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Botanic Gardens Information Kiosk
PRK 1566 BLDG 002 EQ2
Detailed Engineering Evaluation
Quantitative Report
Version FINAL

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Botanic Gardens Information Kiosk
PRK 1566 BLDG 002 EQ2

Detailed Engineering Evaluation
Quantitative Report
Version FINAL

7 Rolleston Avenue, Christchurch Central

Christchurch City Council

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Date
27/2/13

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Botanic Gardens Information Kiosk

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Detailed Engineering Evaluation

Quantitative Report - SUMMARY

Version FINAL

7 Rolleston Avenue, Christchurch Central

Background

This is a summary of the Quantitative Report for the building structure, and is based in general on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections conducted on 4 April 2012 and on the available drawings.

Building Description

The Information Kiosk was constructed in 1986 with extensions added to the western and eastern sides of the building in 2000. The site is surrounded by park land with the south side of the structure over-looking a lake.

The structure comprises a main open lozenge shaped display area with some ancillary rooms and facilities on the north and western sides. The open display area has steel portal frames in both the long and short directions with the ancillary areas having a flat roof. The ancillary areas and external walls utilise timber framed wall construction.

Key Damage Observed

Overall, the building shows no significant damage due to the recent earthquake. The only damage observed was:

- Minor plasterboard cracking
- Slight separation and movement between concrete floor slab and timber framed walls

Building Capacity Assessment

The building was analysed and checked as a single integral structure comprising timber framing and a main steel portal frame. The wall structure achieved a rating of over 100% NBS while the portal frame also achieved a score of over 100% NBS for gravity loads.

Conclusion & Recommendation

The building overall capacity based on the seismic assessment carried out for the structure is greater than 100% NBS. Thus, the Botanic Gardens Information Kiosk is not an Earthquake Risk building.

GHD recommend that the minor cracking in the structure; mostly in the plasterboard walls is repaired.

1. Background

GHD has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the Botanic Gardens Information Kiosk.

This is a Quantitative Assessment Report of the building structure. Quantitative Assessment involves a full seismic review of the existing structure, which is discussed in this report. The structural investigation has been carried out in accordance with the requirements of the relevant New Zealand Standards and the New Zealand Society for Earthquake Engineering (NZSEE) Guidelines for the 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes'.

2. Compliance

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

2.1 Canterbury Earthquake Recovery Authority (CERA)

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

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

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

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

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

2.2 Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

2.2.1 Section 121 – Dangerous Buildings

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

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

2.3 Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

2.4 Building Code

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

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

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

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

3. Earthquake Resistance Standards

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

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

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure 1 below.

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

Figure 1 NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE

Table 1 compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance in the next year.

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

Table 1 %NBS compared to relative risk of failure

4. Building Description

4.1 General

The Information Kiosk is located in the Botanic Gardens at 7 Rolleston Avenue, Christchurch Central. The structure was constructed in 1986 with extensions added to the western and eastern sides of the building in 2000. The site is surrounded by park land with the south side of the structure over-looking a lake. See Photograph 8 for building location on site.

The site is predominantly flat with insignificant variations in ground levels throughout. The building is located approximately 30m south of the Avon River.

The Information Kiosk comprises a main open lozenge shaped display area with some ancillary rooms and facilities on the north and western sides. The open display area has steel portal frames in both the long and short directions with the ancillary areas having a flat roof. The intersecting steel portal frames are connected at the apex and have tie beams spanning between the portal rafters.

The steel frame roof has a pitch of 20 degrees and is made up of lightweight corrugated metal sheeting on 75 x 50 counter battens over 100 x 50 timber rafters. The flat roof ancillary areas are clad with butynol sheeting on plywood on 100 x 50 timber rafters. The ancillary areas utilise timber framed wall construction. The timber wall linings are plasterboard internally, with the ceiling linings consisting of exposed and painted cement sheeting. The floor is 100mm thick cast-in-situ concrete slab on grade. The external walls are supported by perimeter strip footings and pad foundations support the steelwork frames.

The dimensions of the building are approximately 12m in width, 16m long and 5m in height.

Figure 2 shows the floor plan layout of the whole structure. Complete information mentioned above is provided in Appendix C.

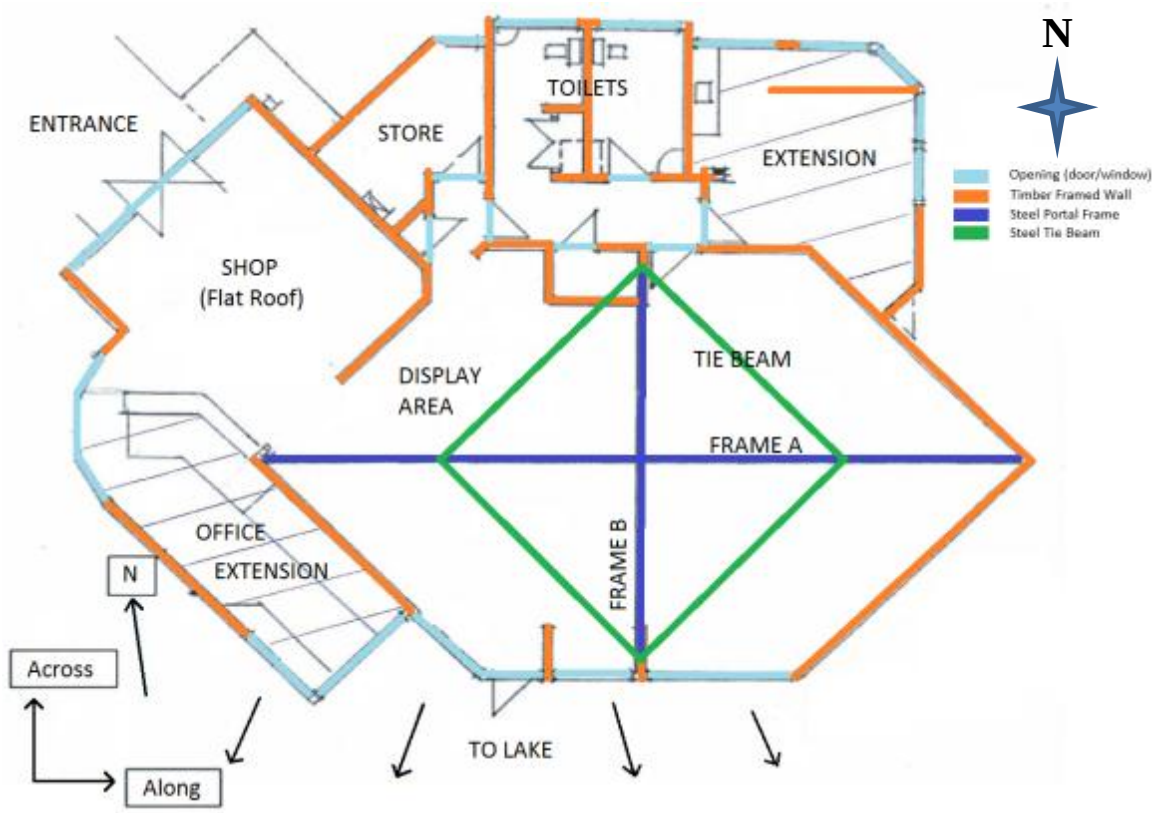

Figure 2 Plan Sketch Showing Key Structural Elements

4.2 Gravity Load Resisting System

The gravity loads over the display area are resisted partly by the steel portal frames and partly by the load bearing timber framed walls around the perimeter. The vertical load is transferred from the roof structure to the steel portal legs. The load is then carried down to the concrete pad foundations.

For the flat roof areas, the gravity load is transferred through the roof rafters onto the timber framed walls. The gravity load is then carried by the timber framed walls to the concrete strip footings.

4.3 Lateral Load Resisting System

The portal frames supporting the roof structure over the display area are integrally tied to the flat roof utility area. A number of wall panels are common to both structures. The lateral loads acting on the structure are resisted in both the transverse and longitudinal directions primarily by the diaphragm action of the roof structure and ceiling and by the plasterboard lined timber framed walls with some additional secondary resistance provided by the steel portal frame action in the display area.

5. Assessment

5.1 Site Inspection

A visual inspection of the building was undertaken on 4 April 2012. Both the interior and exterior of the building were inspected. The building was observed to have a green placard in place. Most of the main structural components of the building were able to be viewed due to the exposed simple construction of the building.

The inspection consisted of observing the building to determine the structural systems and likely behaviour of the building during an earthquake. The site was assessed for damage, including observing the ground conditions, checking for damage in areas where damage would be expected and noting general damage observed throughout the building in both structural and non-structural elements.

A series of photographs was taken for the whole structure and its components for documentation and reference purposes. These are shown in Appendix B.

5.2 Investigation & Opening Up Work

No opening up work was done for this project.

5.3 Available Drawings

There are available existing drawings provided to GHD and are itemised below:

Item #	Title	Sheet No.	Date
1	Christchurch City Council, Botanic Gardens Information Centre (Elevation, Plan and Roof Plan)	1 of 3	7.11.86
2	Christchurch City Council, Botanic Gardens Information Centre (Cross Section)	2 of 3	7.11.86
3	Christchurch City Council, Botanic Gardens Information Centre (Details and Ceiling Plan)	3 of 3	7.11.86
4	Christchurch City Council, Botanic Gardens Information Centre Foundation Plan & Sections	1 of 2	19.11.86
5	Christchurch City Council, Botanic Gardens Information Centre Steel Framing Plan & Details	2 of 2	19.11.86
6	Christchurch City Council, Botanic Gardens Information Centre (Elevation, Plan and Roof Plan) BG-129	1 of 3	7.11.86
7	Revised Plan Site Instruction No. 2 Botanic Gardens Info Centre BG-131	2 of 2	13.06.00
8	Alterations to Info Centre Botanic Gardens	1	06.08.04

5.4 Modelling of the Portal Frames

ETABS software was used for modelling the main steel portal frames. A two-dimensional frame was modelled to realistically simulate the effects of the applied load on the portal frame under gravity loads and combinations thereof.

This modelling approach determines the adequacy of the members or sections of the structure under various loading combinations.

Each section, member and node of the model was defined using the physical dimensions, material properties and connection details from the available drawings.

The model was then analysed using ETABS and the output was checked using manual calculations and spreadsheets.

5.5 Calculation of Bracing Capacity and Demand

The seismic assessment of the lateral load resistance of the structure was carried out using manual calculations and spreadsheets with reference to NZS3604:1981 and NZS3604:2011 (New Zealand Standard for Timber-framed buildings).

The Total Bracing Demand, in Bracing Units (BU), was determined for each direction (along and across) for the seismic critical load condition in accordance with the code. The Total Bracing Demand was then compared to the Total Bracing Capacity of the structure and the %NBS was calculated accordingly.

The minimum Bracing Demand and Capacity ratio was also computed for each bracing line element.

6. Damage Assessment

6.1 General

The Information Kiosk is located in the Botanic Gardens and is surrounded by park land and walkways. It abuts a lake with no properties immediately adjacent to the structure. The nearest building is the Tea Kiosk located approximately 30m to the north-west. During the inspection, some minor damage was observed to this structure notably some internal wall lining cracking. See Photograph 8 for the building location.

6.2 Residual Displacements and Observations

No residual displacements of the structure were noted during the inspection of the building.

No significant damage was evident to the exterior and interior of the building.

No damage was evident to the roof structure.

No cracking was noted to the perimeter strip footing.

No damage was evident to the portal frames, beams and columns supporting the extension roof structure.

No damage was evident to the load bearing timber framed walls.

Minor cracking was observed to the plasterboard joint lines particularly at the eastern side of the structure. Slight separation also occurred between the timber framed walls and concrete floor slab. (See Photographs 6 & 7, Appendix B)

6.3 Ground Damage

No ground damage was observed during the inspection of the site.

7. Analysis

7.1 Seismic Load

The seismic design parameters used are based on current design requirements from NZS1170.5:2004, NZS 3604:2011:

- Site Classification
  (NZS 1170.5:2004, Clause 3.1.3, Soft Soil) D
- Earthquake Zone
  (Figure 5.4 NZS 3604:2011) 2 (Christchurch)
- Importance Level 2 (Office type)
- Applied Floor Live Load 3.0 kPa

8. Geotechnical Consideration

8.1 Site Description

The site is situated within the Botanic Gardens of Hagley Park, in central Christchurch. It is relatively flat at approximately 8m above mean sea level. The structure is situated between 50m and 100m south of the Avon River, and 9.5km west of the coast (Pegasus Bay) at New Brighton.

8.2 Published Information on Ground Conditions

8.2.1 Local Geology

The geological map of the area[1] indicates that the site is underlain by Holocene alluvial soils of the Yaldhurst Member, sub-group of the Springston Formation, comprising alluvial sand and silt overbank deposits.

Brown and Weeber (1992) indicates the site consists of near surface gravel underlain by sand, silt, clay until approximately 20m bgl where the Riccarton Gravels are located. Groundwater is indicated to be present 1 - 2m bgl.

8.2.2 Environment Canterbury Records

Information from Environment Canterbury (ECan) indicates that three boreholes are located within 200m of the site (see Table 2). Of these, two contained adequate lithographic logs. The site geology described in the logs is stratified gravel, sand, silt and clay. Also present are layers of peat between 20m and 40m bgl.

Groundwater was recorded between 2.7m and 4.3m bgl in the ECan logs.

Table 2 ECan Borehole Summary

Bore Name	Log Depth	Groundwater	Distance & Direction from Site
M35/1936	100.9m	4.3m bgl	50m E of office buildings
M35/10619	104.5m	2.7m bgl	100m E of office buildings

It should be noted that the logs have been written by the well driller and not a geotechnical professional or to a standard. In addition strength data is not recorded.

8.2.3 EQC Geotechnical Investigations

The Earthquake Commission has not undertaken geotechnical testing in the area of the subject site.

[1] Brown, L. J. and Weeber, J.H. 1992: Geology of the Christchurch Urban Area. Institute of Geological and Nuclear Sciences 1:25,000 Geological Map 1. Lower Hutt. Institute of Geological and Nuclear Sciences Limited.

8.2.4 CERA Land Zoning

Canterbury Earthquake Recovery Authority (CERA) has published areas showing the Green Zone Technical Category in relation to the risk of future liquefaction and how these areas are expected to perform in future earthquakes. The site is classified as Technical Category N/A – Urban Non-residential.

8.2.5 Post-Earthquake Land Observations

Aerial photography taken following the 22 February 2011 earthquake shows moderate amounts of liquefaction on the northern side of the Avon River and in Victoria Lake. There is no evidence of liquefaction within the Botanic Gardens themselves.

The Canterbury Geotechnical Database[2] shows several observed ground cracks <10mm within 100m of the café and information kiosk structures and 280m from the office block.

Figure 3 Post February 2011 Earthquake Aerial Photography[3]

[2] Canterbury Geotechnical Database (2012) "Observed Ground Crack Locations", Map Layer CGD0400 - 23 July 2012, retrieved 10/10/12 from https://canterburygeotechnicaldatabase.projectorbit.com/

[3] Aerial Photography Supplied by Koordinates sourced from http://koordinates.com/layer/3185-christchurch-post-earthquake-aerial-photos-24-feb-2011/

8.3 Seismicity

8.3.1 Nearby Faults

There are many faults in the Canterbury region, however only those considered most likely to have an adverse effect on the site are detailed below.

Table 3 Summary of Known Active Faults[4,5]

Known Active Fault	Distance from Site	Direction from Site	Max Likely Magnitude	Avg Recurrence Interval
Alpine Fault	120 km	NW	~8.3	~300 years
Greendale (2010) Fault	20 km	W	7.1	~15,000 years
Hope Fault	100 km	N	7.2~7.5	120~200 years
Kelly Fault	100 km	NW	7.2	150 years
Porters Pass Fault	55 km	NW	7.0	1100 years
Port Hills Fault (2011)	7km	SE	6.3	*Not estimated*

The recent earthquakes since 4 September 2010 have identified the presence of a previously unmapped active fault system underneath the Canterbury Plains; these include the Greendale Fault and Port Hills Fault listed in Table 3. Research and published information on this system is in development and the average recurrence interval is yet to be established for the Port Hills Fault.

