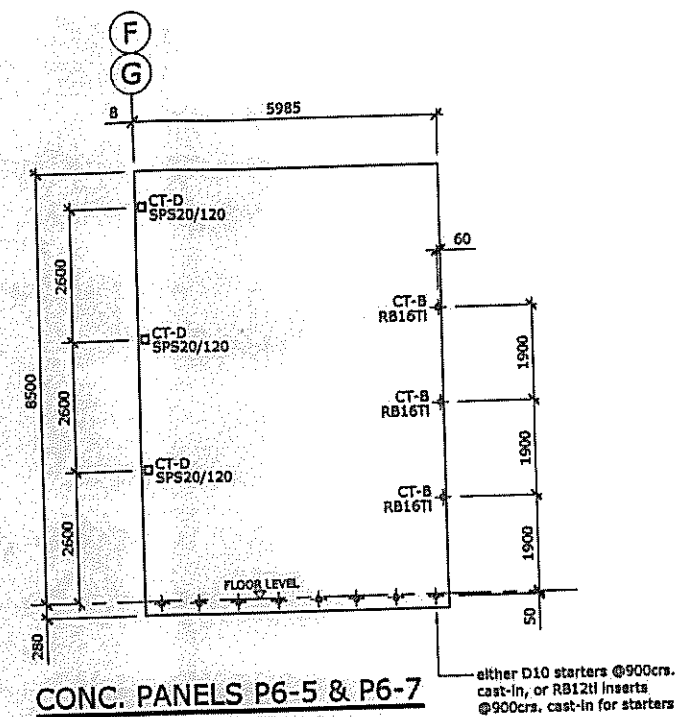
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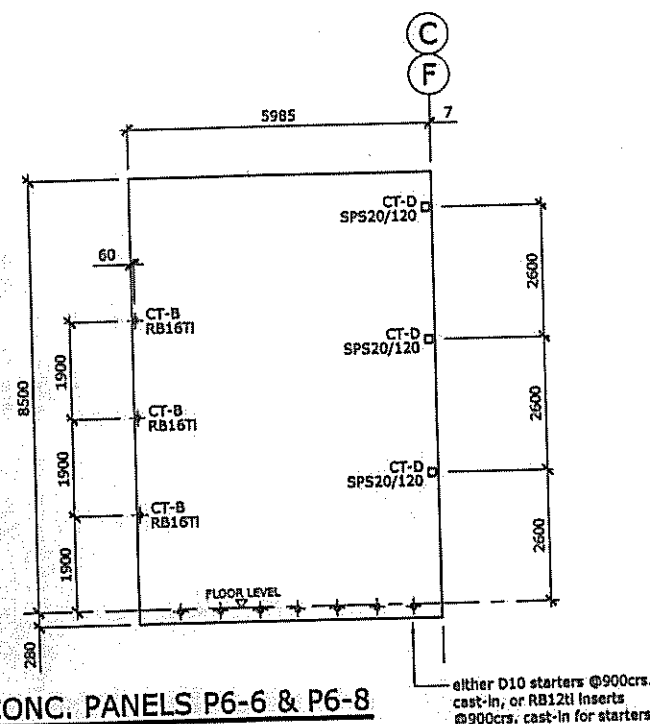
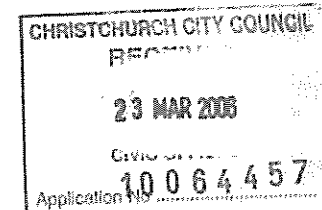
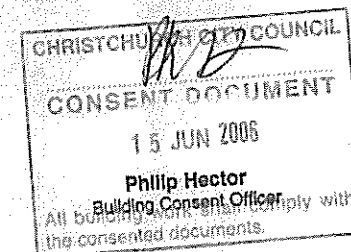
CONC. PANELS P6-2 & P6-4
SCALE 1:100 - 120mm thick



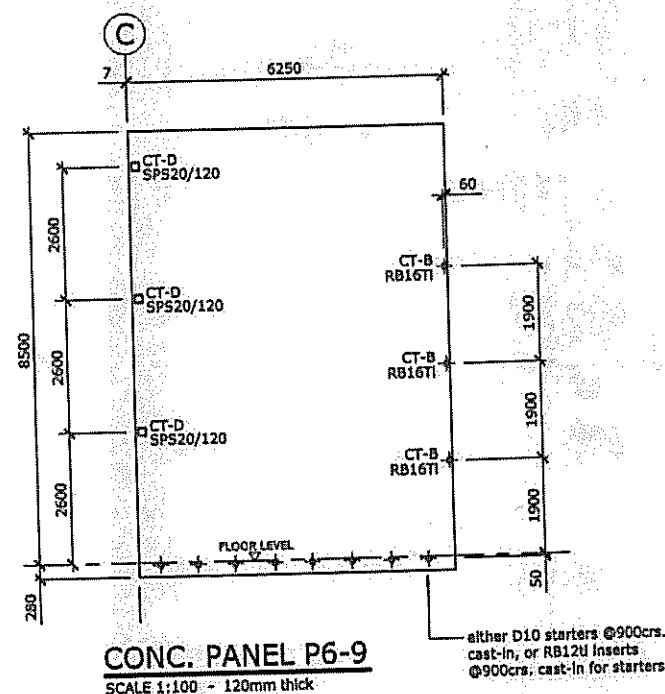
CONC. PANEL P6-3
SCALE 1:100 - 120mm thick



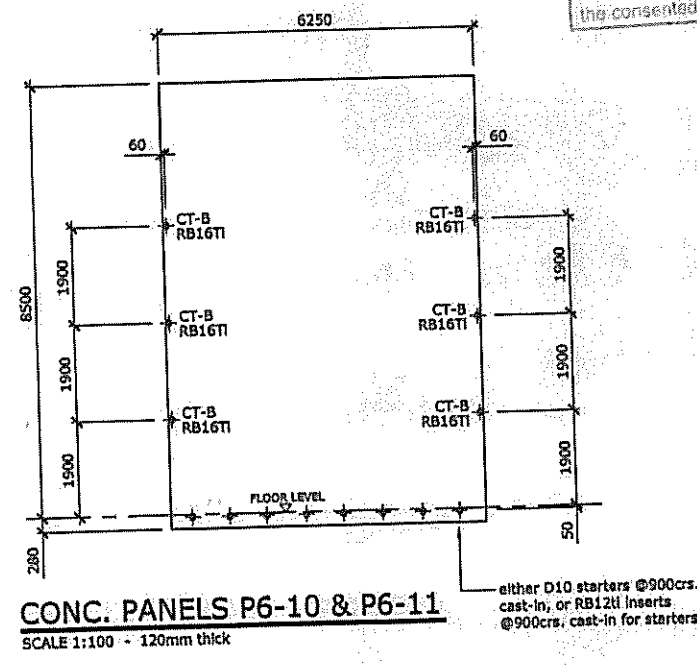
CONC. PANELS P6-5 & P6-7
SCALE 1:100 - 120mm thick



CONC. PANELS P6-6 & P6-8
SCALE 1:100 - 120mm thick

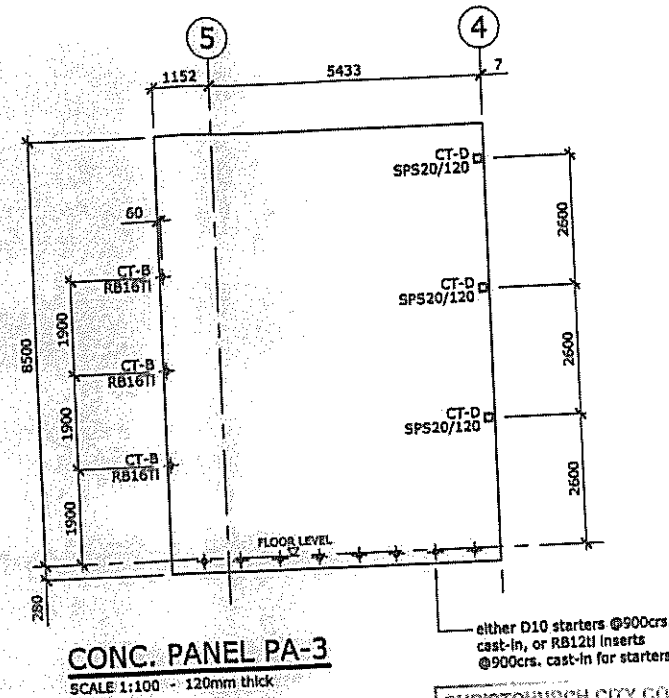
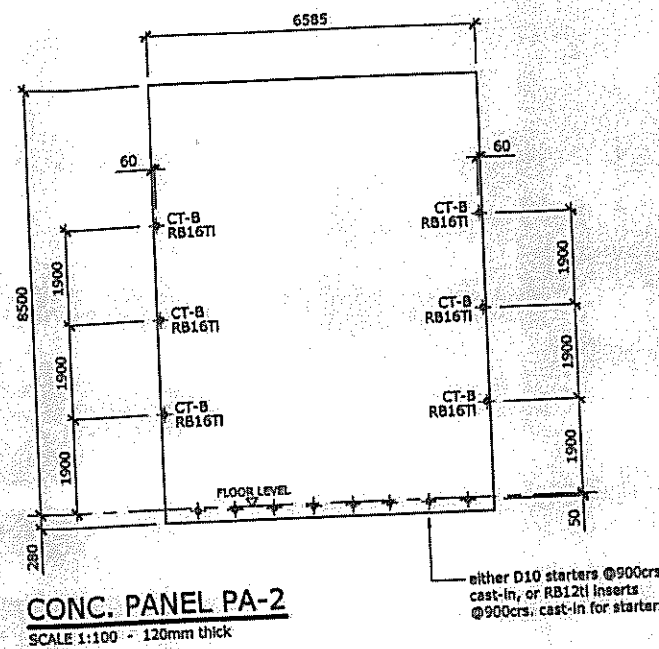
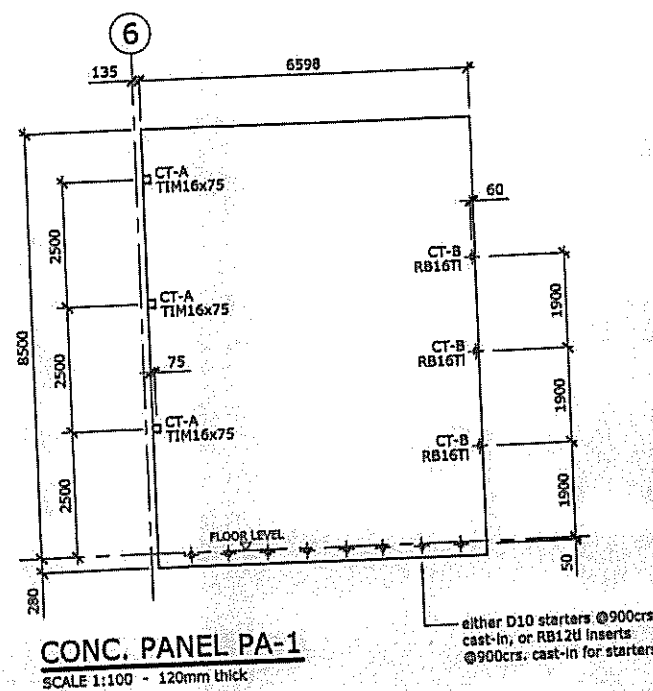
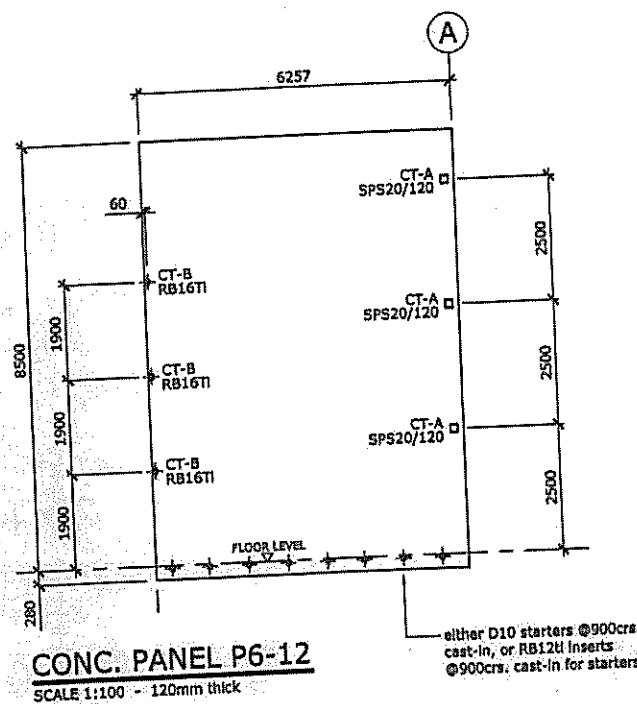


CONC. PANEL P6-9
SCALE 1:100 - 120mm thick



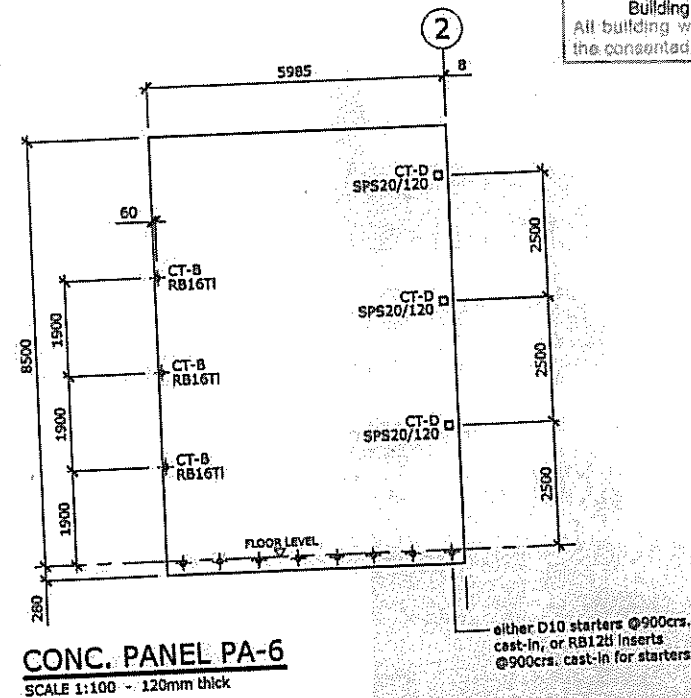
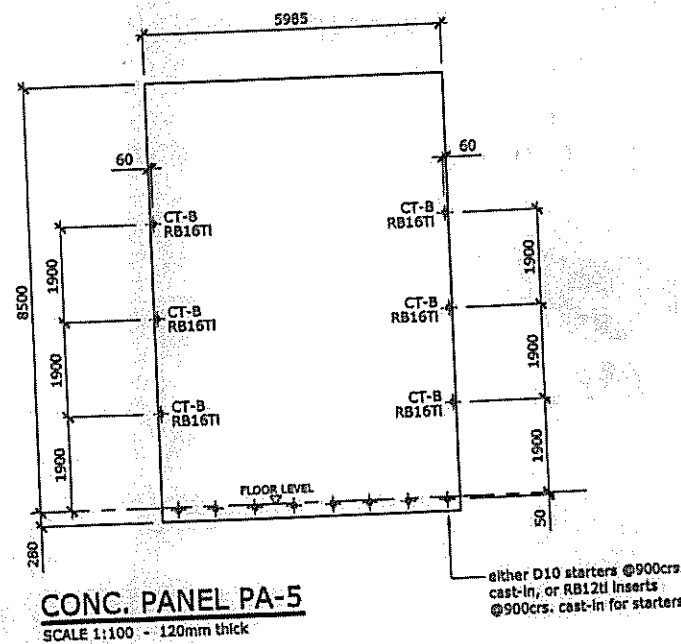
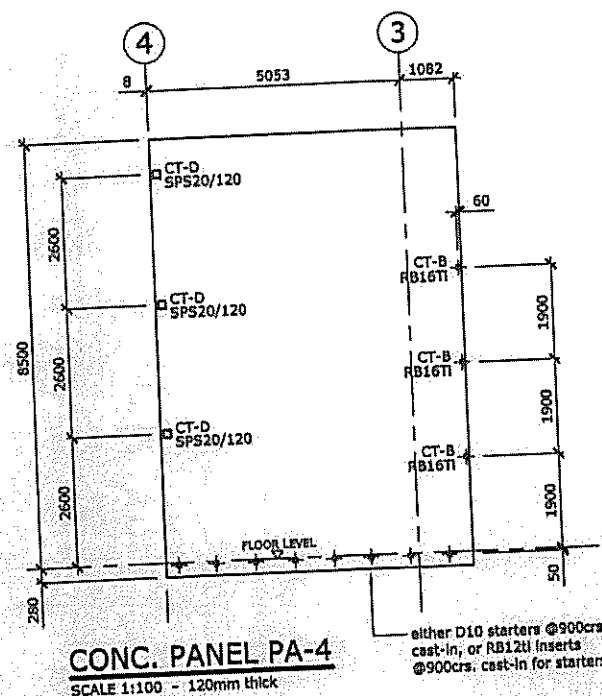
CONC. PANELS P6-10 & P6-11
SCALE 1:100 - 120mm thick

1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-5	Issue: 1

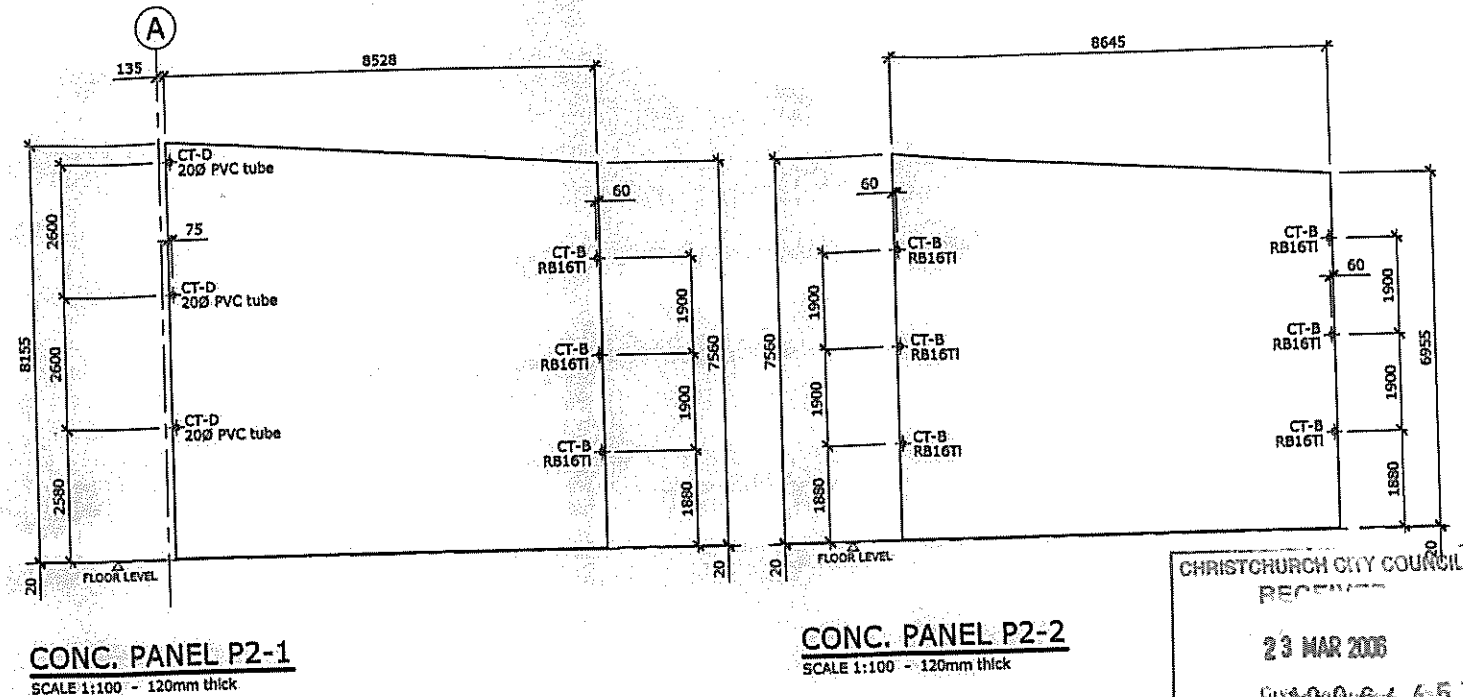
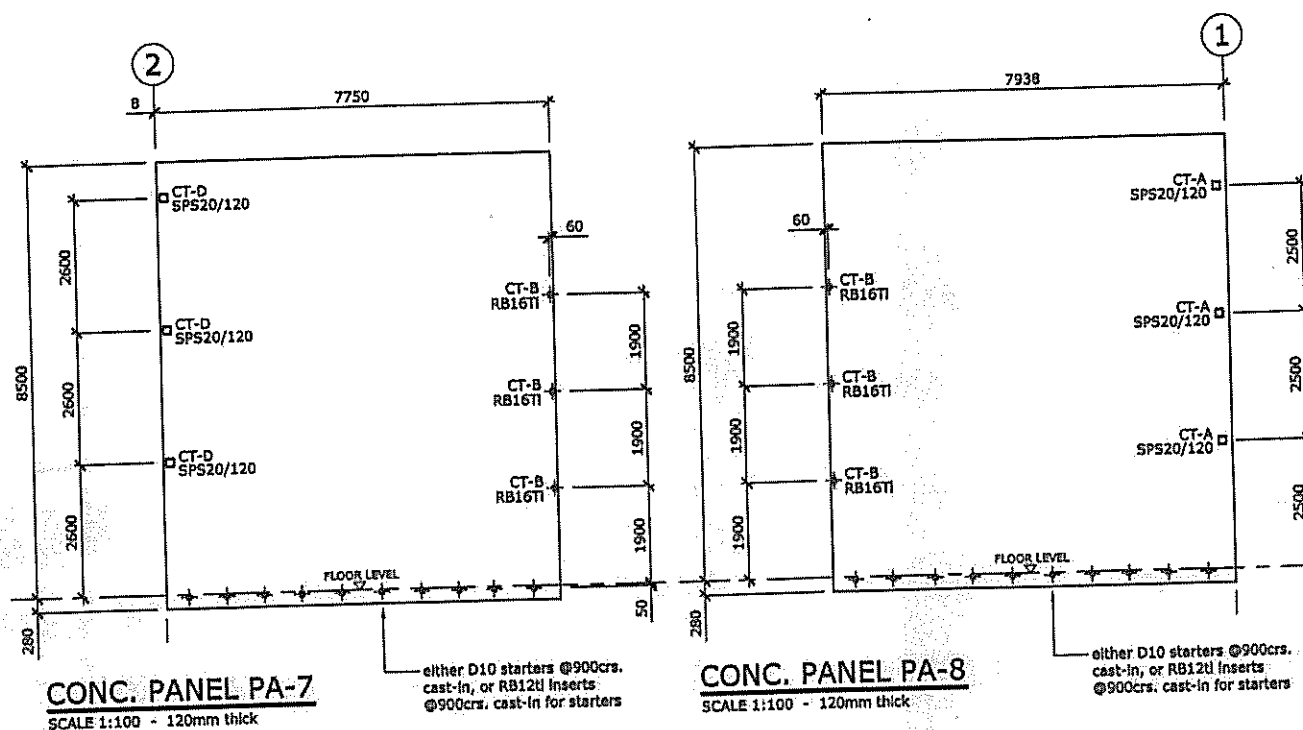


CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Phillip Hector
Building Consent Officer
All building work shall comply with the consented documents.

CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIL ENGINEER
Application No 10064457

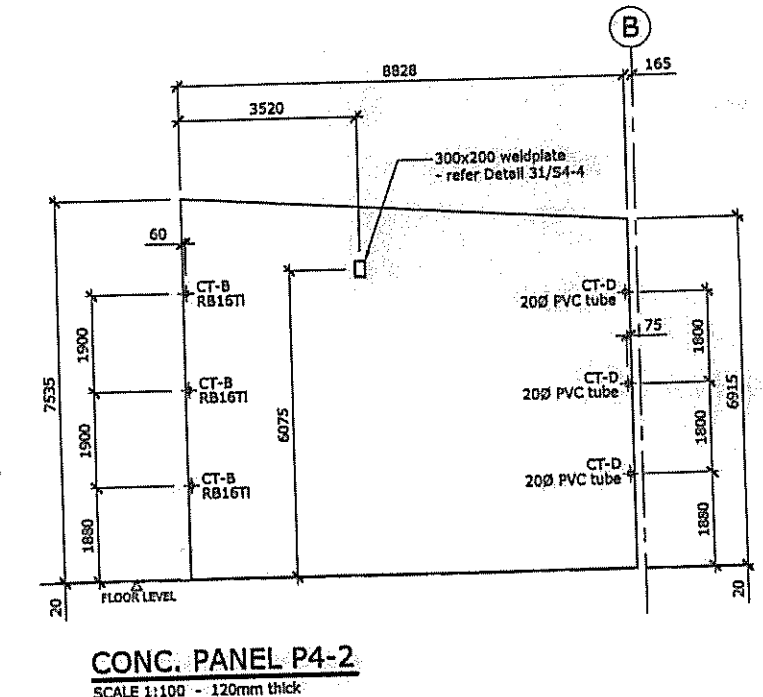
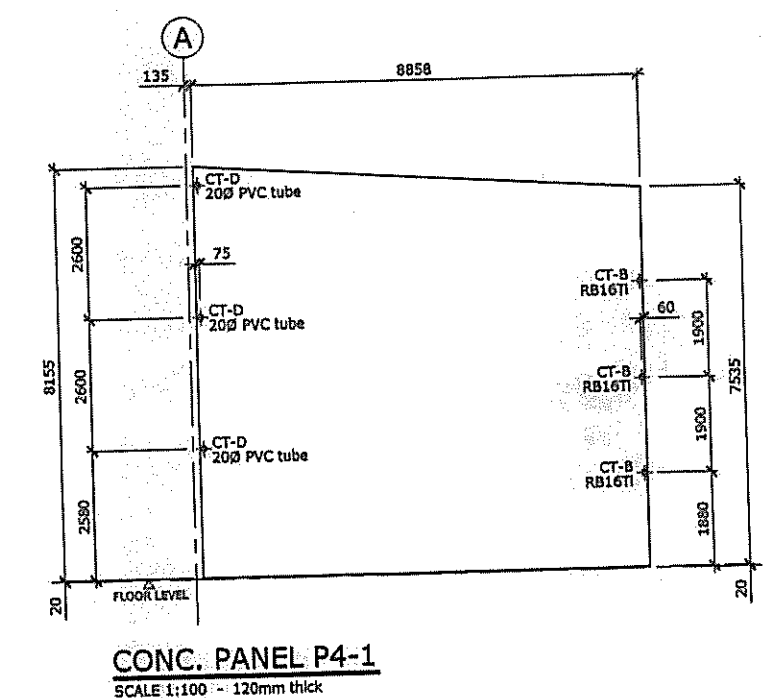
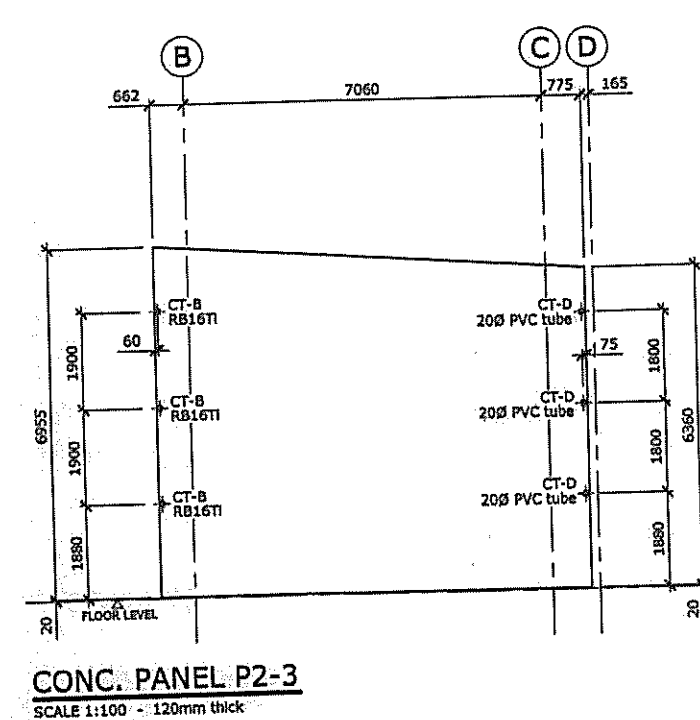


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Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemans.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-6	Issue: 1

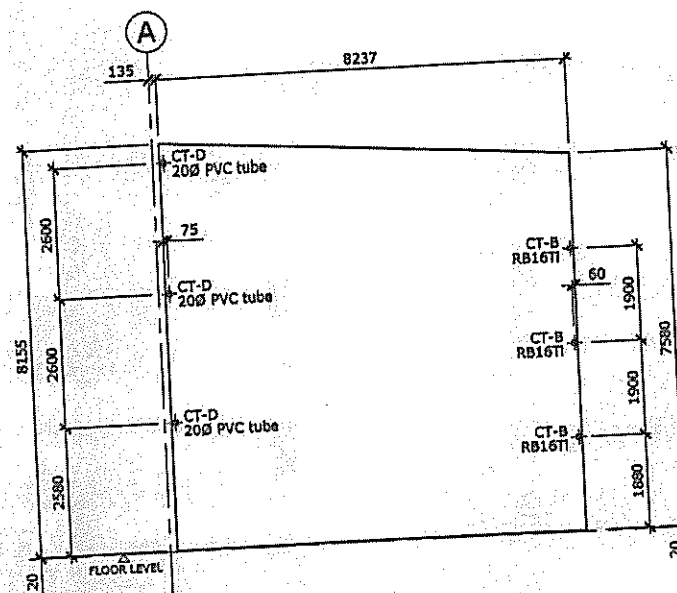


CHRISTCHURCH CITY COUNCIL
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23 MAR 2006
CIV 10-06-457

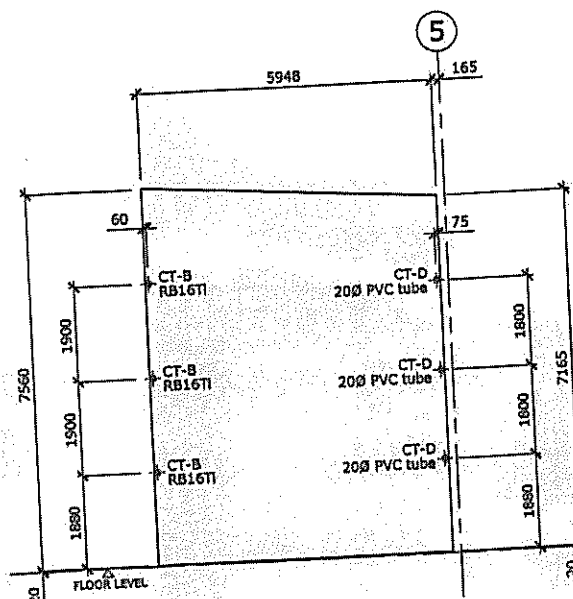
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
16 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with the consented documents.



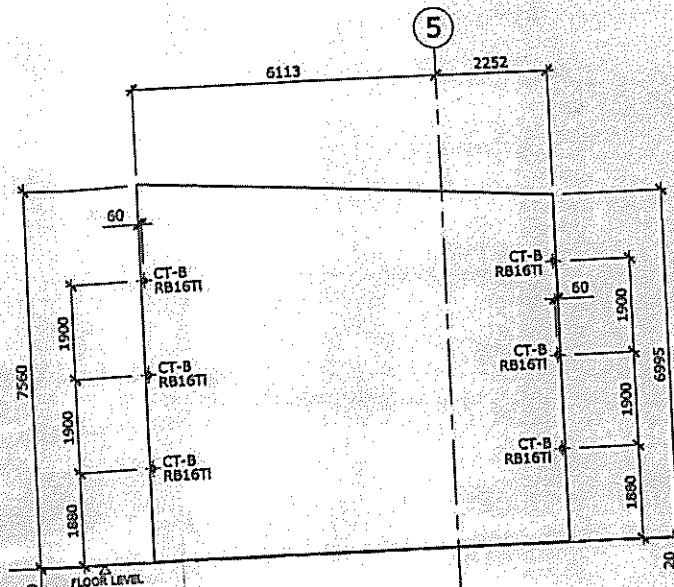
1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL LTD PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-7	Issue: 1



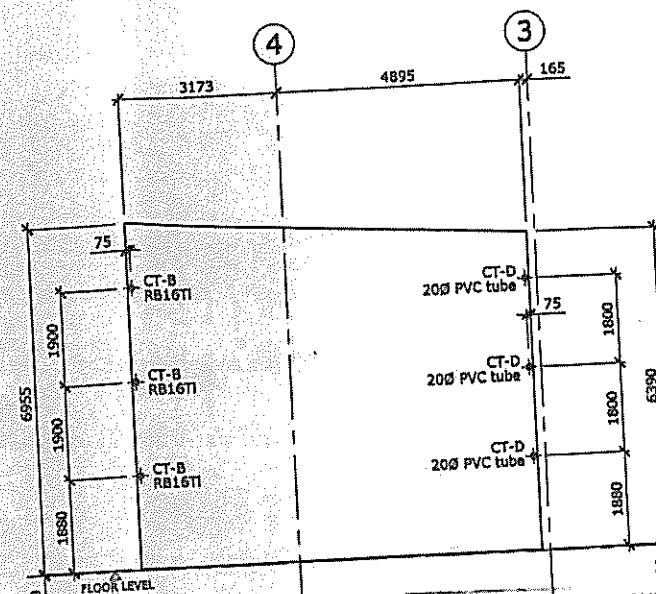
CONC. PANELS PC-3, PF-1, PG-1, & PH-1
SCALE 1:100 - 120mm thick