8.3.2 Ground Shaking

This recent seismic activity has produced earthquakes of Magnitude 6.3 with peak ground accelerations (PGA) up to twice the acceleration due to gravity (2g) in some parts of the city and has resulted in widespread liquefaction throughout Christchurch.

New Zealand Standard NZS 1170.5:2004 quantifies the Seismic Hazard factor for Christchurch as 0.30, being in a moderate to high earthquake zone. This value has been provisionally upgraded recently (from 0.22) to reflect the seismicity hazard observed in the earthquakes since 4 September 2010.

8.4 Slope Failure and/or Rockfall Potential

Given the site's elevation and location in Central Christchurch, global slope instability is considered negligible. However, due to the site's proximity to the Avon River, it may be susceptible to lateral spreading along the river margins. In addition, any localised retaining structures or embankments should be further investigated to determine the site-specific slope instability potential.

[4] Stirling, M.W, McVerry, G.H, and Berryman K.R. (2002) A New Seismic Hazard Model for New Zealand, Bulletin of the Seismological Society of America, Vol. 92 No. 5, pp 1878-1903, June 2002.

[5] GNS Active Faults Database

8.5 Field Investigations

The geotechnical field investigation comprised a site walkover, two machine boreholes, one located between the café and information kiosk and the other outside the office block. The investigation layout is shown in Figure 4 and the GPS locations of the tests are tabulated in Table 4 below.

Table 4 Investigation Locations

Borehole Number	Depth	Northing	Easting
BH01	19.5	5741909	2479508
BH02	19.5	5742005	2479326

Machine drilled boreholes were undertaken by McMillan Specialist Drilling from 8th of October.

Figure 4 Investigation Location Plan

8.6 Ground Conditions Encountered

A summary of the ground conditions encountered in BH01 and BH02 are shown in Table 5.

Table 5 Summary of Machine-drilled Boreholes

Depth (m)	Lithology	SPT-N Values
0.0 – 0.8	Gravelly SAND to SAND with some organic material	-
0.8 – 4.5	Sandy fine to coarse GRAVEL with occasional fine sand and silt lenses	9

Depth (m)	Lithology	SPT-N Values
4.5 – 12.0	Sandy fine to coarse GRAVEL with occasional fine sand and silt lenses	19 to 50
12.0 – 19.5	Stratified layers of silty fine SAND to sandy SILT.	4 to 25
19.5	End of Borehole – Target Depth Achieved	

Detailed engineering borelogs can be found in Appendix A.

Groundwater was encountered at 3.6m and 3.7m in BH01 and BH02 respectively. This correlates with the water level in the Avon River that is within 20m of the boreholes.

8.7 Liquefaction Potential

The site is considered unlikely to liquefy based of the following:

- The surface gravels are unlikely to liquefy because the grain size is too large;
- The saturated sands present from 10m bgl are considered to have a low susceptibility to liquefaction because their relative density is medium dense to dense;
- Any liquefaction beneath surface gravels would be unlikely to penetrate gravels; and;
- No observations of liquefaction from post-earthquake aerial photography in the immediate vicinity of the sites.

8.8 Recommendations and Summary

The grounds conditions beneath the site comprise sand to 0.8m, underlain by sandy gravel to 10m bgl, underlain by interbedded silt and sand to 19.5m bgl.

The soil class of **D** (in accordance with NZS 1170.5:2004) recommended in Section 8 of the Qualitative DEE is still believed to be appropriate.

The ground performance is considered consistent with the TC1 classification.

The café, information kiosk and office buildings have not suffered any damage as a result of the ground conditions present beneath the site. Therefore no ground treatment is recommended for the buildings.

Should repairs be undertaken to parts of the foundations these foundations should follow foundation requirements in accordance with Ministry of Business, Innovation, and Employment Guidelines for TC1 properties.

Should re-development of the site be undertaken a site specific investigation should be undertaken, but it is likely shallow foundations onto the gravels would be appropriate.

Our investigations confirm the ground conditions in the Geotech Consulting report dated May 2010 and we concur with the foundation recommendations.

9. Results of Analysis

9.1 Gravity Loads Check

Based on our two-dimensional model using Etabs, a gravity load check was performed on the main portal frame. The outcome of the calculations and demand/capacity assessment is summarized in Table 6 below.

Table 6 Summary of Capacity of Steel Column and Rafter for Portal Frame on Gravity Loads

Element	Force Direction	Structural Element	% NBS based on calculated capacity
C1	*Vertical*	*Column*	*Over 100%*
C2	*Vertical*	*Column*	*Over 100%*
D1	*Vertical*	*Rafter*	*Over 100%*
D2	*Vertical*	*Rafter*	*Over 100%*

9.1.1 Steel Members

Overall the steel structures achieved a score of over 100% NBS for gravity loads.

9.2 Lateral Loads Check

Our lateral load assessment was carried out based on the timber framed walls and this compared the Total Bracing Demand to the Total Bracing Capacity. The outcome of the calculations and demand/capacity assessment is summarized in Table 7. The timber framed walls were found to be satisfactory to resist lateral loading.

A diagrammatic plan is shown in Figure 5 and Figure 6.

Table 7 Summary of Overall Capacity of Bracing Element for walls

Structural Element	*Direction*	*% NBS based on calculated capacity*
Timber Framed Walls	*Along*	*Over 100%*
	Across	*Over 100%*

9.2.1 Total Bracing System

The overall bracing system of the wall structure achieved a score of over 100% NBS in both directions.

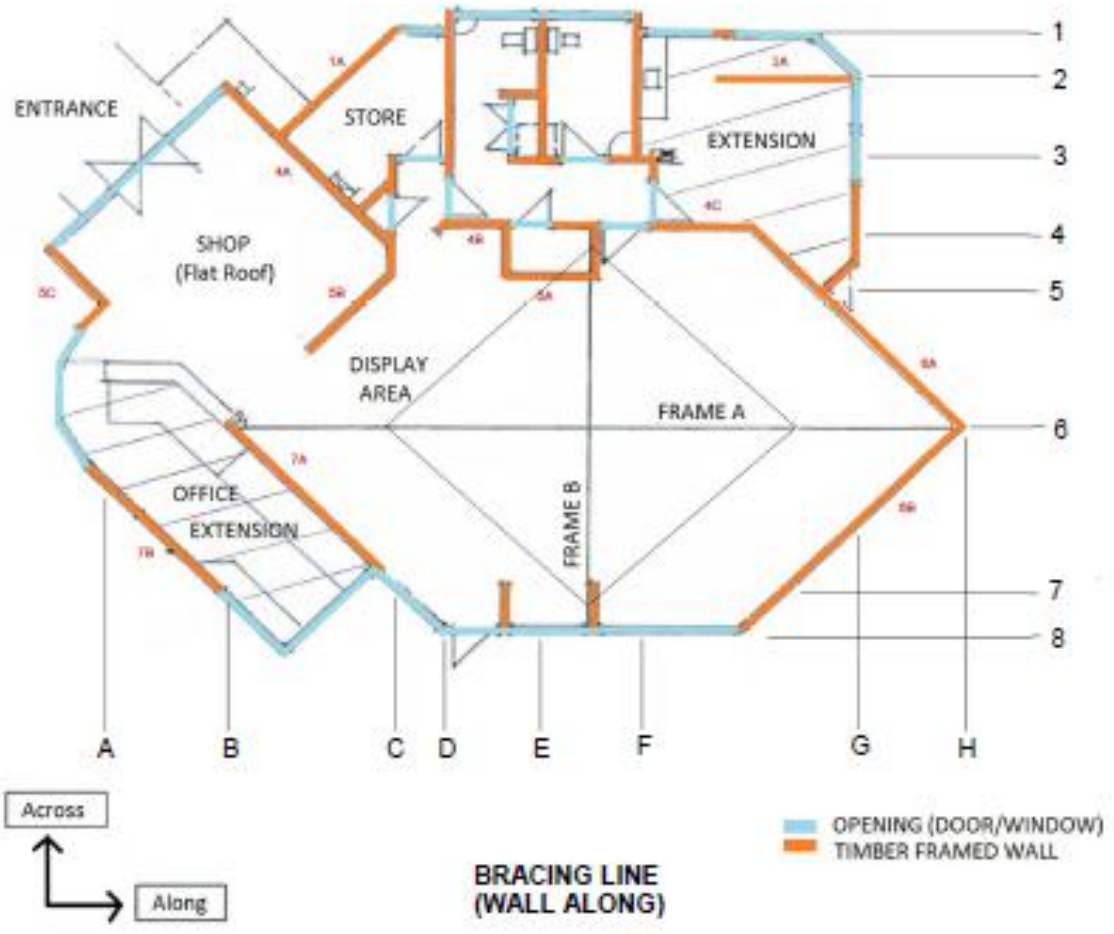

Figure 5 Plan Sketches Showing Numbering Sequence for Bracing Elements (Along)

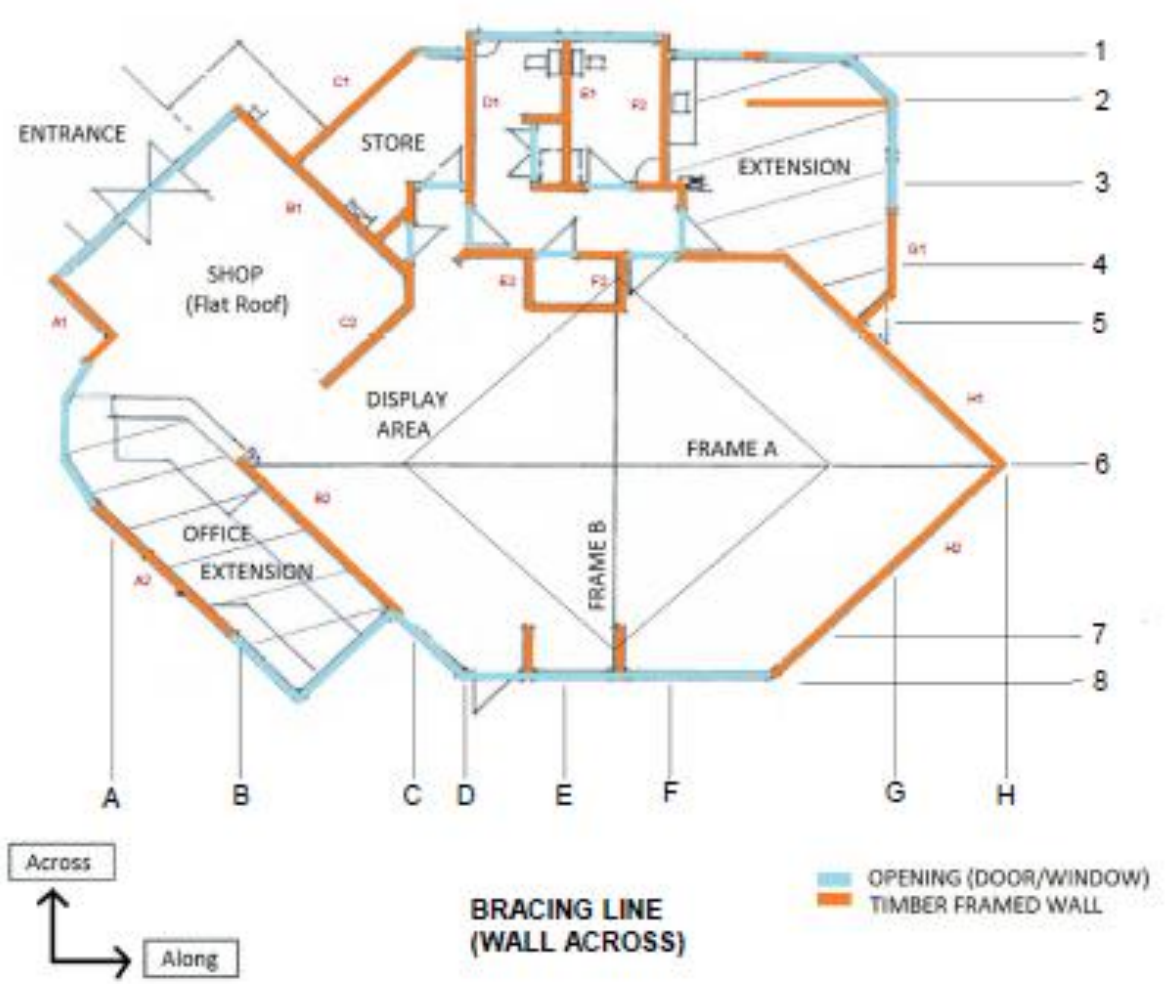

Figure 6 Plan Sketches Showing Numbering Sequence for Bracing Elements (Across)

10. Conclusion & Recommendations

Based on the quantitative assessment of this structure, the results show that the building achieved a rating greater than 100% NBS and therefore is not an Earthquake Risk.

The following recommendations are outlined for this structure:

1. Repair minor cracks that are found in the structure, as specified in Section 6.2 and as shown in Photographs 6 and 7 of Appendix B of this report.

The current green placard should remain in the structure.

11. Limitations

11.1 General

This report has been prepared subject to the following limitations:

- Available drawings as seen on Appendix C are used as reference.
- The foundations of the building were unable to be inspected.
- No level or verticality surveys have been undertaken.
- No material testing has been undertaken.

It is noted that this report has been prepared at the request of Christchurch City Council and is intended to be used for their purposes only. GHD accepts no responsibility for any other party or person who relies on the information contained in this report.

11.2 Geotechnical Limitations

The data and advice provided herein relate only to the project and structures described herein and must be reviewed by a competent geotechnical engineer before being used for any other purpose. GHD Limited (GHD) accepts no responsibility for other use of the data by third parties.

Where drill hole or test pit logs, cone tests, laboratory tests, geophysical tests and similar work have been performed and recorded by others under a separate commission, the data is included and used in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

The advice tendered in this report is based on information obtained from the desk study investigation location test points and sample points. It is not warranted in respect to the conditions that may be encountered across the site other than at these locations. It is emphasised that the actual characteristics of the subsurface materials may vary significantly between adjacent test points, sample intervals and at locations other than where observations, explorations and investigations have been made. Subsurface conditions, including groundwater levels and contaminant concentrations can change in a limited time. This should be borne in mind when assessing the data.

It should be noted that because of the inherent uncertainties in subsurface evaluations, changed or unanticipated subsurface conditions may occur that could affect total project cost and/or execution. GHD does not accept responsibility for the consequences of significant variances in the conditions and the requirements for execution of the work.

The subsurface and surface earthworks, excavations and foundations should be examined by a suitably qualified and experienced Engineer who shall judge whether the revealed conditions accord with both the assumptions in this report and/or the design of the works. If they do not accord, the Engineer shall modify advice in this report and/or design of the works to accord with the circumstances that are revealed.

An understanding of the geotechnical site conditions depends on the integration of many pieces of information, some regional, some site specific, some structure specific and some experienced based. Hence this report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approval by GHD. GHD accepts no responsibility for any

circumstances which arise from the issue of the report which have been modified in any way as outlined in Section 8.