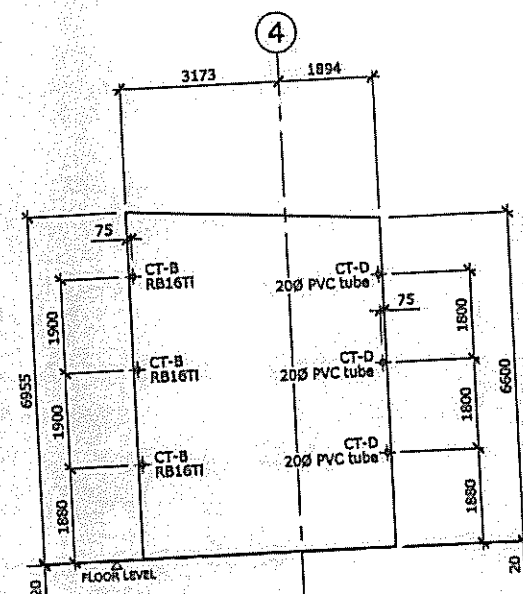
CONC. PANEL PC-4
SCALE 1:100 - 120mm thick



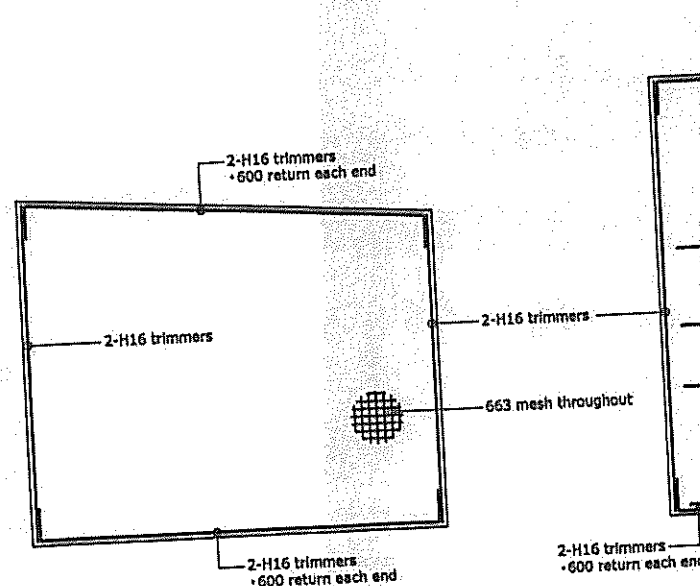
CONC. PANELS PF-2 PG-2 & PH-2
SCALE 1:100 - 120mm thick



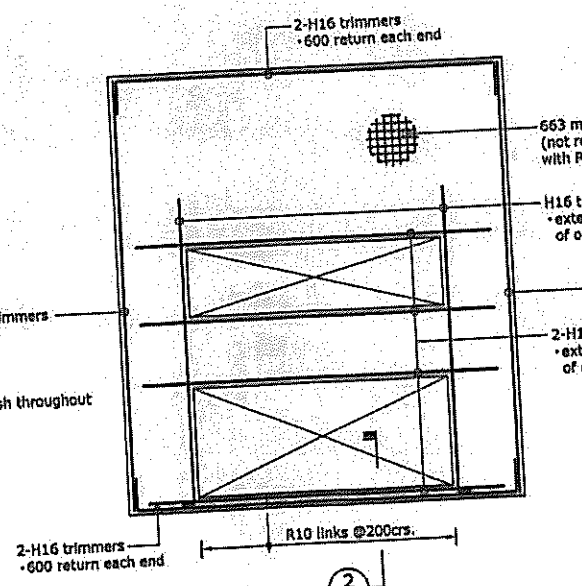
CONC. PANEL PG-3
SCALE 1:100 - 120mm thick



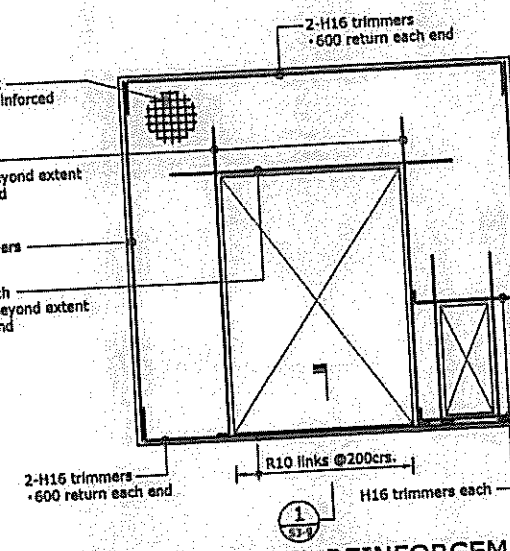
CONC. PANEL PH-3
SCALE 1:100 - 120mm thick



CONC. WALL PANEL REINFORCEMENT
SCALE 1:100 - applies to panels:
P1-1, P1-2, P1-3, PB-1, PE-2, PX-4, PX-7
P1-2, P1-3, PG-1, PG-2, PG-3, PG-4, PG-5, PG-6
PG-7, PG-8, PG-9, PG-10, PG-11, PG-12, PA-1, PA-2
PA-3, PA-4, PA-5, PA-6, PA-7, PA-8, P2-1
P2-2, P2-3, P4-1, P4-2, PC-1, PF-1, PG-1
PH-1, PC-3, PC-4, PF-2, PG-2, PH-2, PG-3 & PH-3



CONC. WALL PANEL REINFORCEMENT
SCALE 1:100 - applies to panels:
P1-4, PE-1, PX-1, PC-2, PX-2, PB-3, PX-3, PF-3
P3-2, P3-3, P3-4 & PJ-1

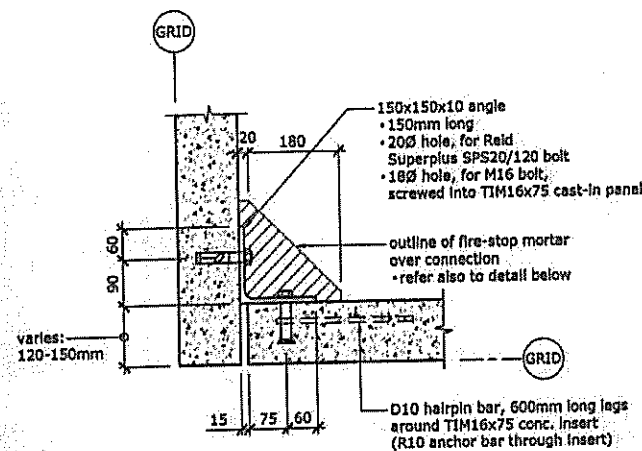


CONC. WALL PANEL REINFORCEMENT
SCALE 1:100 - applies to panels:
PC-1, PB-2, P5-1, P5-2, P3-1, PX-5 & PX-6

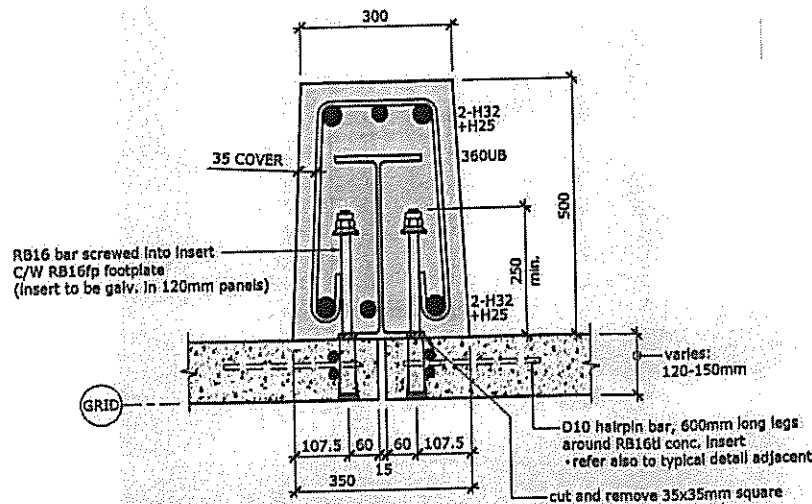
CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
10064457

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
All building work shall comply with
the consent documents.

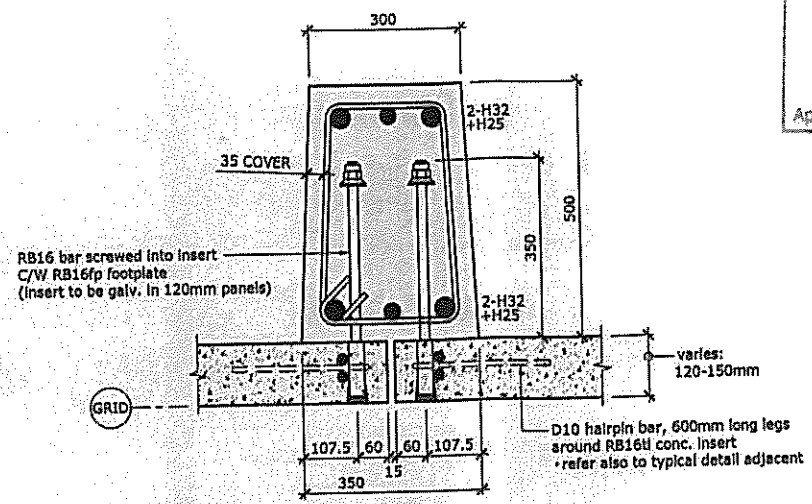
1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANELS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S3-8	Issue: 1



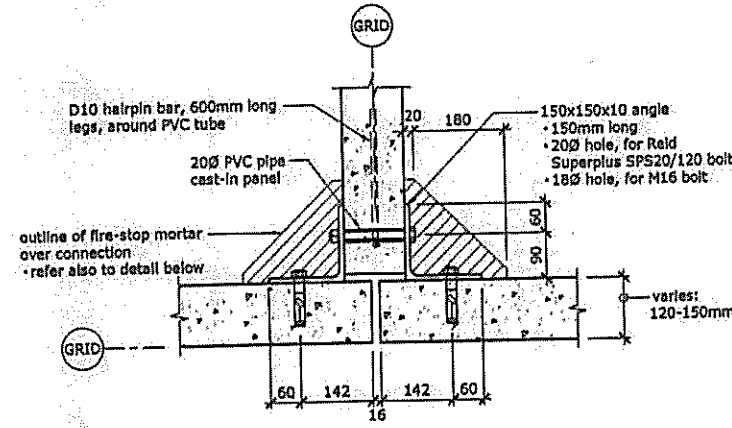
CONNECTION TYPE CT-A
SCALE 1:10 - PLAN VIEW



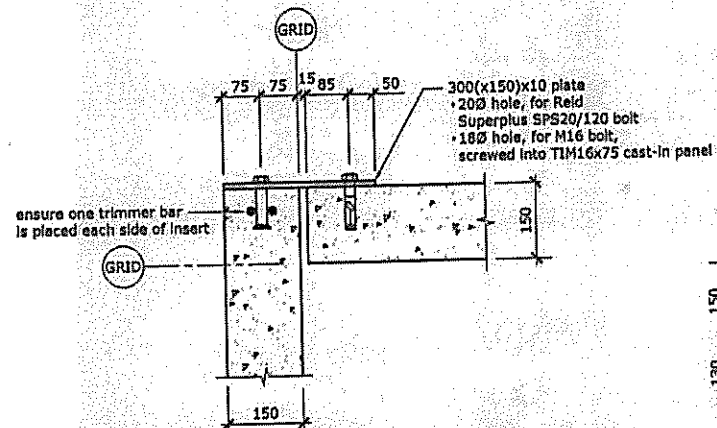
CONNECTION TYPE CT-B
SCALE 1:10 - PLAN VIEW