12. References

1. Detailed Engineering Evaluation Qualitative Report for Botanic Gardens Information Kiosk, April 20, 2012, GHD Pty. Ltd.
2. AS/NZS 1170.0:2002 Structural design actions, Part 0: General Principles, New Zealand Standards
3. AS/NZS 1170.0 Supplement 1:2002 Structural design actions - General principles - Commentary
4. AS/NZS 1170.1:2002 Structural design actions, Part 1: Permanent, imposed and other actions, New Zealand Standards
5. AS/NZS 1170.1 Supplement 1:2002 Structural design actions – Permanent, imposed and other actions - Commentary
6. NZS 1170.5:2004 Structural design actions, Part 5: Earthquake actions, New Zealand Standards
7. NZS 1170.5 Supplement 1:2004 Structural design actions –Earthquake actions – New Zealand - Commentary
8. NZS 3404: Part 1:1997 Steel Structures Standard
9. NZS 3603:1993 Timber Structures Standard, New Zealand Standards
10. NZS 3604:1981 Timber-framed buildings, New Zealand Standards
11. NZS 3604:2011 Timber-framed buildings, New Zealand Standards
12. Timber Design Guide by Andrew Buchanan, University of Canterbury, 3rd Edition 2007
13. NZSEE 2006, Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, New Zealand Society for earthquake Engineering
14. Compliance Document for New Zealand Building Code Clause B1: Structure, Department of Building and Housing

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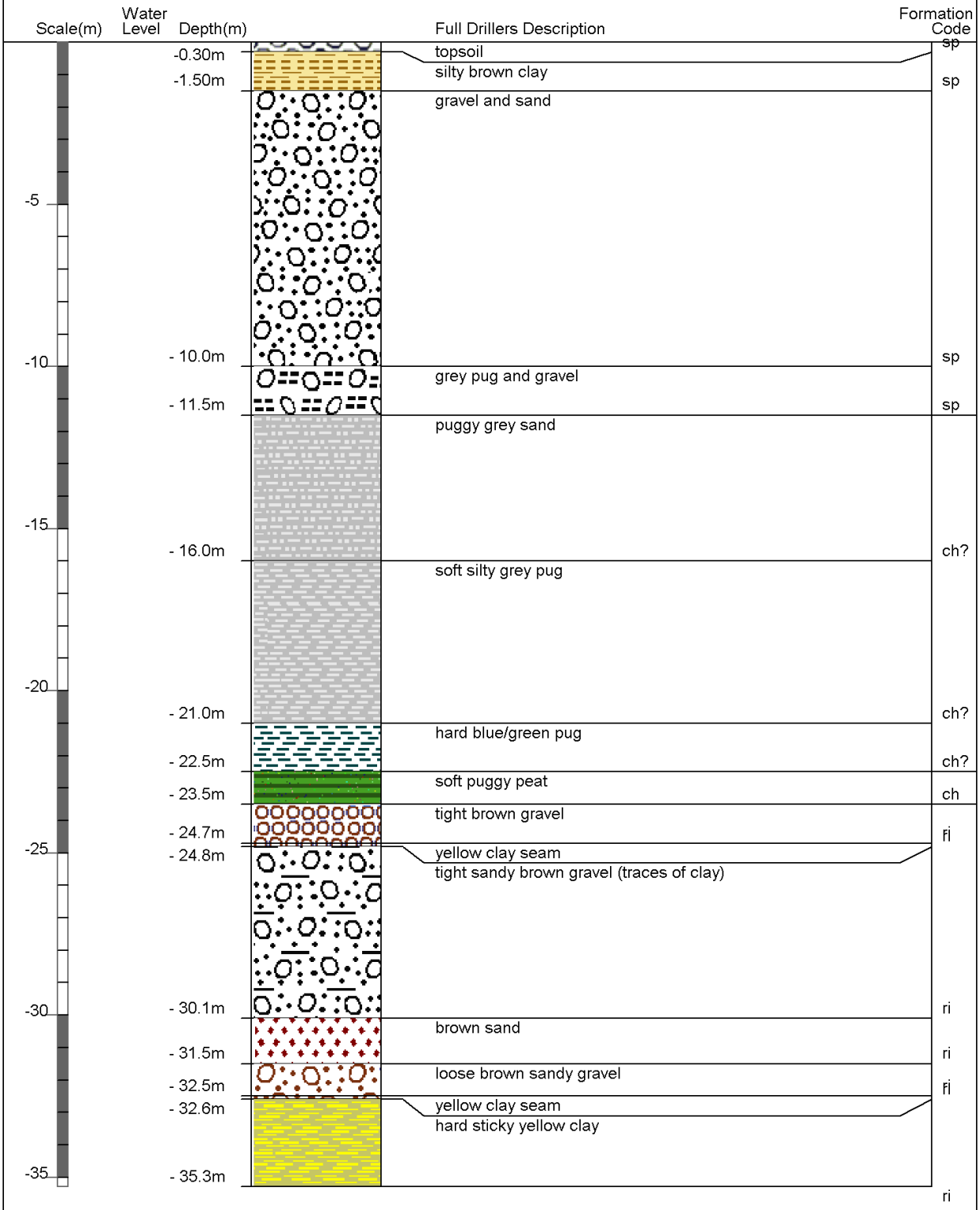
Appendix A

Geotechnical Investigation – Borehole Logs

Borelog for well M35/10619 page 1 of 3

Gridref: M35:7952-4188 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 7.5 +MSD
Driller : Clemence Drilling Contractors
Drill Method : Rotary/Percussion
Drill Depth : -105.9m Drill Date : 6/10/2006

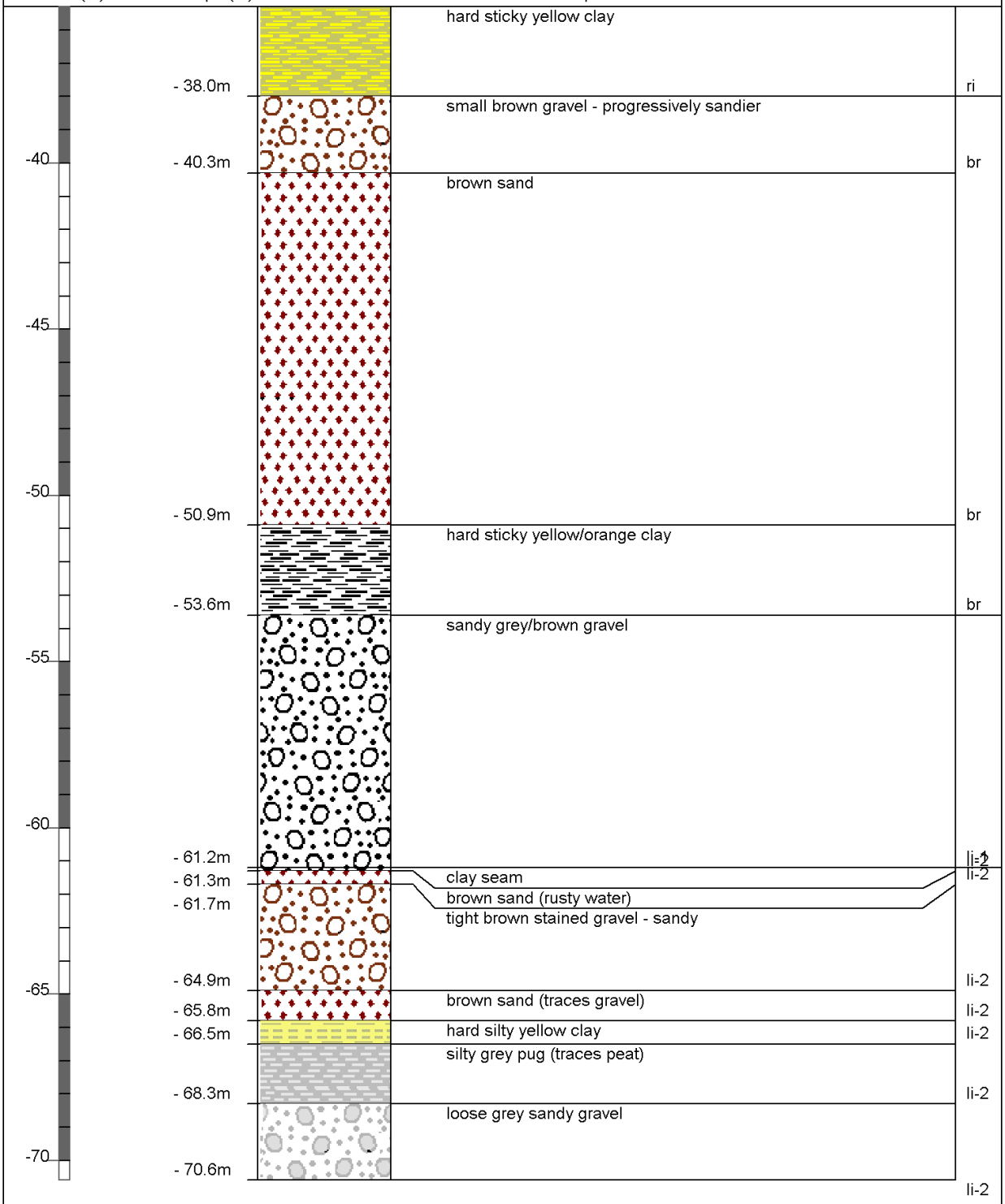
Environment Canterbury Regional Council



Borelog for well M35/10619 page 2 of 3

Gridref: M35:7952-4188 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 7.5 +MSD
Driller : Clemence Drilling Contractors
Drill Method : Rotary/Percussion
Drill Depth : -105.9m Drill Date : 6/10/2006

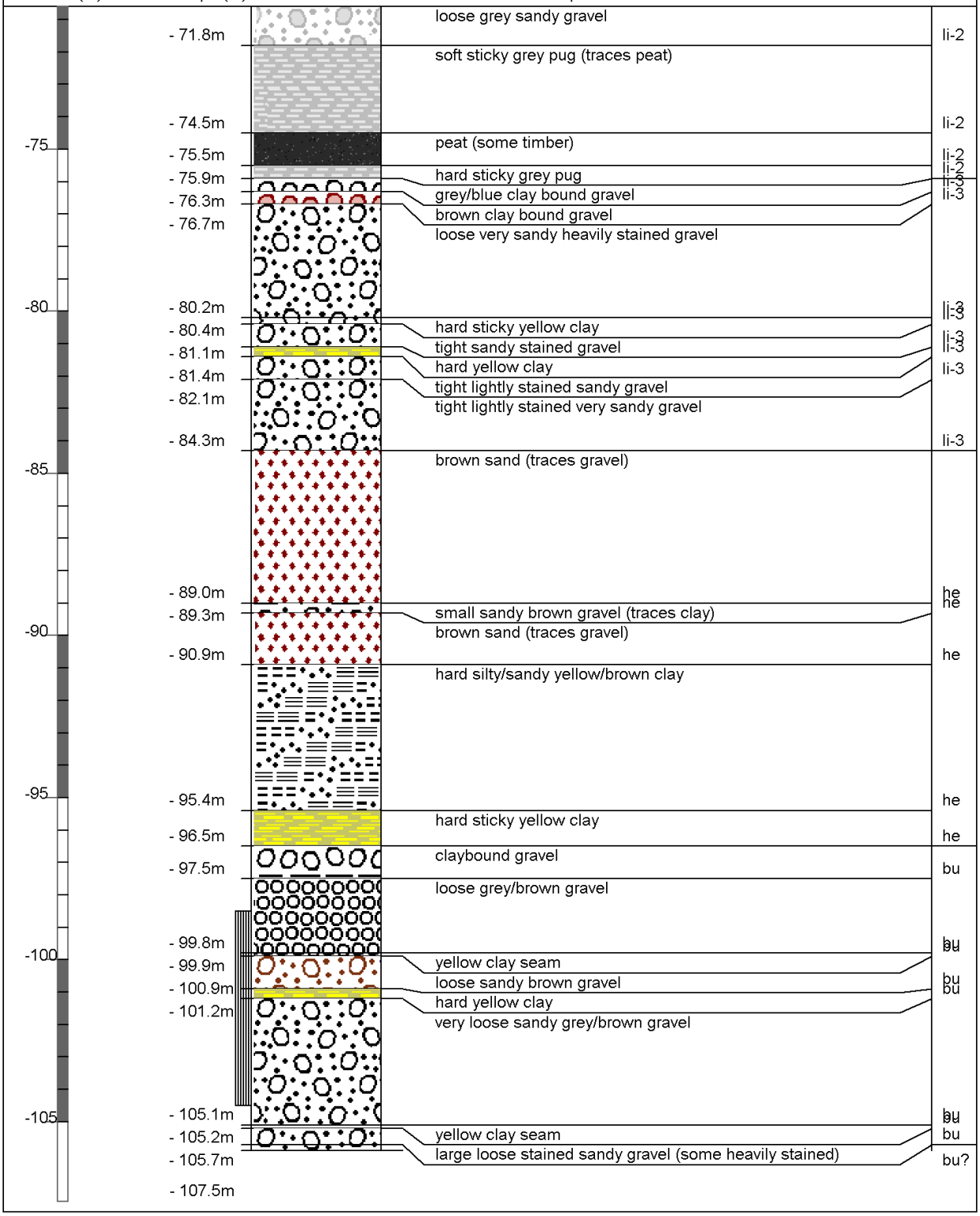
Environment Canterbury Regional Council



Borelog for well M35/10619 page 3 of 3

Gridref: M35:7952-4188 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 7.5 +MSD
Driller : Clemence Drilling Contractors
Drill Method : Rotary/Percussion
Drill Depth : -105.9m Drill Date : 6/10/2006

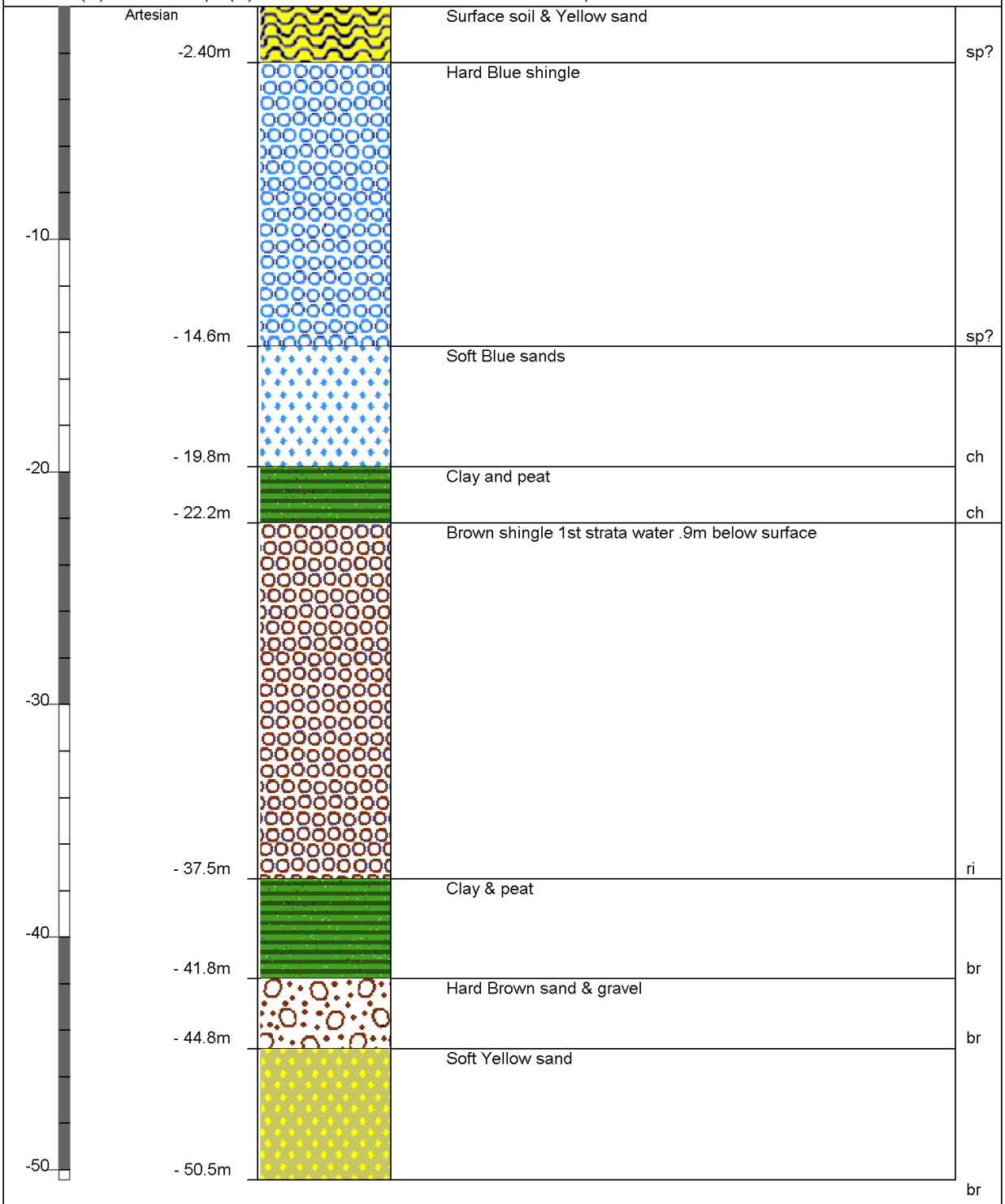
Environment Canterbury Regional Council



Borelog for well M35/1936 page 1 of 2

Gridref: M35:79554-41858 Accuracy : 2 (1=high, 5=low)
Ground Level Altitude : 7.6 +MSD
Driller : Job Osborne (& Co/Ltd)
Drill Method : Hydraulic/Percussion
Drill Depth : -100.9m Drill Date : 2/07/1898

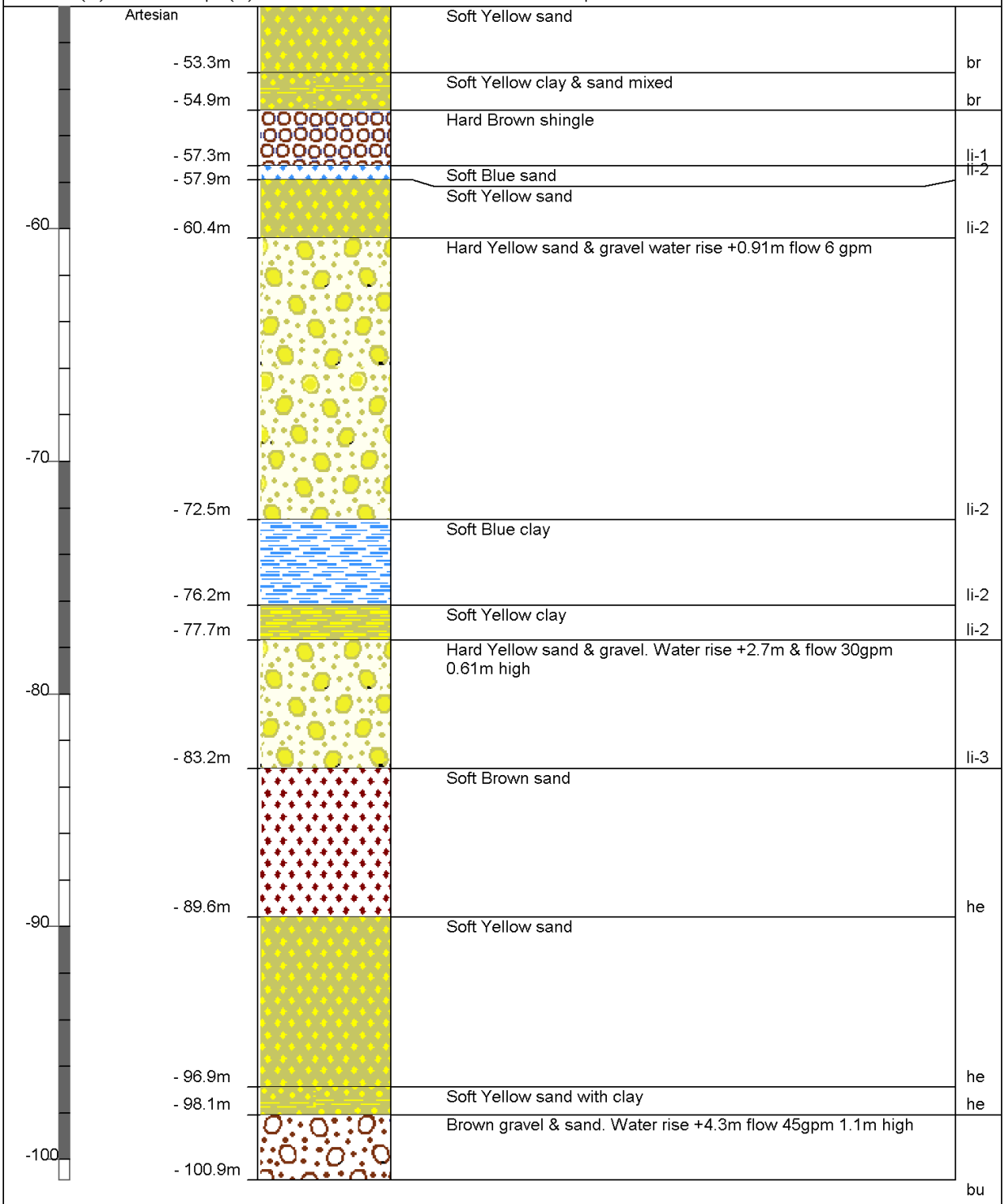
Environment Canterbury Regional Council



Borelog for well M35/1936 page 2 of 2

Gridref: M35:79554-41858 Accuracy : 2 (1=high, 5=low)
Ground Level Altitude : 7.6 +MSD
Driller : Job Osborne (& Co/Ltd)
Drill Method : Hydraulic/Percussion
Drill Depth : -100.9m Drill Date : 2/07/1898

Environment Canterbury Regional Council



BOREHOLE LOG

GHD Limited

PO Box 13468
Christchurch 8141

Site Identification: **BH01**

Sheet 1 of 2

Project: Christchurch Botanic Gardens
Client: Christchurch City Council
Site: Botanic Gardens
Job No.: 513059691

Coordinates: **E** 2479 508, **N** 5741 909
Datum: NZMG
Surface RL (m): +8.0m
Total Depth: 19.5m
Commenced: 08-Oct-12
Contractor: McMillan Specialist Driling
Completed: 10-Oct-12
Driller: McMillan

Equipment: Truck 9700D
Inclination: -90
Shear Vane:
Comments:
Bore Diameter (mm):

Logged:	DW
Processed:	DW
Checked:	JR

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength (EW VW W MS S VS ES)	RQD (%)	Defect Spacing (mm) (20 60 200 600 2000)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating
0.3 [+7.8]	Dual Tube	54	None		Springston Formation	SP		Gravelly medium to coarse SAND; brown. Dry; well graded; gravel, fine to coarse, angular to subrounded, greywacke.	D						
						SP			M						
0.5 [+7.5]						SP		Organic fine SAND with some silt; dark brown. Moist; poorly graded.	M						
0.8 [+7.2]								Fine SAND; brown. Moist; poorly graded.							
								CORELOSS							
1.5 [+6.5]		67				GP		Sandy fine to coarse GRAVEL; brown. Loose; moist; well graded, angular to subrounded, greywacke; sand, fine to coarse.	M	L				SPT	8,8, 4,2, 2,1, [9]
2.5 [+5.5]								CORELOSS *inferred* Sandy GRAVEL							
3.0 [+5.0]		53				GP		Sandy fine to coarse GRAVEL; brown. Loose; moist; poorly graded, angular to subrounded, greywacke; sand, fine to coarse.	M	L				SPT	2,1, 2,1, 3,3, [9]
3.8 [+4.2]								CORELOSS							
4.5 [+3.5]		67				SP		Medium to coarse SAND; grey. Dense; wet; poorly graded.	W	D				SPT	6,6, 6,8, 9,9, [32]
4.8 [+3.2]						GP		Sandy fine to coarse GRAVEL; grey. Dense; wet; poorly graded, angular to subrounded, greywacke; sand, medium to coarse.	W	D					
5.5 [+2.5]								CORELOSS *inferred* Sandy GRAVEL							
6.0 [+2.0]		40				GP		Sandy fine to coarse GRAVEL; grey. Dense; wet; poorly graded, angular to subrounded, greywacke; sand, medium to coarse.	W	D				SPT	6,7, 10,9, 10,12, [41]
6.1 [+1.9]						SP			W	MD					
6.2 [+1.8]						GP			W	D					
6.6 [+1.4]								Medium SAND; grey. Medium dense; wet; poorly graded.	W						
								Sandy fine to coarse GRAVELwith trace silt; grey. Dense; wet; poorly graded, angular to subrounded, greywacke; sand, medium to coarse.							
								CORELOSS *inferred* Sandy GRAVEL							
7.5 [+0.5]		73				SP		Gravelly medium to coarse SAND; grey. Dense; wet; gravel, fine to medium, angular to subrounded, greywacke	W	D				SPT	11,12, 15,16, 16,17, [50]
7.7 [+0.3]						GP			W	MD					
								Sandy fine to coarse GRAVELwith trace silt; grey. Medium dense to dense; wet; poorly graded, angular to subrounded, greywacke; sand, medium to coarse.							
8.6 [-0.6]								CORELOSS *inferred* Sandy GRAVEL							
9.0 [-1.0]		100				GP		Sandy medium to coarse GRAVELwith trace silt; grey. Medium dense; wet; poorly graded, angular to subrounded, greywacke; sand, fine to coarse.	W	MD				SPT	10,7, 5,5, 5,5, [20]
		67												SPT	3,4, 5,7, 6,5, [23]

BOREHOLE LOG NZ ALT BOTANIC GARDENS GINT LOG.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 12/7/12

BOREHOLE LOG

GHD Limited

PO Box 13468
Christchurch 8141

Site Identification: **BH01**

Project: Christchurch Botanic Gardens
Client: Christchurch City Council
Site: Botanic Gardens
Job No.: 513059691

Coordinates: **E** 2479 508, **N** 5741 909
Surface RL (m): +8.0m
Commenced: 08-Oct-12
Completed: 10-Oct-12

Datum: NZMG
Total Depth: 19.5m
Contractor: McMillan Specialist Driling
Driller: McMillan

Equipment: Truck 9700D
Shear Vane:
Bore Diameter (mm):

Inclination: -90
Comments:

Logged:	DW
Processed:	DW
Checked:	JR

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength (EW VW W MS S VS ES)	RQD (%)	Defect Spacing (mm) (20 60 200 600 2000)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	
11.5 [-3.5]	Dual Tube	67	None		Springston Formation	GP		Sandy medium to coarse GRAVELwith trace silt; grey. Medium dense; wet; poorly graded, angular to subrounded, greywacke; sand, fine to coarse.	W	MD						
12								CORELOSS *inferred* Sandy GRAVEL								
12.0 [-4.0]						GP		Sandy medium to coarse GRAVELwith trace silt; grey. Medium dense; wet; poorly graded, angular to subrounded, greywacke; sand, fine to coarse.	W	MD					SPT 3,4, 4,5, 5,5, [19]	12
12.9 [-4.9]		68				ML		SILT with some organic material; grey. Stiff; wet; low plasticity.		St						
13 13.0 [-5.0]								CORELOSS								13
13.5 [-5.5]						SP		Fine SAND with some silt; grey. Medium dense; wet; poorly graded.	W	MD					SPT 3,4, 6,6, 6,7, [25]	
14		100														14
15						ML		SILT; grey. Stiff; wet; low plasticity.		S					SPT 2,1, 1,1, 1,1, [4]	15
15.8 [-7.8]		100				SP		Fine SAND with some silt; grey. Loose; saturated; well graded. @15.87m shell fragments	S	L						
16																16
16.5 [-8.5]						ML		SILT; grey. Stiff; wet; low plasticity.	S	S					SPT 1,1, 1,2, 1,2, [6]	
17		100														17
17.4 [-9.4]						SW		Fine to medium SAND with some silt; grey. Medium dense; saturated; well graded.	S	'MD'						
18																18
18.0 [-10.0]						SP		Fine SAND with some silt; grey. Medium dense; saturated; poorly graded.	S	MD					SPT 1,2, 2,6, 7,8, [23]	
19		100														19
19.5 [-11.5]								Termination Depth = 19.5m, Target Depth							SPT 1,2, 3,5, 7,7, [22]	
20																20
21																21
22																22

BOREHOLE LOG

GHD Limited

PO Box 13468
Christchurch 8141

Site Identification: **BH02**

Sheet 1 of 2

Project: Christchurch Botanic Gardens
Client: Christchurch City Council
Site: Botanic Gardens
Job No.: 513059691

Coordinates: **E** 2479 326, **N** 5742 005
Surface RL (m): +8.0m
Commenced: 10-Oct-12
Completed: 11-Oct-12

Datum: NZMG
Total Depth: 19.5m
Contractor: McMillan Specialist Driling
Driller: McMillan

Equipment: Truck 9700D
Shear Vane:
Bore Diameter (mm):

Inclination: -90
Comments:

Logged:	JS
Processed:	JS
Checked:	JR

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength (EW VW W MS S VS ES)	RQD (%)	Defect Spacing (mm) (20 60 200 600 2000)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating
0.3 [+7.7]	Dual Tube	73	None		Springston Formation	GP		Sandy fine GRAVEL; brown. Dry; poorly graded, angular greywacke gravel; sand, fine to coarse.	D						
0.6 [+7.4]						ML		SILT with trace gravel; brown. Very stiff; dry; low plasticity; gravel, fine, angular greywacke.	D	VSt					
0.7 [+7.3]						ML GP		SILT with some sand and trace gravel; brown. Stiff; moist; low plasticity; sand, fine; gravel, fine, subrounded greywacke.	M D	'St' MD					
1								Sandy fine to medium GRAVEL; brown. Medium dense; dry; poorly graded; subrounded greywacke; sand, fine to medium.							SPT 5,5, 4,3, 4,5, [16]
2.0 [+6.0]		100				GP		Sandy fine to medium GRAVEL; grey. Medium dense; wet; poorly graded; subrounded greywacke; sand, fine to coarse.	W	MD					SPT 6,7, 6,7, 8,7, [28]
3.7 [+4.3]		87				GP		Sandy fine to medium GRAVEL; grey. Medium dense; saturated; poorly graded; subrounded greywacke; sand, fine to coarse.	S	'MD'					
4.1 [+3.9]						SP		Fine SAND; grey. Medium dense; moist; uniformly graded.	M	'MD'					
4.3 [+3.7]						GC			M	'D'					
4.5 [+3.5]						SP		Sandy fine to medium GRAVEL; grey. Dense; moist; poorly graded; subrounded greywacke; sand, fine to medium.	M	D					SPT 6,7, 8,8, 8,9, [33]
5.0 [+3.0]		87				GP		Fine to medium SAND; grey. Dense; moist; poorly graded.	W	D					
6								Sandy fine to coarse GRAVEL; grey. Dense; wet; well graded; subrounded greywacke; sand fine to medium.							SPT 5,6, 6,7, 9,11, [33]
7		87													
7.5 [+0.5]		53						Core loss							SPT 3,2, 4,7, 6,4, [21]
8.0 [+0.0]						GP		Gravelly fine to medium SAND; grey. Medium dense; moist; poorly graded; gravel, fine to medium, subrounded greywacke.	M	MD					
8.5 [-0.5]						SP		Fine to medium SAND; grey. Medium dense; moist; poorly graded.	M	'MD'					
8.7 [-0.7]						GP			W	'MD'					
8.8 [-0.8]						SP		Sandy fine to medium GRAVEL; grey. Medium dense; wet; poorly graded; subrounded greywacke; sand, fine to medium.	W	'MD'					
9.0 [-1.0]		80				SW			W S	MD					SPT 3,5, 6,3, 3,5, [17]
9.4 [-1.4]						GP		Coarse SAND with wood; grey. Medium dense; wet; uniformly graded.	S	'MD'					
9.7 [-1.7]								Fine to coarse SAND; grey. Medium dense; saturated; well graded.							
9.9 [-1.9]						GP		Sandy fine to medium GRAVEL; grey. Very dense; saturated; poorly graded; subrounded greywacke; sand, fine to medium.	S	'MD'					
10.0 [-2.0]						SP			W	'MD'					
10.2 [-2.2]								Wooden Log (~200mm thick).							
10.5 [-2.5]		100	None			SP		Sandy fine to coarse GRAVEL; grey. Medium dense; saturated; well graded; subrounded greywacke; sand, fine to coarse.	M	VD					SPT 11,11, 13,15, 16,18, [>50]
11															

BOREHOLE LOG

GHD Limited

PO Box 13468
Christchurch 8141

Site Identification: **BH02**

Sheet 2 of 2

Project: Christchurch Botanic Gardens
Client: Christchurch City Council
Site: Botanic Gardens
Job No.: 513059691