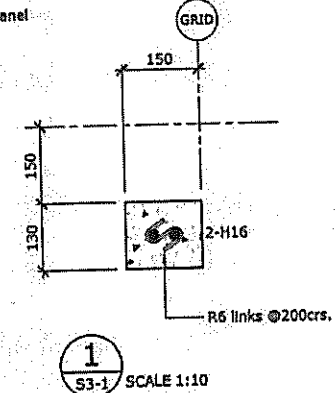
CONNECTION TYPE CT-C
SCALE 1:10 - PLAN VIEW



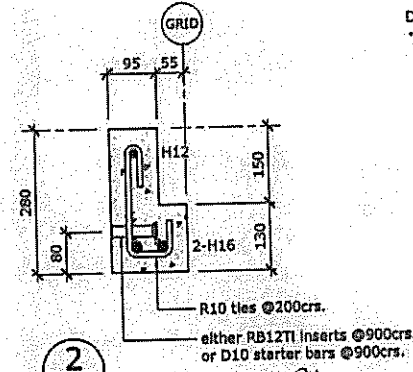
CONNECTION TYPE CT-D
SCALE 1:10 - PLAN VIEW



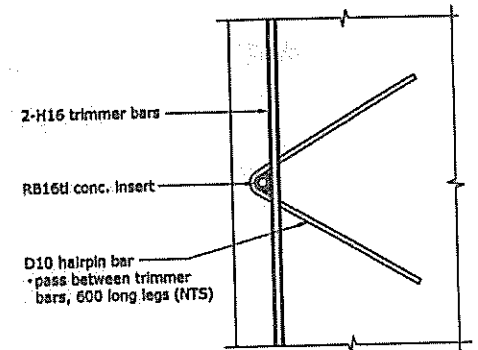
CONNECTION TYPE CT-E
SCALE 1:10 - PLAN VIEW



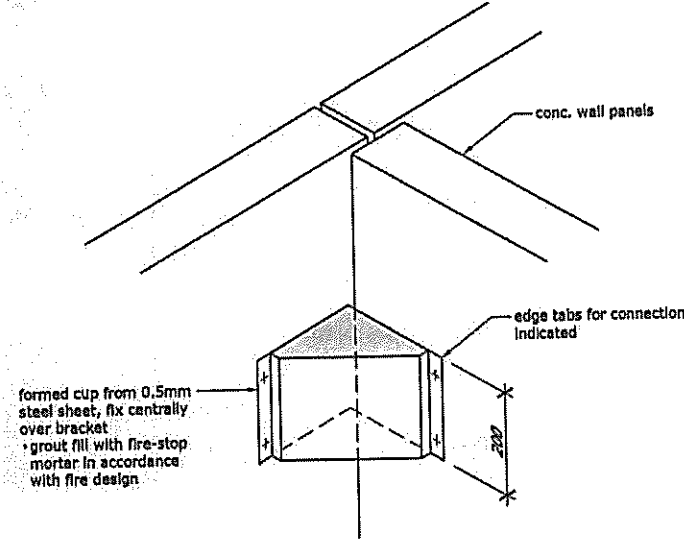
1
S3-1 SCALE 1:10



2
S3-1 SCALE 1:10



TYPICAL RB16TI DETAIL
SCALE 1:10 - SIDE ELEVATION
(typical panel req. not shown)

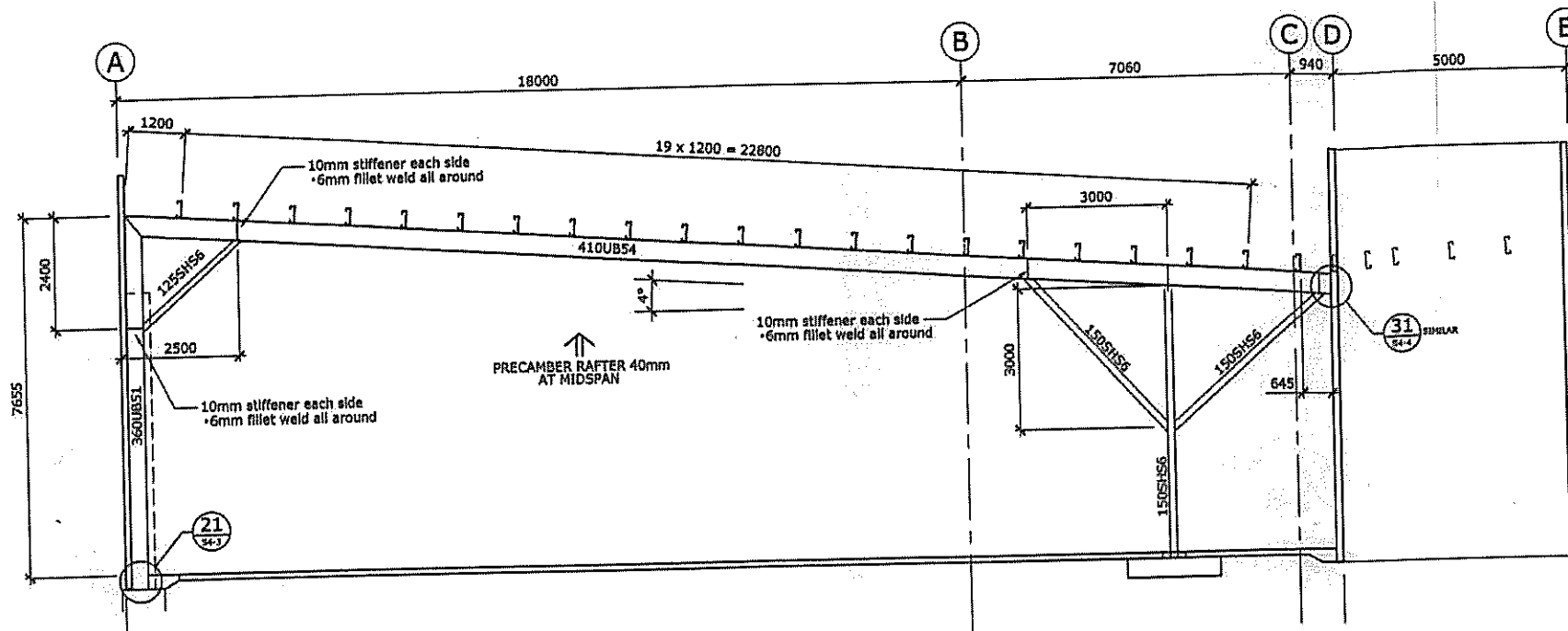


FIRE RATED CONNECTION DETAIL
SCALE 1:10 - ISOMETRIC VIEW

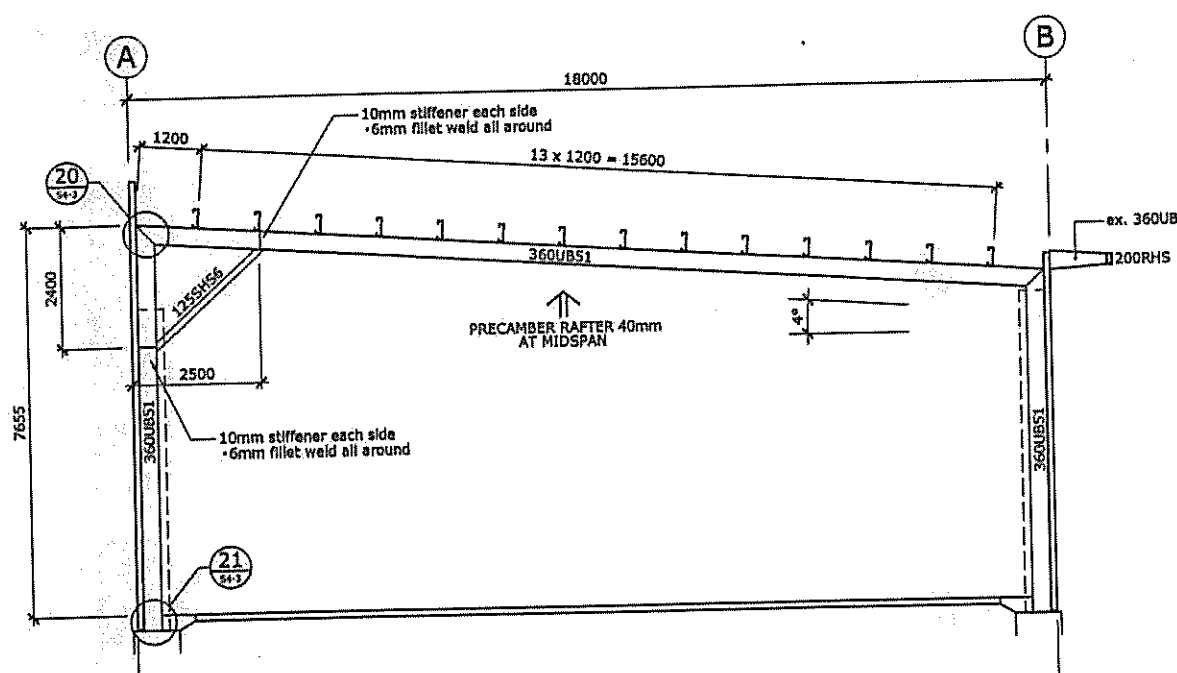
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
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Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
CONCRETE WALL PANEL DETAILS		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	IBM	JAN 2006
Scales:	1:10	
Sheet No.:	S3-9	Issue: 1

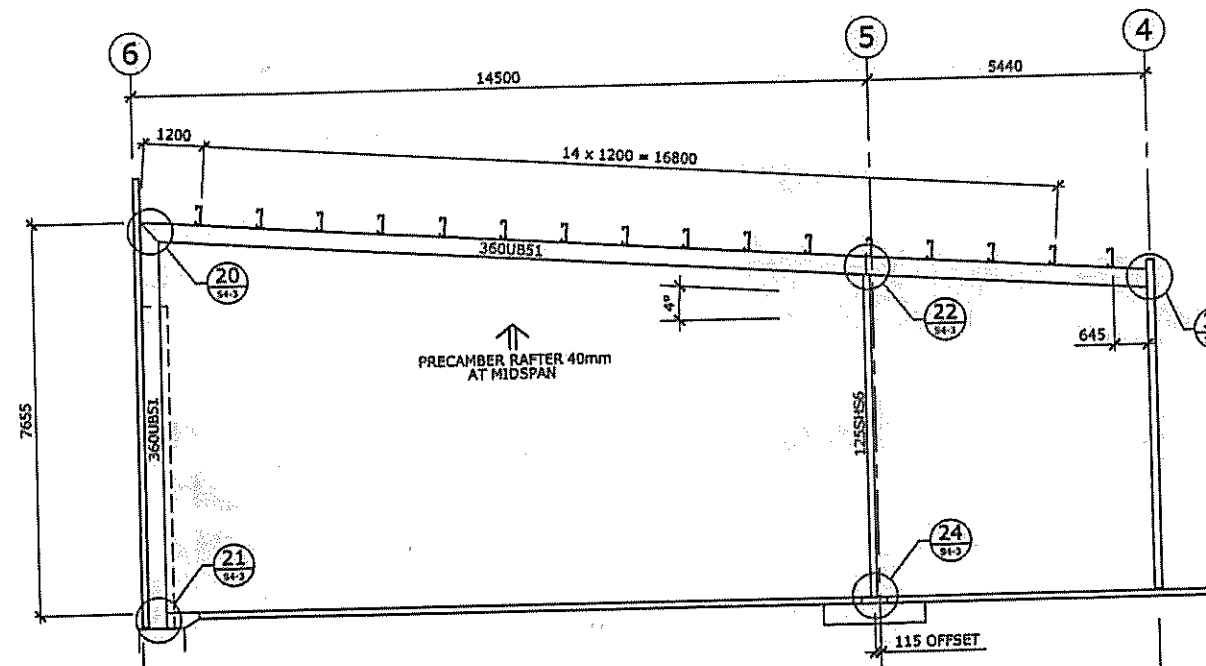
CHRISTCHURCH CITY COUNCIL
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Application No 10064457