Coordinates: **E** 2479 326, **N** 5742 005
Surface RL (m): +8.0m
Commenced: 10-Oct-12
Completed: 11-Oct-12

Datum: NZMG
Total Depth: 19.5m
Contractor: McMillan Specialist Driling
Driller: McMillan

Equipment: Truck 9700D
Shear Vane:
Bore Diameter (mm):

Inclination: -90
Comments:

Logged:	JS
Processed:	JS
Checked:	JR

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength (EW VW W MS S VS ES)	RQD (%)	Defect Spacing (mm) (20 60 200 600 2000)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating
11.5 [-3.5]	Dual Tube	100	None		Christchurch Formation	SP		Fine to medium SAND; grey. Medium dense; wet; poorly graded.	M	VD					
11.6 [-3.6]								Core loss							
12						ML		Fine to medium SAND with rare wood fragment; grey. Very dense; moist; poorly graded.	M	'S'					
						SP		SILT; grey. Soft; moist; low plasticity.	W	MD					
12.4 [-4.4]		67						Fine SAND; grey. Medium dense; wet; uniformly graded.							SPT 7,9, 8,8, 6,5, [27]
						SP		Silty fine SAND; grey. Medium dense; wet; poorly graded.	W	MD					
13								Core loss							
13.5 [-5.5]		100				ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	F					SPT 1,1, 1,8, 10,10, [29]
14						SP		Silty fine SAND with some shell fragments; grey. Medium dense; wet; poorly graded.	W	'MD'					
14.5 [-6.5]						ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	'F'					
15						SP		Silty fine SAND; grey. Medium dense; wet; poorly graded.	W	MD					SPT 2,3, 5,8, 7,6, [26]
15.4 [-7.4]		100				ML		SILT with some sand; grey. Firm; wet; low plasticity; sand, fine.	W	F					
16															SPT 1,0, 2,1, 2,2, [7]
17						ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	F					
17.2 [-9.2]		100				ML		SILT with some fine sand; grey. Firm; wet; low plasticity.	W	F					
18						SP		Fine SAND; grey. Medium dense; moist; uniformly graded.	M	MD					SPT 0,0, 1,4, 6,8, [19]
18.1 [-10.1]						ML		Sandy SILT; grey. Stiff to very stiff; wet; low plasticity.	W	St					
18.6 [-10.6]		100				ML		SILT with some sand; greenish grey. Firm; moist; low plasticity.	M	'F'					
19						ML		Clayey SILT; green. Very Stiff; dry to moist; low plasticity.	M	'VSt'					
19.5 [-11.5]								Termination Depth = 19.5m, Target Depth							SPT 2,2, 2,6, 6,5, [19]
20															
21															
22															

BOREHOLE LOG NZ ALT BOTANIC GARDENS GINT LOG.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 12/7/12

BOREHOLE LOG

GHD Limited

PO Box 13468
Christchurch 8141

Site Identification: **BH02**

Sheet 2 of 2

Project: Christchurch Botanic Gardens
Client: Christchurch City Council
Site: Botanic Gardens
Job No.: 513059691

Coordinates: **E** 2479 326, **N** 5742 005
Surface RL (m): +8.0m
Commenced: 10-Oct-12
Completed: 11-Oct-12

Datum: NZMG
Total Depth: 19.5m
Contractor: McMillan Specialist Driling
Driller: McMillan

Equipment: Truck 9700D
Shear Vane:
Bore Diameter (mm):

Inclination: -90
Comments:

Logged:	JS
Processed:	JS
Checked:	

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength (EW VW W MS S VS ES)	RQD (%)	Defect Spacing (mm) (20 60 200 600 2000)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating
[7.9] 10.0 [-2.0] 10.2 [-2.2]		80	None			GP		Sandy fine to medium GRAVEL; grey. Very dense; saturated; poorly graded; subrounded greywacke; sand, fine to medium.	S	'MD'					
						SP			W	'MD'					
10.5 [-2.5]								Wooden Log (~200mm thick).							
	Dual Tube	100	None		Christchurch Formation	SP		Sandy fine to coarse GRAVEL; grey. Medium dense; saturated; well graded; subrounded greywacke; sand, fine to coarse.	M	VD					SPT 11,11, 13,15, 16,18, [>50]
11								Fine to medium SAND; grey. Medium dense; wet; poorly graded.							11
								Core loss							
11.5 [-3.5] 11.6 [-3.6]						ML		Fine to medium SAND with rare wood fragment; grey. Very dense; moist; poorly graded.	M	'S'					
						SP		SILT; grey. Soft; moist; low plasticity.	W	MD					
12								Fine SAND; grey. Medium dense; wet; uniformly graded.							SPT 7,9, 8,8, 6,5, [27] 12
12.4 [-4.4]		67				SP		Silty fine SAND; grey. Medium dense; wet; poorly graded.	W	MD					
13.0 [-5.0] 13								Core loss							13
13.5 [-5.5]						ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	F					SPT 1,1, 1,8, 10,10, [29]
14						SP		Silty fine SAND with some shell fragments; grey. Medium dense; wet; poorly graded.	W	'MD'					14
14.5 [-6.5]		100				ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	'F'					
15			None			SP		Silty fine SAND; grey. Medium dense; wet; poorly graded.	W	MD					SPT 2,3, 5,8, 7,6, [26] 15
15.4 [-7.4]						ML		SILT with some sand; grey. Firm; wet; low plasticity; sand, fine.	W	F					
16		100													16
17															SPT 1,0, 2,1, 2,2, [7] 17
17.0 [-9.0]						ML		Sandy SILT; grey. Firm; wet; low plasticity.	W	F					
17.2 [-9.2]		100				ML		SILT with some fine sand; grey. Firm; wet; low plasticity.	W	F					
17.9 [-9.9] 18						SP		Fine SAND; grey. Medium dense; moist; uniformly graded.	M	MD					SPT 0,0, 1,4, 6,8, [19] 18
18.1 [-10.1]						ML		Sandy SILT; grey. Stiff to very stiff; wet; low plasticity.	W	St					
18.6 [-10.6]		100				ML		SILT with some sand; greenish grey. Firm; moist; low plasticity.	M	'F'					
19						ML		Clayey SILT; green. Very Stiff; dry to moist; low plasticity.	M	'VSt'					19
19.0 [-11.0] 19.5 [-11.5]								Termination Depth = 19.5m, Target Depth							SPT 2,2, 2,6, 6,5, [19]
20															20

BOREHOLE LOG NZ ALT BOTANIC GARDENS GINT LOG.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 10/24/12

Appendix B

Photographs

Photograph 1: Front entrance at north-west facing elevation

Photograph 2: North-east elevation with extension showing insignificant short column potential

Photograph 3: Balcony and structure abutting lake with insignificant short column potential

Photograph 4: Permimeter strip footing supporting timber framed walls

Photograph 5: Steel framework to roof showing exposed timber rafters

Photograph 6: Separation between concrete floor slab and timber framed wall

Photograph 7: Minor cracking in plasterboard

Photograph 8: Building location on site

Appendix C

Existing Drawings/Sketches

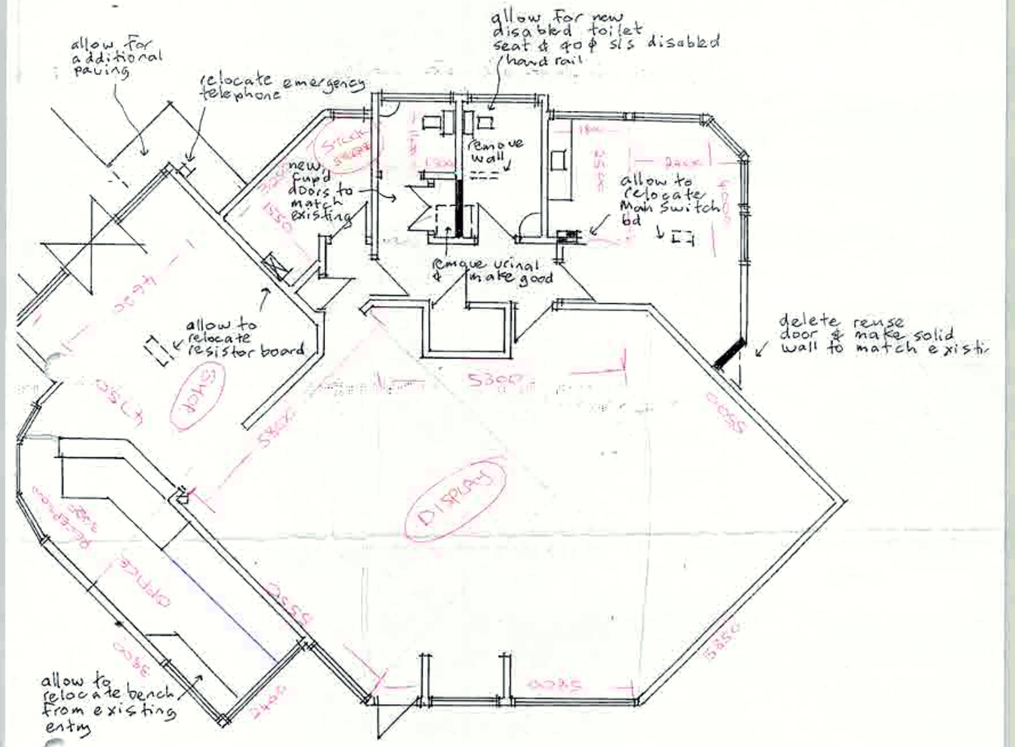
BG 131

Re-Order Filemaster "D"

SELF-ADHESIVE PLAN HANGER

Patent Number 137841

NOTICE TO TENDERS
No 2



REVISED PLAN
SITE INSTRUCTION No 2.
BOTANIC GARDENS INFO CENTRE

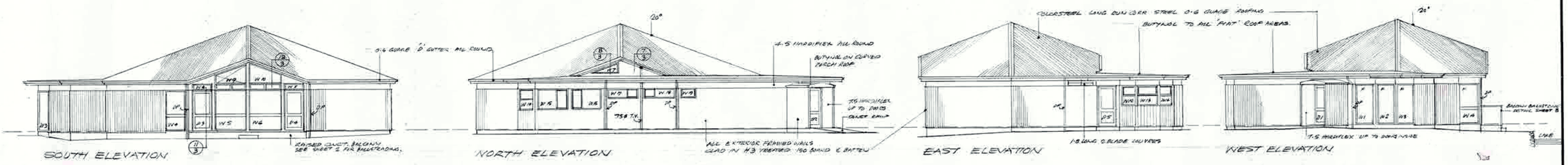
Stationery Cupboard 1360 x 550

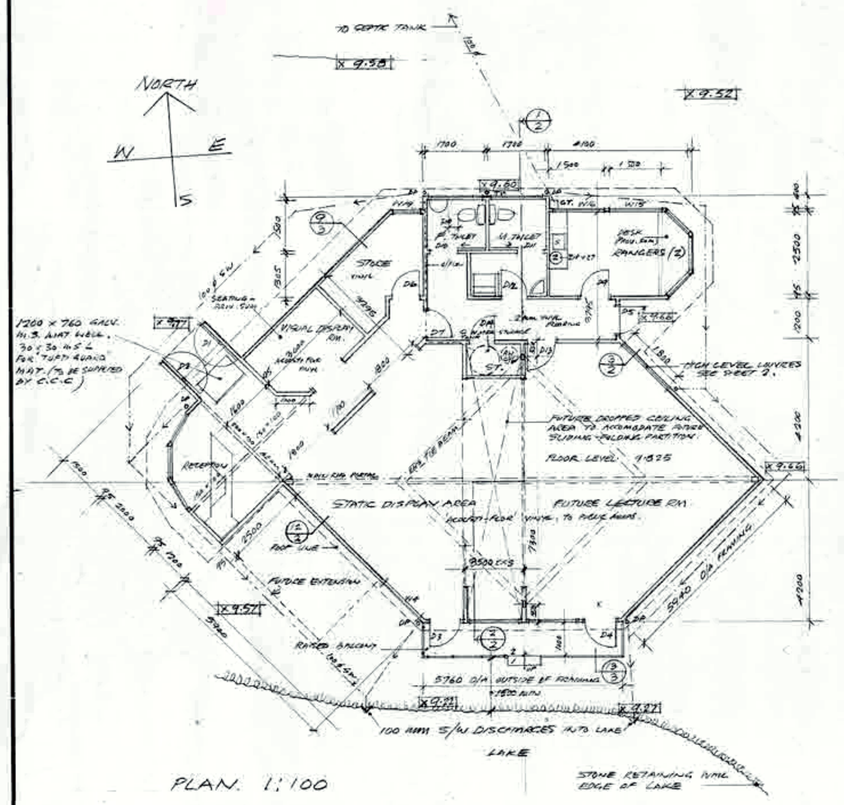
Storage:-
Playground
Bin Hagley
years
Nursery

PAGE OF 2

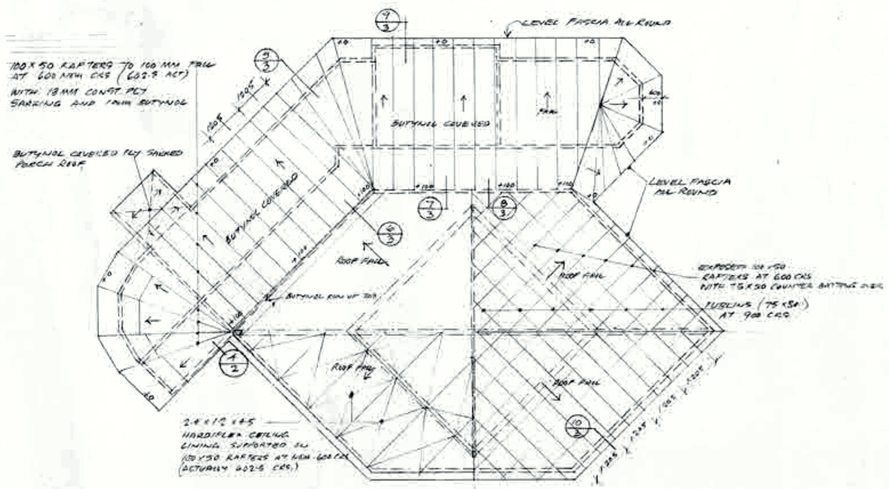
CITY DESIGN	INITIALS	DATE		APPROVED	DRAWING TITLE
CHRISTCHURCH THE GARDEN CITY	DESIGNED	13/6	DATUM		
	DRAWN	2000	BENCH MK		
	TRACED		SURVEY PB	DATE	
	DRW. CHK.		SURVEY LB		
	DES. CHK.		CONSTN. EB		
	ORDERED		CONSTN. LB	CITY DESIGN MANAGER	