10 STEELWORK ELEVATION
S4-1 SCALE 1:100



11 STEELWORK ELEVATION
S4-1 SCALE 1:100

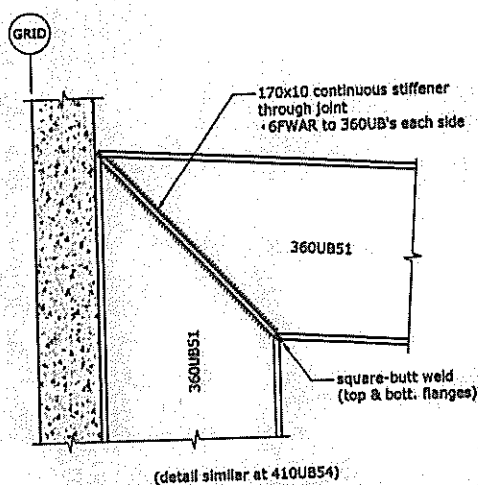


12 STEELWORK ELEVATION
S4-1 SCALE 1:100

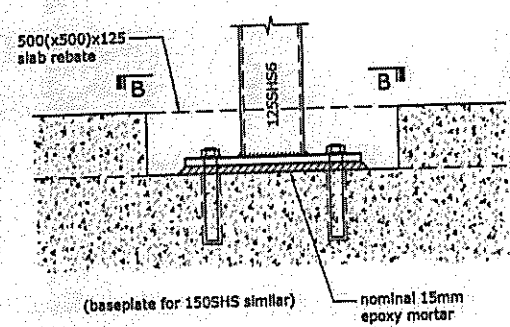
CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
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1	20.03.05	Consent Issue
Issue:	Date:	Amendment:
FREEMAN D STRUCTURAL T		
PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
ROOF STEELWORK		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:100	
Sheet No.:	S4-2	Issue: 1

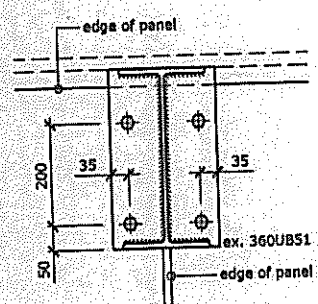
CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIC OFFICE
Application No. 10064457



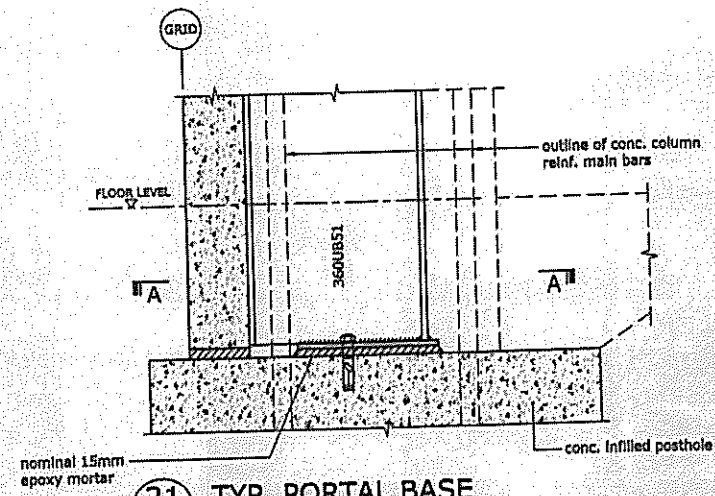
20 TYP. PORTAL KNEE JOINT
S4-2 SCALE 1:10



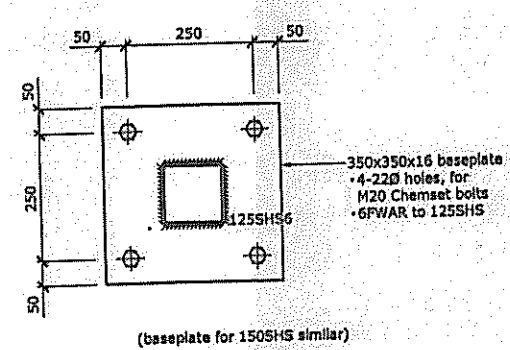
24 SCALE 1:10
S4-1



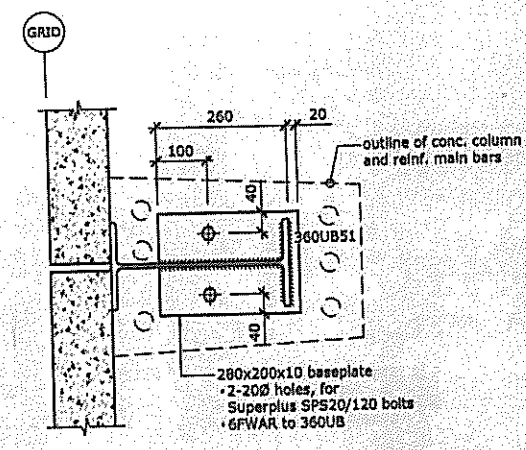
SECTION C-C
SCALE 1:10



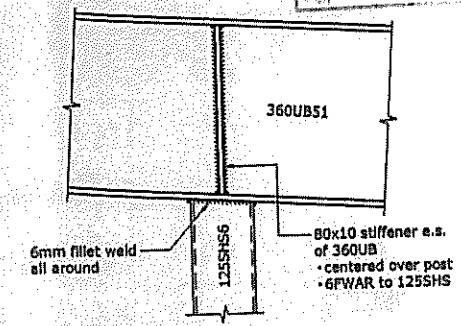
21 TYP. PORTAL BASE
S4-1 SCALE 1:10



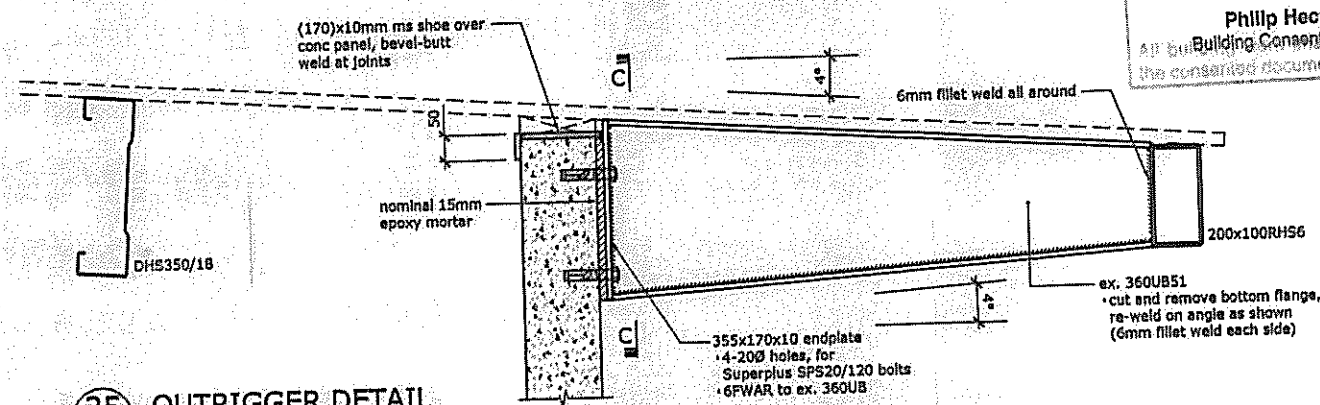
SECTION B-B
SCALE 1:10



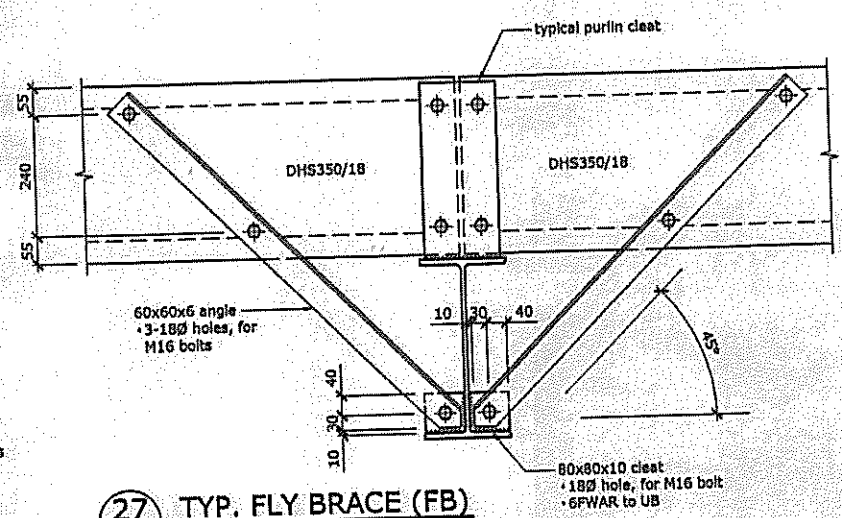
SECTION A-A
SCALE 1:10



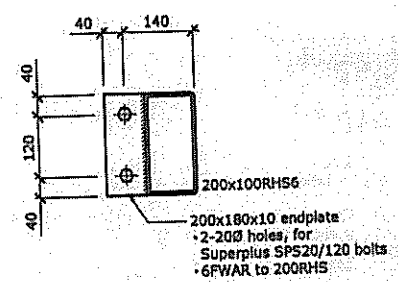
22 SCALE 1:10
S4-1



25 OUTRIGGER DETAIL
S4-1 SCALE 1:10



27 TYP. FLY BRACE (FB)
S4-1 SCALE 1:10

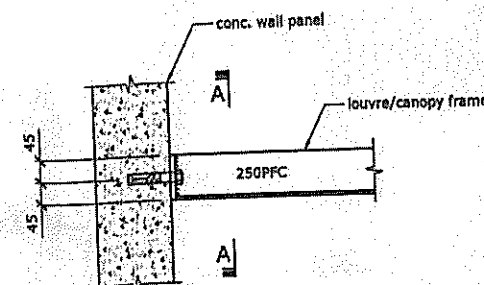


SECTION D-D
SCALE 1:10

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
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Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
ROOF STEELWORK		
Job No.:	05170	
Designed:	ARF	JAN 2006
Drawn:	JBM	JAN 2006
Scales:	1:10	
Sheet No.:	S4-3	Issue: 1