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK





PLAN. 1:100

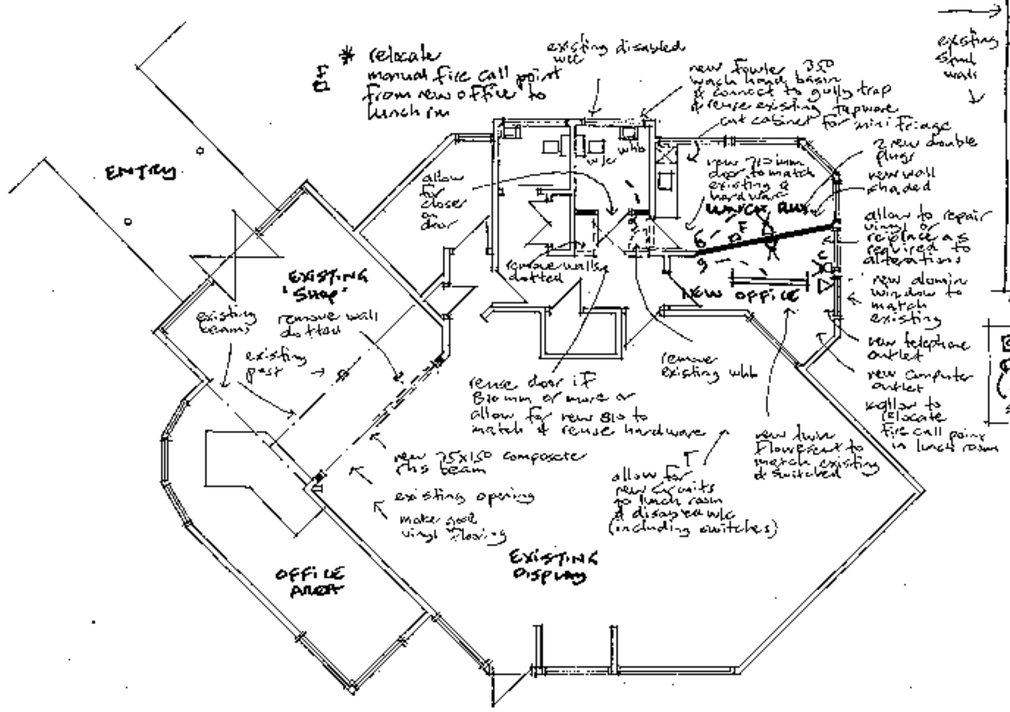


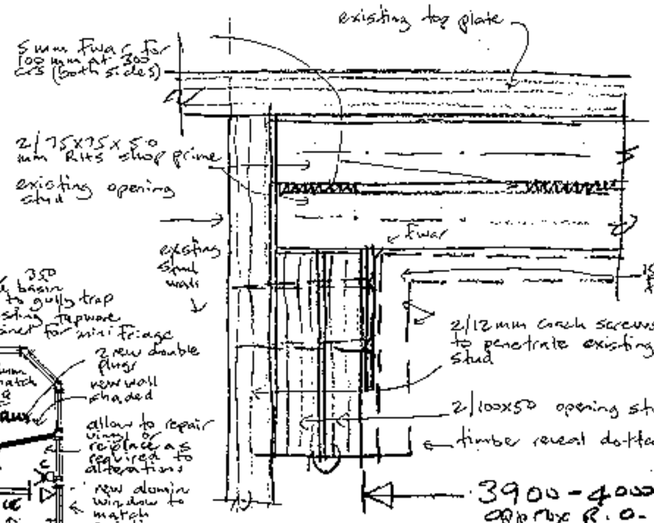
ROOF PLAN. 1:100 SHOWING SUPPORT STRUCTURE

CHRISTCHURCH CITY COUNCIL BOTANIC GARDENS INFORMATION CENTRE

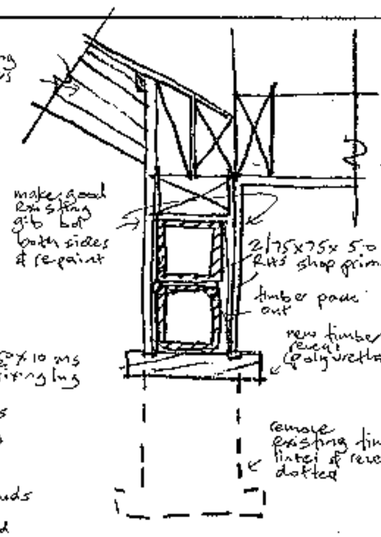
CITY ARCHITECTS DIVISION: CITY WORKS & PLANNING DEPARTMENT

SCALE 1:100
SITE PLAN 1:200
DESIGN
DRAWN
TRACED
JOB NO A375 SHEET NUMBER 1

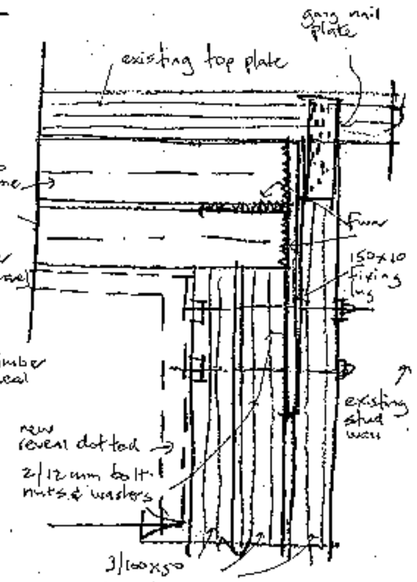




BEAM POST DETAIL LHS (at meeting room)
scale 1:5

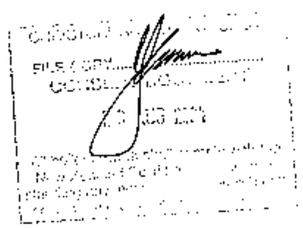


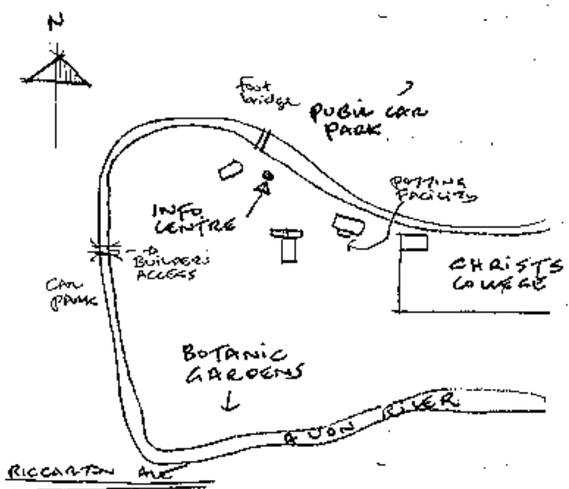
NEW M.S. BEAM DETAIL
scale 1:5



BEAM POST DETAIL RHS (at meeting room)
scale 1:5

RUSSELL SIMSON
Building Consent Officer





SITE PLAN NTS

PREPARED BY CITY SOLUTIONS - CITY SOLUTIONS OPERATES AS A BUSINESS UNIT WITHIN THE CHRISTCHURCH CITY COUNCIL

ISSUE	AMENDMENTS	SIGNED	DATE

CITYSOLUTIONS

DATUM	COO.
DOMAIN VK.	
SURVEY FD.	
SURVEY LB.	
CONSTN EB.	
CONSTN LD.	
SOIL FILE	

	NAME	SIGNED	DATE
DESIGNED			
DES. REVIEW			
DRAWN			
DRW. CHECK			

APPROVED
DATE

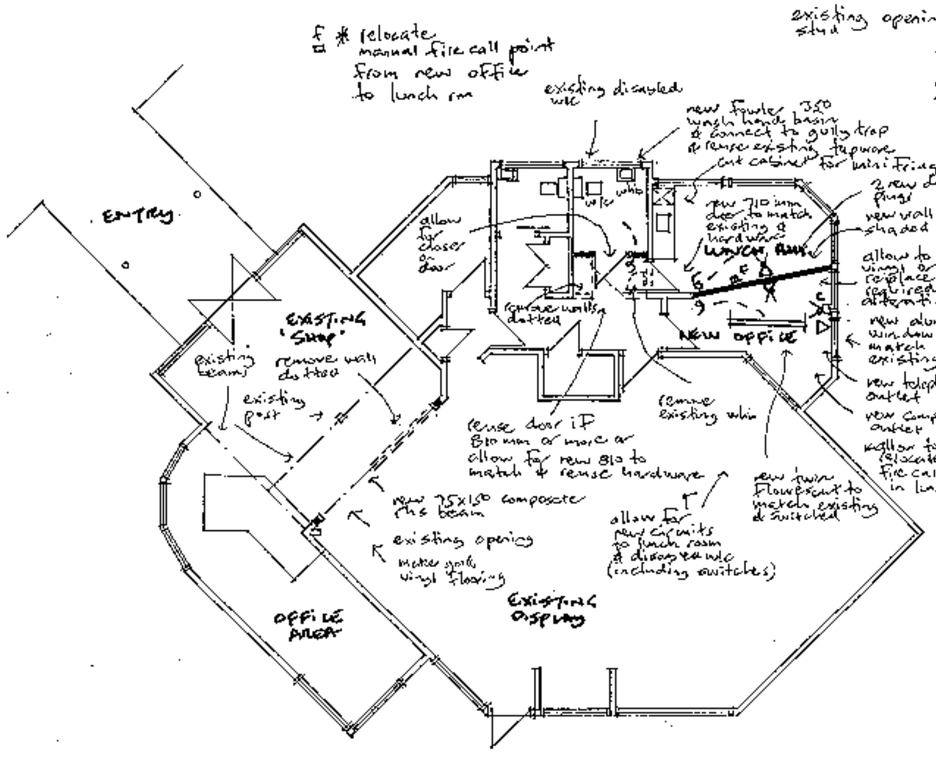
CHRISTCHURCH
CITY COUNCIL · YOUR PEOPLE · YOUR CITY

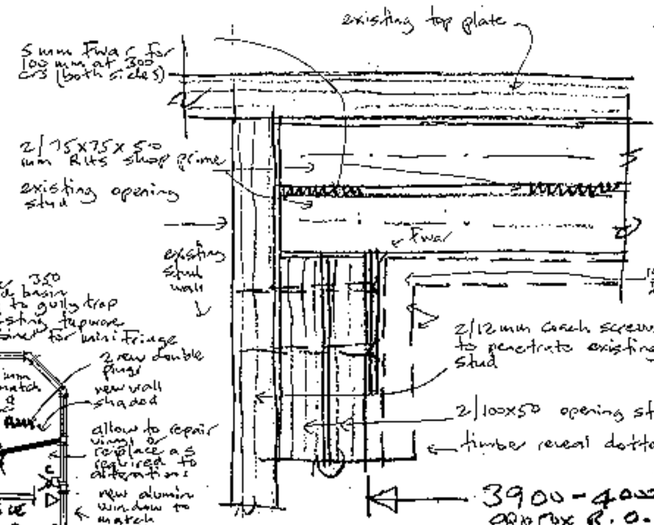
PROJECT TITLE
ALTERATIONS TO INFO CENTRE BOTANIC GARDENS (5 ROLLESTON AVE)

DRAWING TITLE

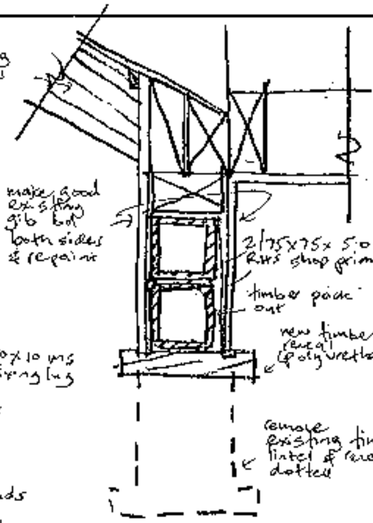
BCP (CON-8072

FILE NUMBER	ORIGINAL SHEET SIZE	SCALES
254/06/13	A2	
CONTRACT NUMBER		
DRAWING & PROJECT NUMBER	SHEET	
	A1 OF 1	

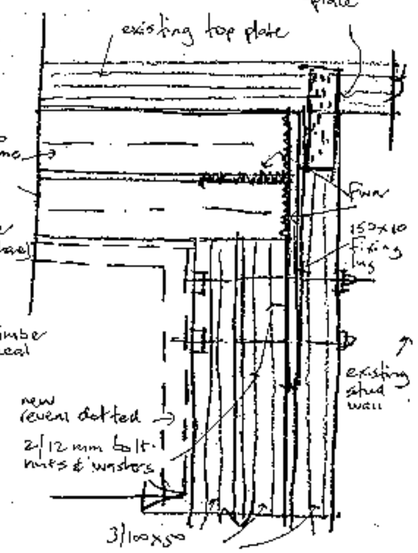




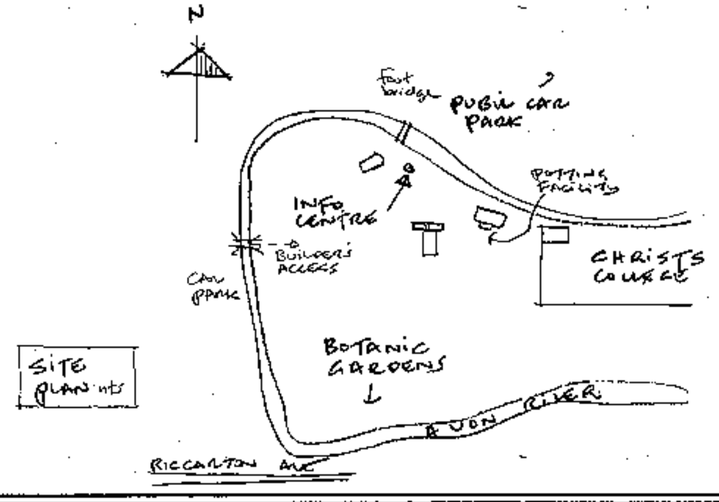
BEAM POST DETAIL LHS (at meeting room)
scale 1:5



NEW M.S. BEAM DETAIL
scale 1:5



BEAM POST DETAIL RHS (at meeting room)
scale 1:5



SITE PLAN nts

PREPARED BY CITY SOLUTIONS - CITY CITY SOLUTIONS OPERATED AS A BUSINESS UNIT WITHIN THE CHRISTCHURCH CITY COUNCIL

ISSUE	AMENDMENTS	SIGNED	DATE

CITYSOLUTIONS

DATUM	CCDB
BENCH MK	
SURVEY PB	
SURVEY LB	
CONSTN. EB	
CONSTN. RB	
SOR FILE	

	NAME	SIGNED	DATE
DESIGNED			
DES. REVIEW			
DRAWN			
DRW. CHECK			

APPROVED
DATE

CLIENT: CHRISTCHURCH CITY COUNCIL · YOUR PEOPLE · YOUR CITY

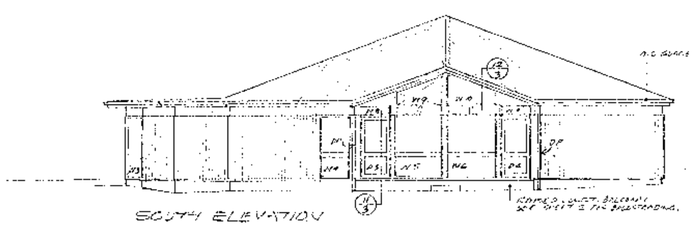
PROJECT TITLE: ALTERATIONS TO INFO CENTRE BOTANIC GARDENS (5 ROLLESTON AVE)

DRAWING TITLE:

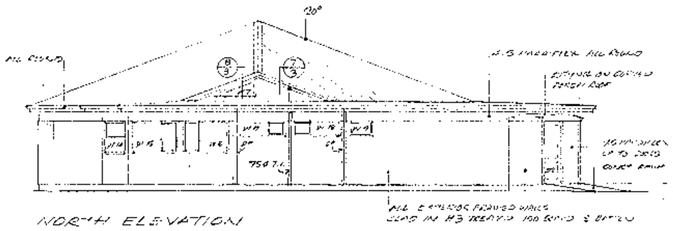
FILE NUMBER	ORIGINAL SHEET SIZE	SCALES
254/06/13	A2	
CONTRACT NUMBER		
DRAWING & PROJECT NUMBER	SHEET	
	A1 OF 1	

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK

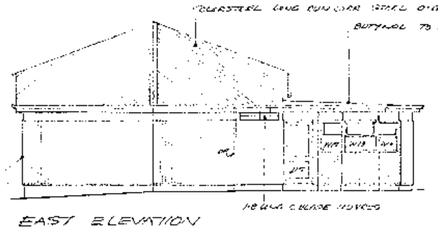
BG 3524 Sheet 2



SOUTH ELEVATION



NORTH ELEVATION



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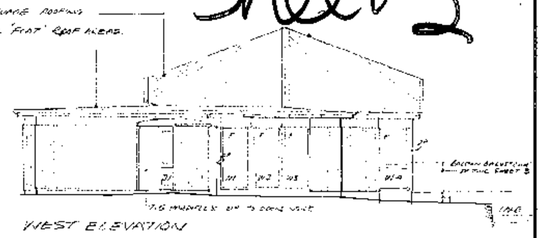