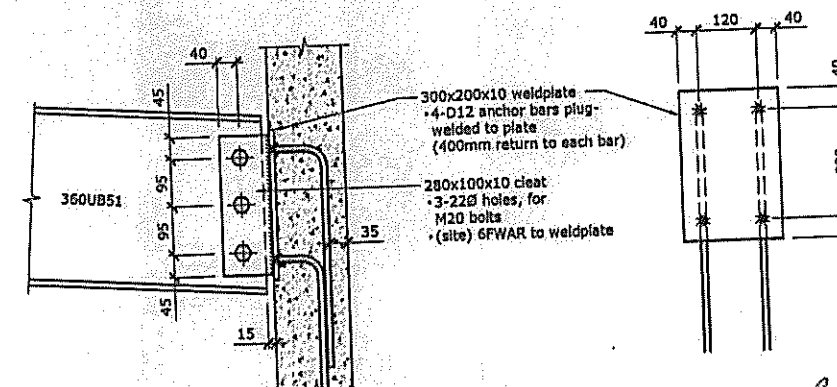
CHRISTCHURCH CITY COUNCIL
RECEIVED
23 MAR 2006
CIVIC OFFICES
Application No. 10064457



30 TYP. FRAME END CONNECTION
SCALE 1:10 (top flange of 250PFC omitted)

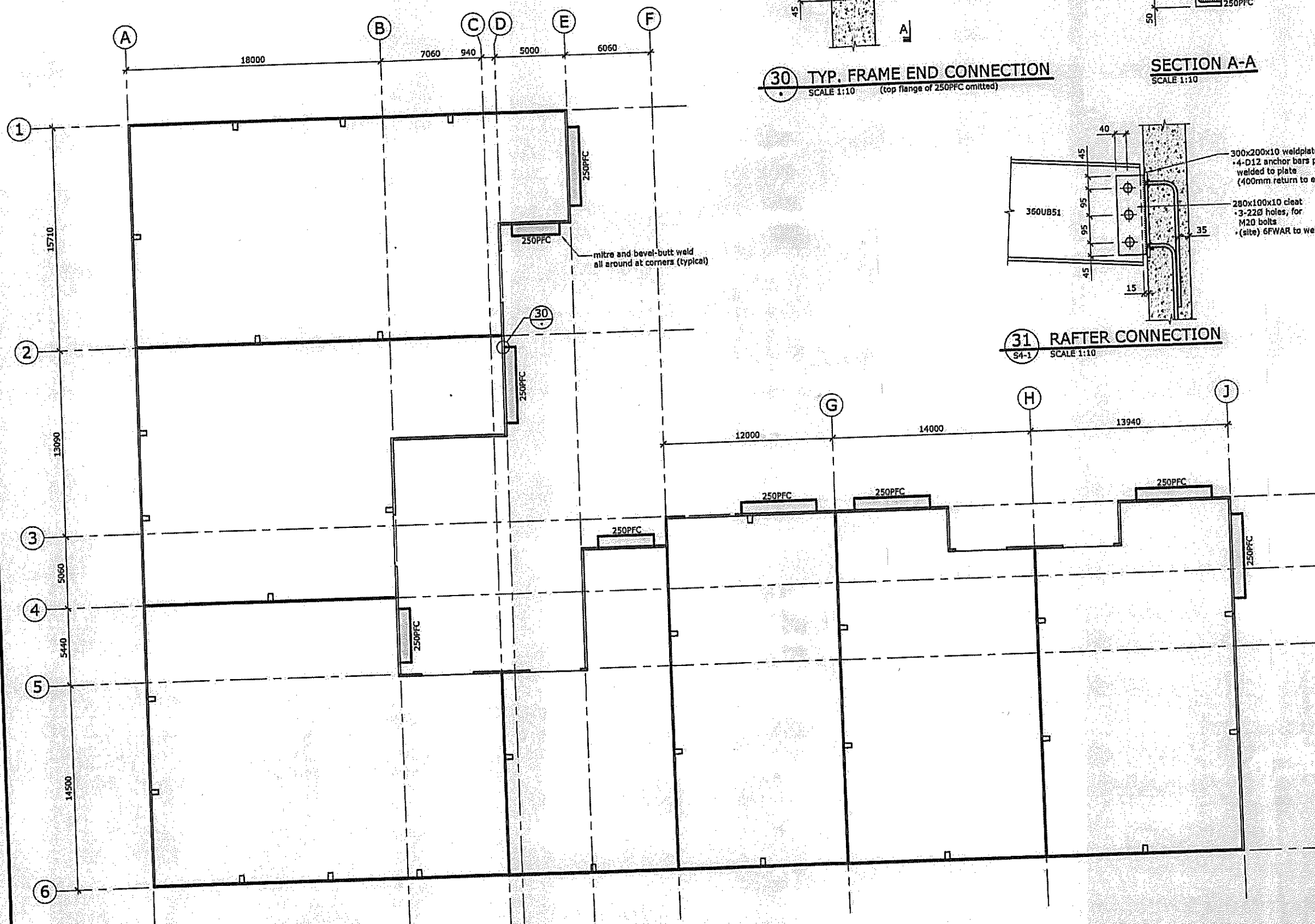
SECTION A-A
SCALE 1:10

250x90x10 endplate
• 2-20Ø holes, for
Superplus SP520/120 bolts
• 6FWAR to 250PFC



31 RAFTER CONNECTION
SCALE 1:10

CHRISTCHURCH CITY COUNCIL
CONSENT DOCUMENT
15 JUN 2006
Philip Hector
Building Consent Officer
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LOUVRE AND CANOPY SUPPORT FRAMES
SCALE 1:200

1	20.03.06	Consent Issue
Issue:	Date:	Amendment:
FREEMAN STRUCTURAL PO Box 12-254, Beckenham Christchurch (03) 338 8570 P (03) 338 8578 F 0274 794 234 M andrew@freemansl.co.nz E		
INDUSTRIAL DEVELOPMENT 39 FORMANS ROAD CHRISTCHURCH		
LOUVRE AND CANOPY FRAMES		
Job No.:	05170	
Designed:	ARF	MAR 2006
Drawn:	JBM	MAR 2006
Scales:	1:200 1:10	
Sheet No.:	S4-4	Issue: 1

Ref:05170



7 February 2006

PO Box 12-254, Beckenham
Christchurch
(03) 338 8570 P
(03) 338 8578 F
0274 794 234 M
andrew@freemansl.co.nz E

H & H Dakota Limited
c/- 250 Kennedys Bush Road
CHRISTCHURCH

Attention: Jim Hailes / Mike Hann

RE: SOILS INVESTIGATION RESULTS FOR 39 FOREMANS ROAD

Confirming our observations of the machine auger tests and review of the soil ground conditions for the proposed industrial development at 39 Foremans Road, Hornby, (Front half part of Lot 5, DP 76397).

We have reviewed previous borehole logs and investigation reports that have been carried out on the site and neighbouring building sites. These include:

- Soils & Foundations Report dated 15 November 1994, for the entire subdivision, Lots 1 to 12 DP 76397,
- Alan Stevens report dated 6 April 2001, for adjacent lots 1 & 2 DP 76397 at 15 & 27 Foremans Road for the buildings constructed on these sites during and prior to 2004.
- Geotech Consulting review/letter dated 10 November 2003, reviewing and confirming the foundation design for the Wyma Electrical building on Lot 3 DP 76397 at 27 Foremans Road.

The augered holes indicated the following typical site ground conditions over the area of the proposed new building:

- The top 1000mm appears to be a reasonably well compacted clean stoney pit-run type material overlying,
- Foundry type waste imported fill material mainly containing stones/gravels and dark silty material with minor metals, timber, wire, bricks, concrete, glass etc. This fill material extended to varying depths between 3000 and 4700mm, and is overlying,
- Natural well compacted sandy gravels, with fine to coarse round gravels.

The earlier reports indicate that the site was originally used as a gravel pit by New Zealand Railways for railway ballast. The pit was most likely backfilled between 1965 and 1975 with what is likely to be foundry type waste. The fill has been in place in excess of 30 years, and will have largely compacted and consolidated under its own weight during this period.

Based on the recommendations of the Soils & Foundations report and what has been used for foundations on the adjacent buildings we propose that the foundations for the new building be piles/postholes founded on the natural gravel layer.

We have designed the foundations for the new industrial warehouse concrete panel buildings to be augered posthole/pile footings dug to a depth at least 500mm into the natural ground.

We also recommend that the entire site under the building slab be striped, heavily compacted, and backfilled with heavy well compacted granular fill in layers to build up to the underside of the new slab and form a building platform. Compaction tests should be carried out on the platform to confirm an even compacted platform and minimise differential settlements of the slab.

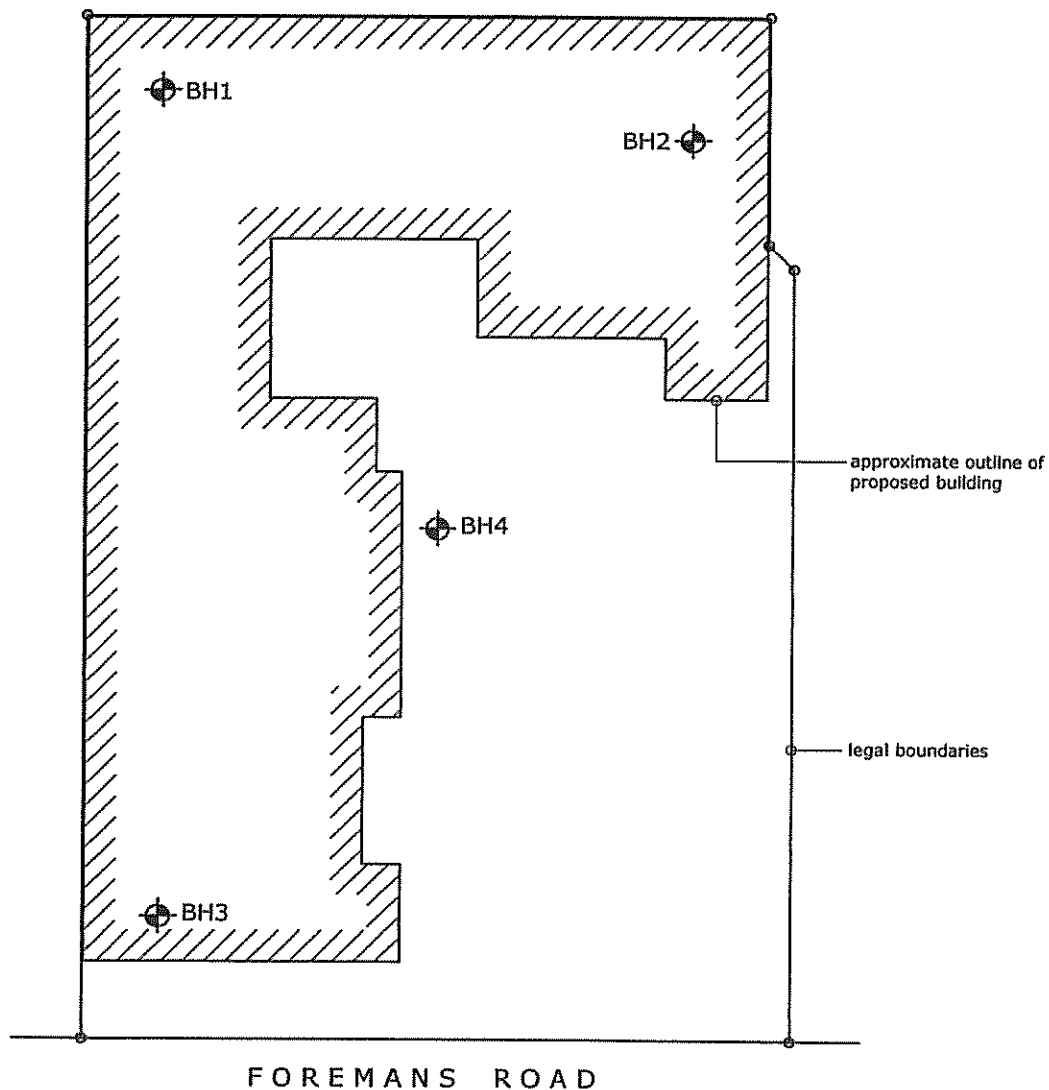
Yours faithfully,
FREEMAN STRUCTURAL LTD.