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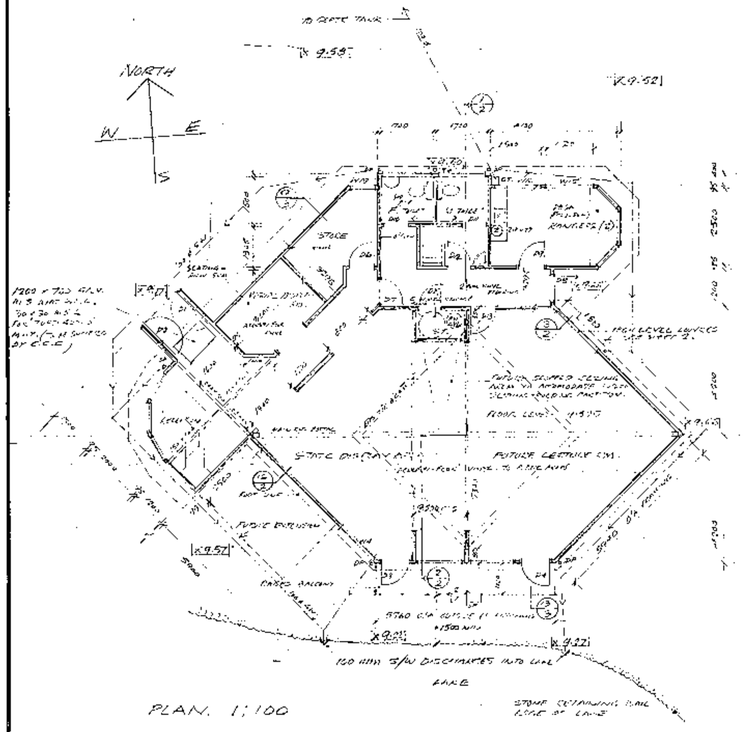
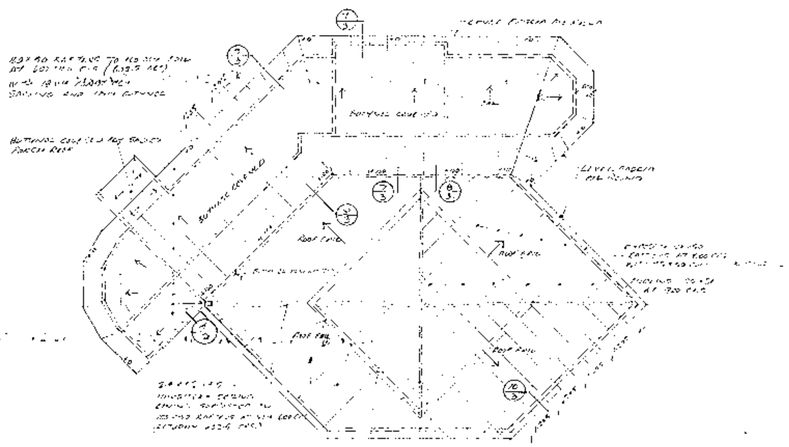
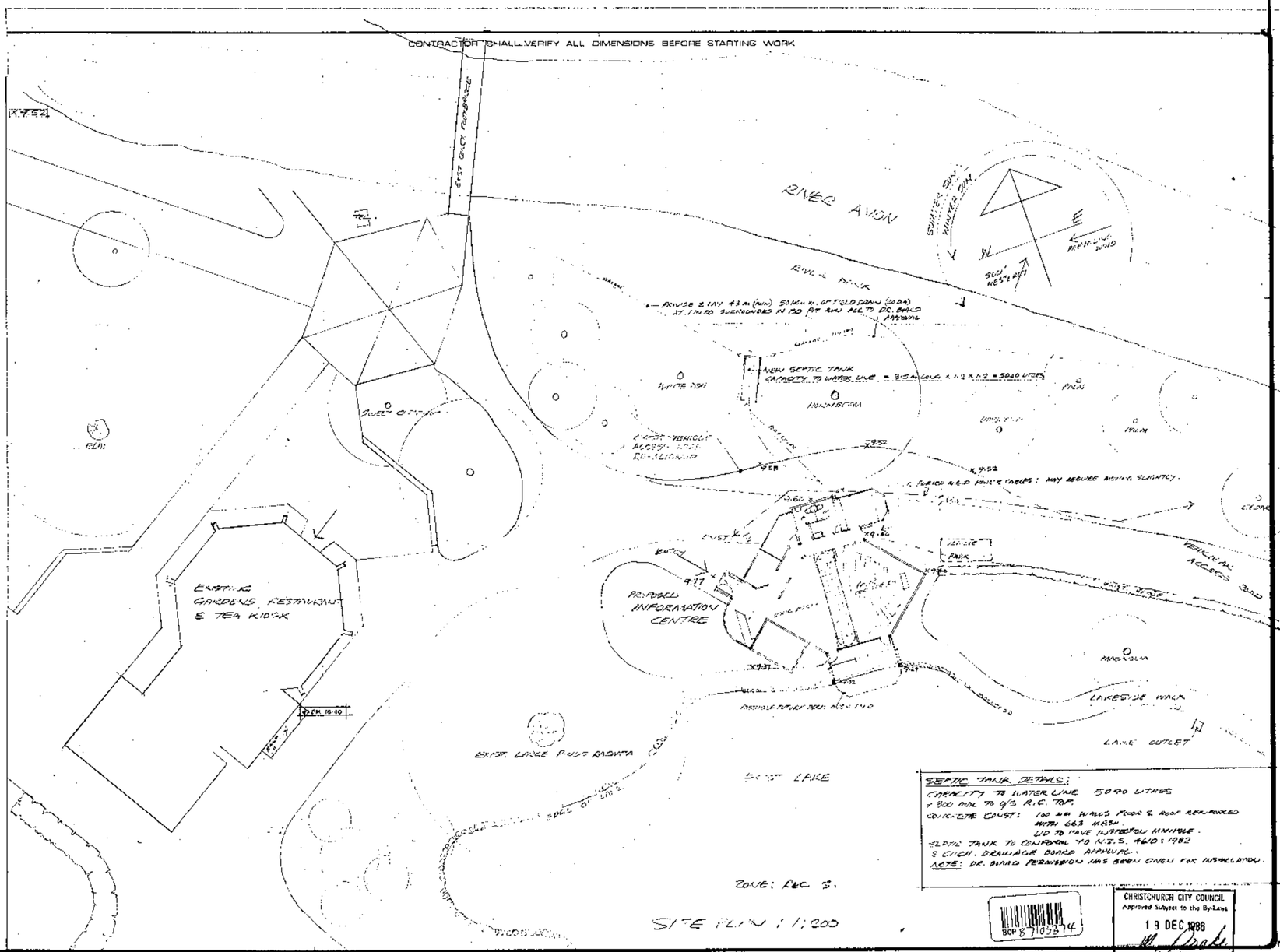


PLAN. 1:100



ROOF PLAN. 1:100

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



SEPTIC TANK DETAILS:
CAPACITY TO WATER LINE 5040 LITRES
+ 300 mm TO U/S R.C. TOP.
CONCRETE CONST: 100 mm WALLS, FLOOR & ROOF REINFORCED WITH SE3 MESH.
LID TO HAVE INSPECTION MANHOLE.
SEPTIC TANK TO CONFORM TO N.Z.S. 4410:1982
S CHCH. DRAINAGE BOARD APPROVAL.
NOTE: DR. BOARD PERMISSION HAS BEEN GIVEN FOR INSTALLATION.

ZONE: REC 3.

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
19 DEC 1986
For Engineer

BCP 8710334

CHRISTCHURCH CITY COUNCIL
CITY ARCHITECTS DIVISION : CITY WORKS & PLANNING DEPARTMENT

BOTANIC GARDENS INFORMATION CENTRE

SCALE 1:100 1:200 DESIGN JOB NO 1216 SHEET NUMBER P1.
DRAWN JOB NO SHEET NUMBER
DATE 7.11.86 TRACED FILE NO 20.16.7 OF 3 SHEETS

(3)

87103374

CHRISTCHURCH CITY COUNCIL
CITY ARCHITECTS DIVISION : CITY WORKS & PLANNING DEPARTMENT

BOTANIC GARDENS INFORMATION CENTRE

SCALE 1:20 / 1:50 — DESIGN — DRAWN — TRACED — DATE 7.11.86

JOB NO A325 — SHEET NUMBER 2 — FILE NO 84.16.7 — OF 3 SHEETS

87103374

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK

MAINTAIN VENTIL. GAP 25mm

680 REINFORCED BUILDING PAPER UNDER ALL CLAD. STEEL ROOFING

23°

4.5 HANDIFLEX WITH PVC VENT JOINTERS

130 BATTENS UNSPACED

W7

CULTURED OR REAL TO ARCHITECT

BUTYNOL

8/1

7/1

HIGH +100 MM

THIS ROOF SLOPING FROM +100 & +0.

BUTYNOL

EX 200 x 30 FIN FASCIA LEVEL ALL ROUND

4/1

27.1°

300 MIN

% OF TOP 2" 70 x 150 RHS PORTAL PROFILE

6/1

TOP OF PORTAL

2400

2400 ABOVE F.L.

3295

1 mm BUTYNOL ON 18 mm CDIST. PLY SHEATHING

+0 MM

100 x 50 RAFTERS AT 600 MM CRS

4.5 HANDIFLEX SOFFIT

600

5/1

EF 1

27.1° APPROX

10/1

EXCEPT FOR 12 RAFTERS ALL FINISHED LEVEL AT 2350 APPROX ABOVE F.L.

LOUVRED CEILING

CEILING & SERVICES PLAN 1:100

SCHEDULE

- 10A 2/65W FLUORESCENT
- 10A 2/40W "
- 10A 2/30W "
- FUTURE RECESSED "
- OUTSIDE CEILING LIGHT (FLUSH)
- 'THORN' LIGHTSTREAM TRACK TGT.
- 'THORN' 200/20
- DIP V27 BULKHD HTD (BY PLUMBER) RECESSED INCANDESCENT DIMMER CONTROLLED
- CEILING SPOTLIGHT
- OUTSIDE WALL BRACKET P.E.
- SWITCH V10 (TWO WAY)
- 2.2KW WALL PANEL HTR. (STUART) (12 O/P)
- MAINS BOARD (RECESSED)
- FIRE HOSE REEL
- FIRE DETECTOR CENTRAL PANEL (EXT.)
- FIRE DETECTOR HEAD
- " " " IN FUTURE DIAMOND PATTERN IN FUTURE SUSPENDED CEILING.
- MANUAL FIRE CALL POINTS

BOARD & BATTEN DETAIL FOR EXTERNAL WALL CLADDING. 1:5

150 150 150

H3 TREATED SELECT RADIATA PINE 150 x 25

75 x 25 BATTENS 600 CRS

ONLY NAILED TO BATTENS

4.5 HANDIFLEX SOFFIT

200

25

FLASH

CABLE ROOF & WINDOW HEAD AT 20° SLOPE

12/1 & 2

EX 200 x 50 BALAU TOP RAIL

LEVEL ALL ROUND

TEMPERED OPENING SASHES

20°

1170

20 x 120 x 3 ROLLED LUGS WELDED ON & TO RCS

BALUSTER JOINTER

30 x 30 x 3.2 HOT DIP GALV. RHS BALUSTERS AT APPROX 750 C/R — (NO 12 OFF)

DOMESTIC (WD) TYPE UPPER WINDOWS ALUMINIUM ALTHERM OR EQUAL APPROVED

375

76 x 64 SUITE DOOR FRAME

COMMERCIAL SECTION (WD) LOWER WINDOWS & DOORS. ALTHERM OR EQUAL APPROVED.

COMMERCIAL 65mm RAIL

7025

TOP RAIL MITRED & JOINED AT CORNERS

PLAN AT CORNER

ARMOURED WEATHER BRUSH THRESHOLD FOR SOUTH FACING DOORS

FL 9.825

7x7 GALV WIRE ROPE (12 mm DIA) JOINED TO BALUSTERS WITH 'TALURIT' (MAINTAIN TENSION)

9.775

FULL

150

30 x 5 GALV W/BAR

THIS DETAIL FOR ALL EXTERNAL DOORS

13/1

M10 DYNABOLTS

ELEVATION

SECTION

BALUSTRADE DETAILS : SOUTH BALCONY

SECTION THRO' SOUTH DOORS SILL DETAIL TYPICAL ALSO FOR D1-D5 INCL.

LEVEL

±0

EX 50 x 25

SARKING

EX 200 x 30 FIN H3 TREATED WHITE PINE FASCIAS.

LEVEL 4.5 FLEXIFLEX SOFFIT

200

9/1

V'BOARD FLASHING SLOPE

9775

7025

150 x 25 BOARD 75 x 25 BATTEN (TWICE GROOVED) BAND SAWN RADIATA PINE H.3 TREATED UNPAINTED - LEFT TO WEATHER

M10 BOLTS @ 900 CRS TO RC PLATES & ADJ. TO RC WALL ENDS.

5mm CLEARANCE

WATER TAB ... D.P.C.

25 mm REV. CHAMF.

9/1

86 3524

Sheet 4

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
19 DEC 1986
M. Drake
For Engineer

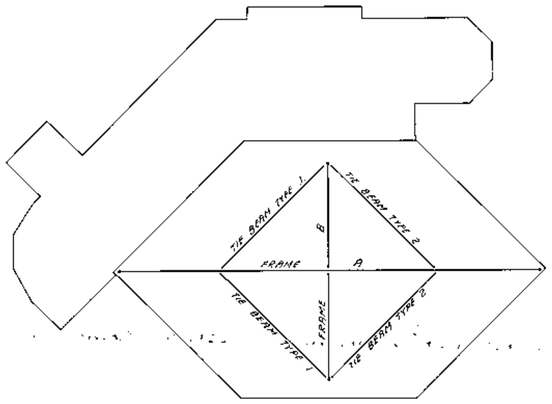
CHRISTCHURCH CITY COUNCIL
CITY ARCHITECTS DIVISION : CITY WORKS & PLANNING DEPARTMENT

BOTANIC GARDENS INFORMATION CENTRE

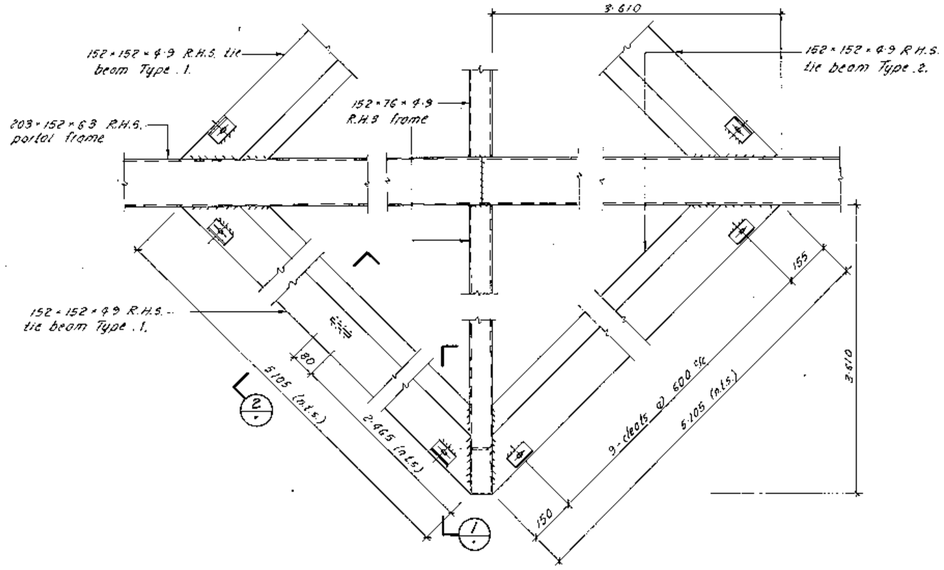
SCALE 1:5 NOA 1:100 DESIGN DRAWN
DATE 22.10.86 TRACED
JOB NO A 325 SHEET NUMBER 3
FILE NO 86.16.7 OF 3 SHEETS