Andrew R. Freeman

Encl.

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SITE PLAN
SCALE 1:500 APPROX.

BH1  BOREHOLE

SOIL TEST BORE LOG FOR
39 FORMANS ROAD
CHRISTCHURCH

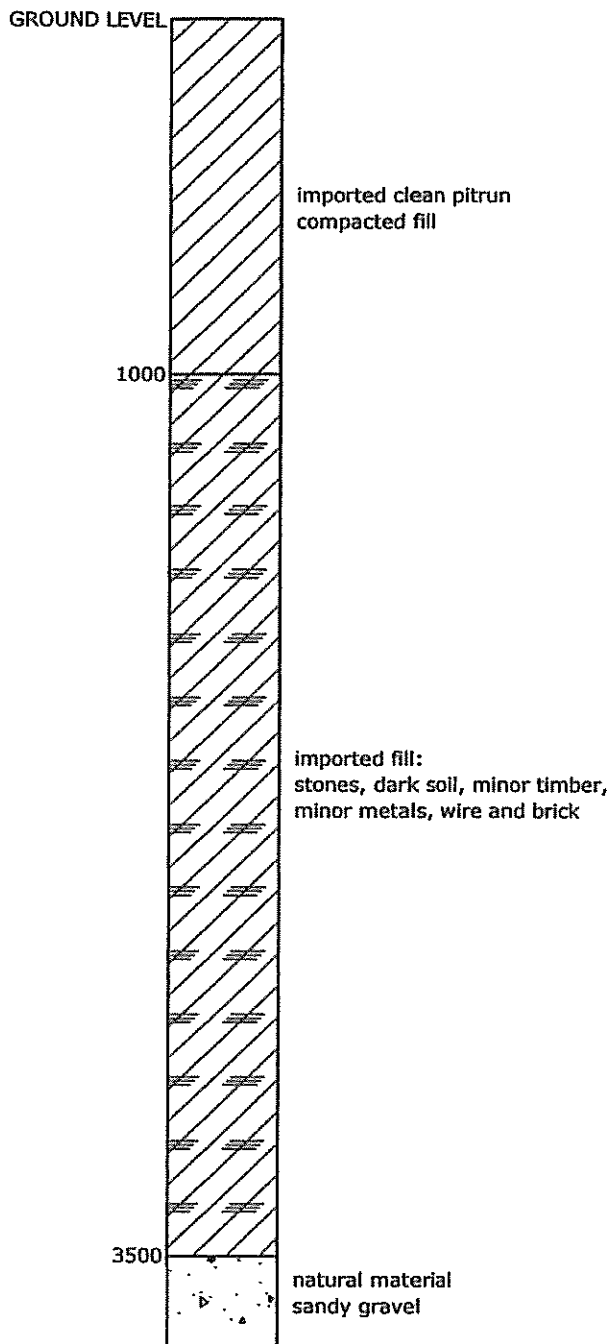
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Sheet No.:	1	



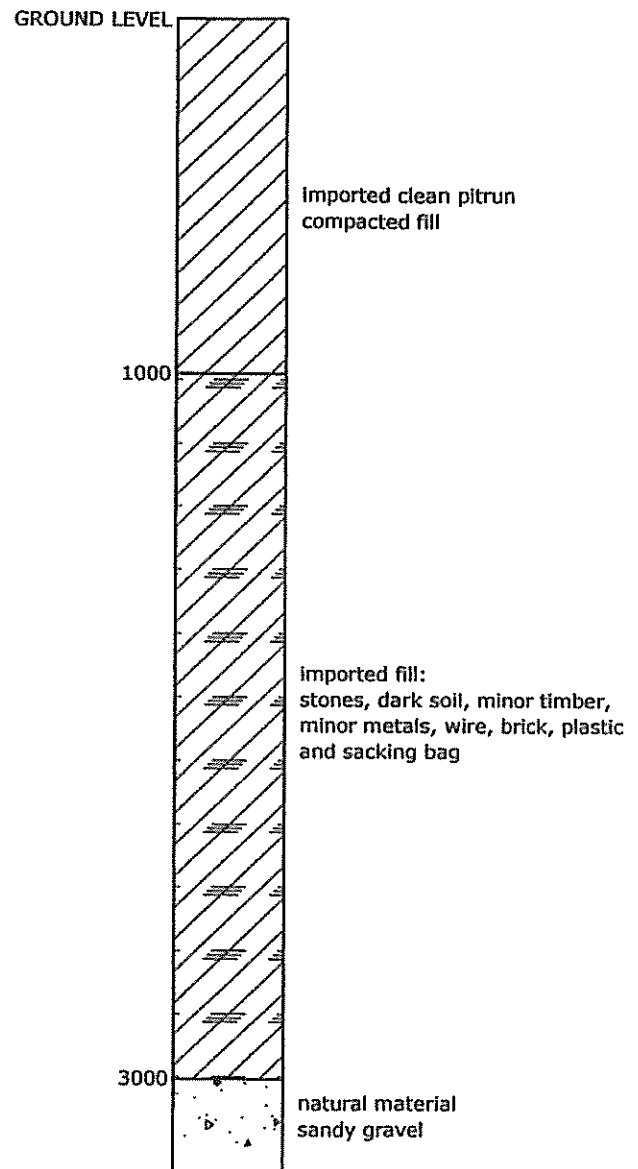
FREEMAN INC
STRUCTURAL

Job No.: 05170

BORE AT LOCATION 1:



BORE AT LOCATION 2:



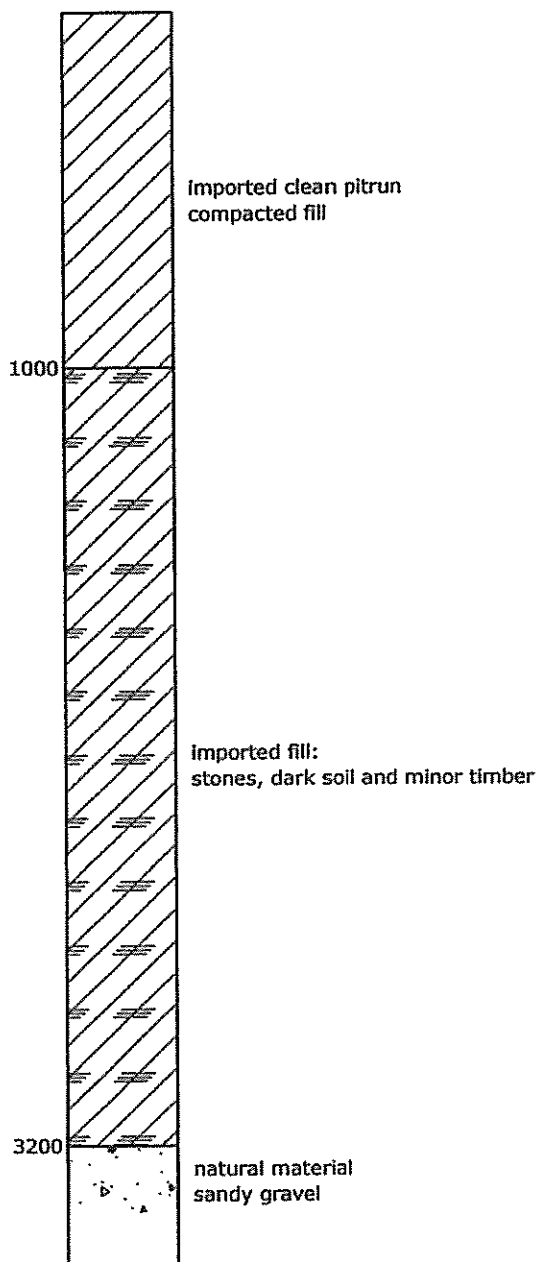
SOIL TEST BORE LOG FOR
39 FORMANS ROAD
CHRISTCHURCH

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Drawn:	JBM	02.06
Scales:	NTS	
Sheet No.:	2	

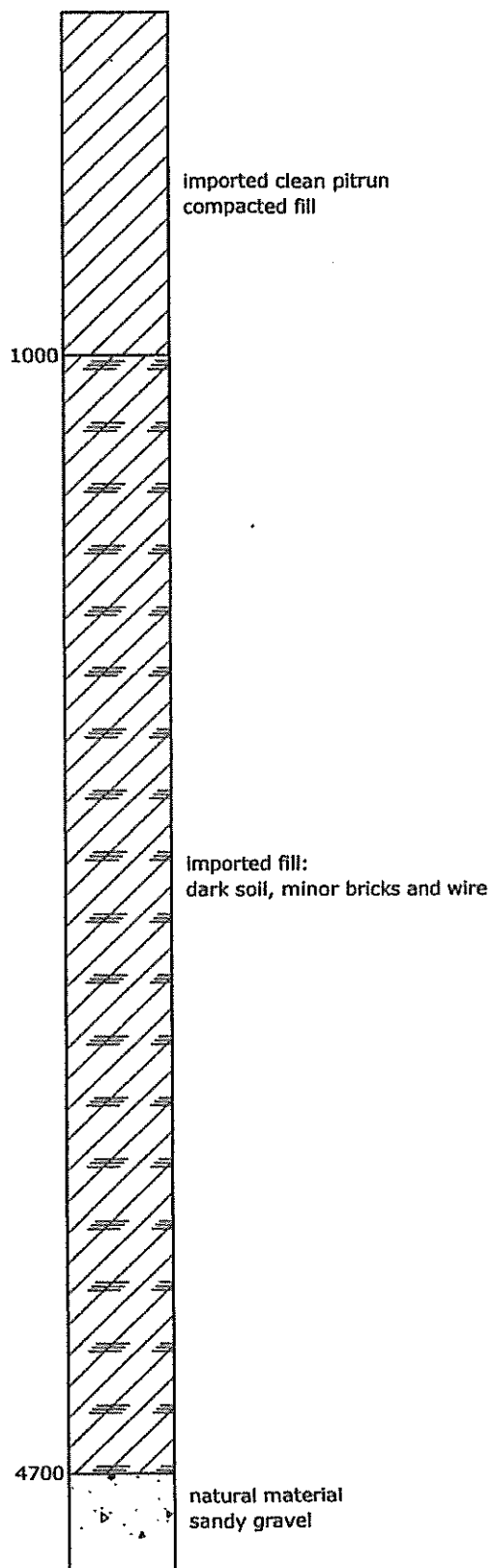
 **FREEMAN**
STRUCTURAL

Job No.: 05170

BORE AT LOCATION 3:



BORE AT LOCATION 4:



SOIL TEST BORE LOG FOR
39 FORMANS ROAD
CHRISTCHURCH

Designed:	-	-
Drawn:	JBM	02.06
Scales:	NTS	
Sheet No.:	3	



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Job No.: 05170