87103374

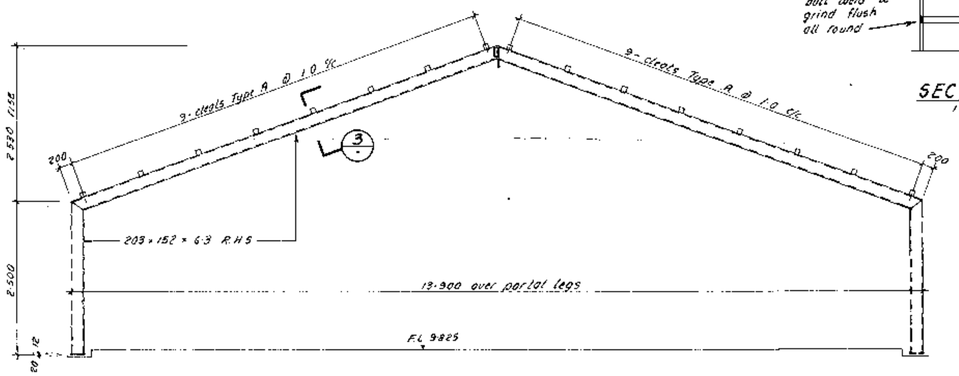
IF IN DOUBT ASK - ALL DIMENSIONS TO BE SITE CHECKED BEFORE WORK COMMENCES



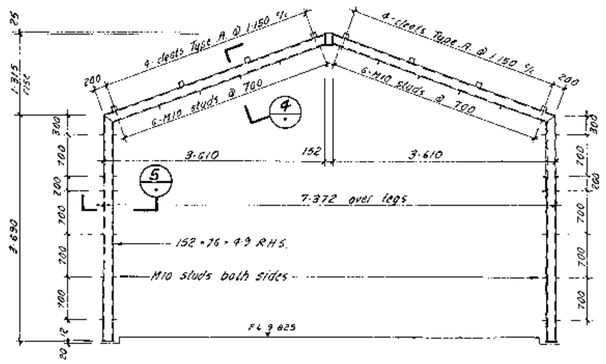
STEEL FRAMING PLAN
1:100



PART STEELWORK PLAN
1:10



ELEVATION OF FRAME A
1:50

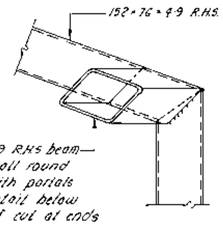


ELEVATION OF FRAME B
1:50

SEC A-A
1:5

DETAILS OF FRAME A
1:10

DETAILS OF FRAME B
1:10



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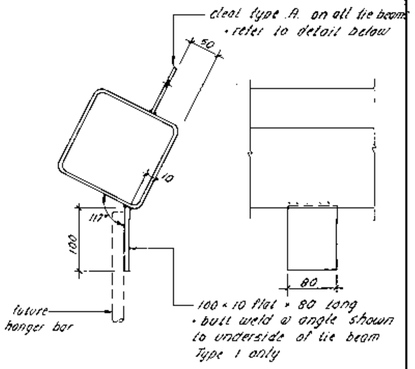
1:10



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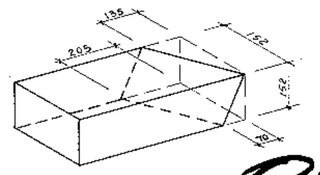
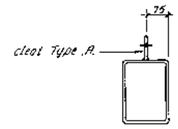
1:5



DETAIL OF CUT AT ENDS OF R.H.S. TIE BEAMS
N.T.S.

86-3348
Sheet 5



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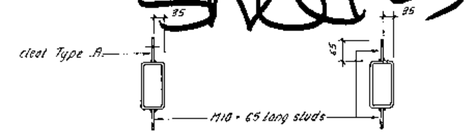
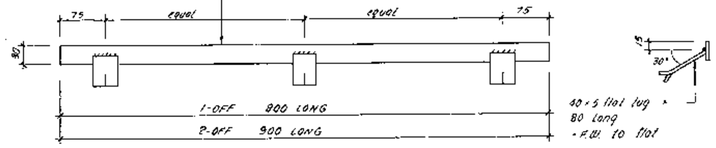
1:10

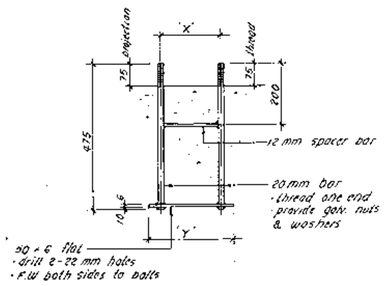


SECTION 4/.
1:10

SECTION 5/.
1:10



WEATHER BARS
• hot dip galvanise after fabrication
1:5



2-OFF TYPE A — DIM 'X' = 270, DIM 'Y' = 350
2-OFF TYPE B — DIM 'X' = 195, DIM 'Y' = 275

HOLDING DOWN BOLT DETAILS
• hot dip galvanise after fabrication
1:10

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
19 DEC 1986
M. Drake
Fa. Engineer

NOTES
Refer to notes on Sheet .1.

Service	Initials	Service	Initials
H.P. Water		Lands & Survey	
Sewer		Planning	
S.W. Drainage			
Gas			
Cables (M.E.D.)			
" (P.O.)			

Amendments	Initials	Date

	Book	Page	Initials	Date
Surveyed				
Levelled				
B.M.				
Compiled from				

		Date
Designed	S.D.Smith	10/86
Drawn	R.J.O'Brien	10/86
Traced	R.J.O'Brien	10/86
Dwg. Chk.	S.D.S.	"
Des. Chk.	[illegible]	11/86
Indexed		

Approved
[illegible] design engineer 19/4/86 Date
City Engineer

CHRISTCHURCH CITY COUNCIL — CITY WORKS AND PLANNING DEPARTMENT

BOTANIC GARDENS - INFORMATION CENTRE
STEEL FRAMING PLAN & DETAILS

Scales: 1:100, 1:50, 1:10, 1:5

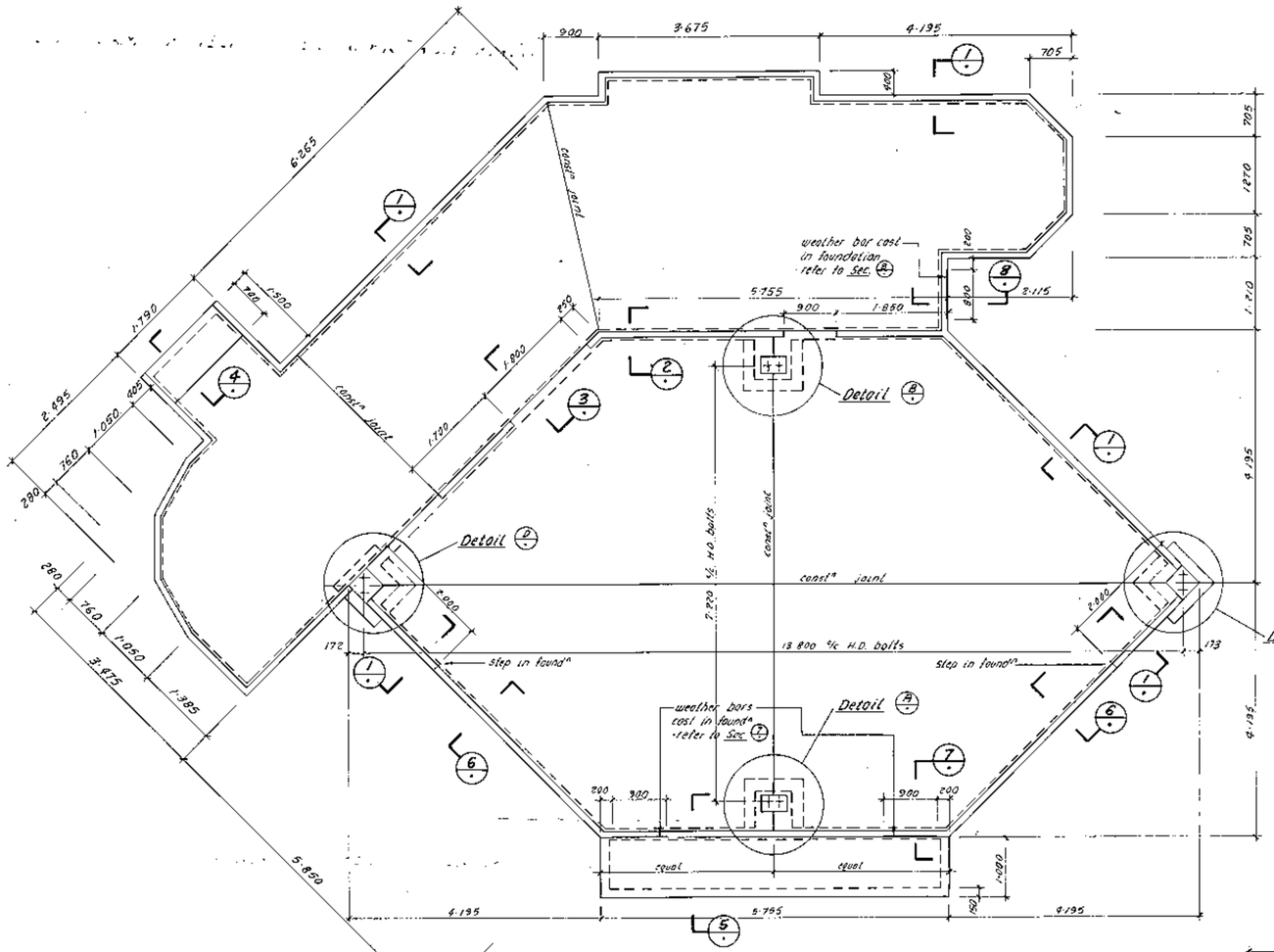
File No.
Issue
D.3348
Sheet 2 of 2

87103374

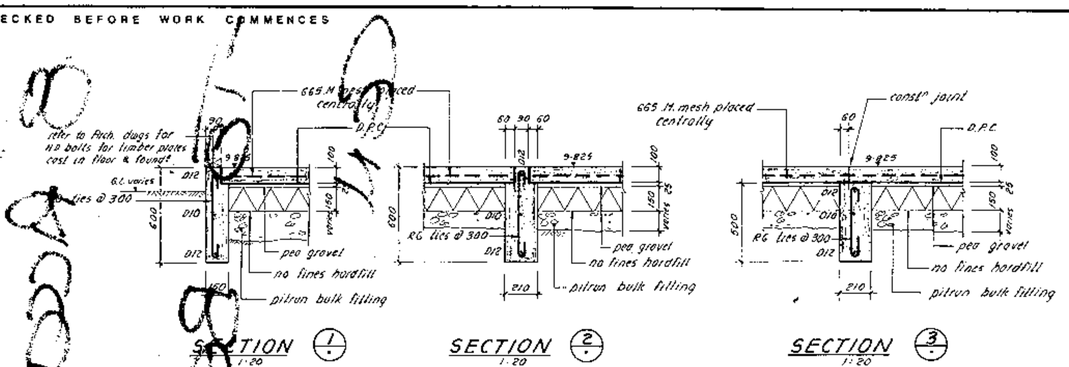
Original scale of millimetres

IF IN DOUBT ASK - ALL DIMENSIONS TO BE SITE CHECKED BEFORE WORK COMMENCES

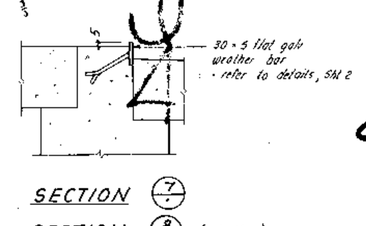
Original scale at millimetres



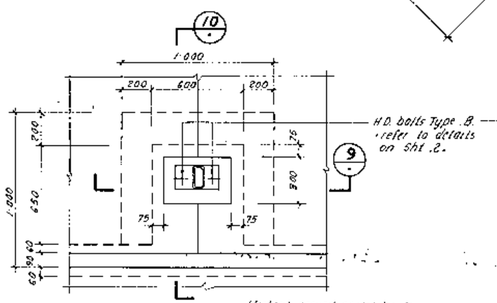
FOUNDATION & FLOOR PLAN (5)
1:50



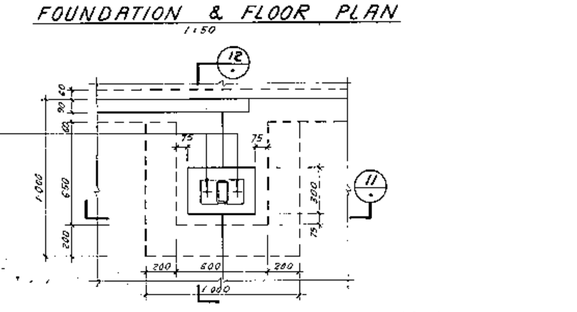
SECTION (1) 1:20
SECTION (2) 1:20
SECTION (3) 1:20
SECTION (4) 1:20
SECTION (5) 1:20
SECTION (6) 1:20



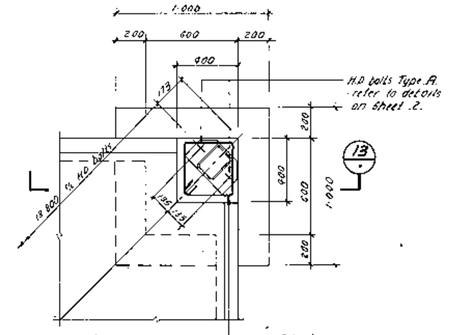
SECTION (7)
SECTION (8) (similar.) 1:5



SEC. (9)
SEC. (10)
DETAIL (A) 1:20



SEC. (11)
SEC. (12)
DETAIL (B) 1:20



SEC. (13)
DETAIL (C)
DETAIL (D) (similar) 1:20

NOTES

1) Concrete
(a) All concrete work to be in accordance with N.Z.S. 3109 : 1980
(b) Concrete to be special grade
(c) Concrete strength shall be ; f'c = 20 MPa
(d) Cover to reinforcing to be 50 mm unless shown otherwise

2) Reinforcing
(a) All reinforcing work to be in accordance with N.Z.S. 3109 : 1980
(b) All reinforcing to be continuous throughout
R = plain round bar Grade 275
D = deformed bar Grade 275
(c) Laps shall be : D10 300 mm
D12 900 mm
(d) Mesh to be placed centrally with 300 mm laps

3) Steelwork
(a) All welds to be 5mm F.W. unless shown otherwise
(b) F.W. indicates 5mm F.W.
(c) Butt welds to be full penetration
(d) All lines of contact to be welded
(e) All ends to be machine sawn sharp edges & burrs to be removed by grinding
(f) Site welded areas to be power wire brushed and coated with two good coats of carbomastic 15 or equivalent

4) Refer to Architects dwgs for any pipes, ducts, chases, bolts, etc. to be formed in or cast in concrete.

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
19 DEC 1986
M Drake
City Engineer

Service	Initials	Service	Initials
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Sewer		Planning	
S.W. Drainage			
Gas			
Cables (M.E.D.)			
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Des. Chk.		11/86
Indexed		

Approved
Design Engineer 19/12/86 Date
City Engineer

CHRISTCHURCH CITY COUNCIL — CITY WORKS AND PLANNING DEPARTMENT

BOTANIC GARDENS - INFORMATION CENTRE
FOUNDATION PLAN & SECTIONS

Scales: 1:50, 1:20, 1:5

File No.
Issue
D.3348
Sheet 1 of 2

86-3504
Sheet 6

87103374

Appendix D

CERA Form

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Botanic Gardens Information Kiosk			Reviewer:	Stephen Lee
	Unit	No:	Street	CPEng No:	1006840
Building Address:	7 Rolleston Avenue			Company:	GHD
Legal Description:				Company project number:	513059684
				Company phone number:	6433780900
	Degrees	Min	Sec		
GPS south:				Date of submission:	
GPS east:				Inspection Date:	04/04/2012
				Revision:	Final
Building Unique Identifier (CCC):	PRK_1566_BLDG_002_EQ2			Is there a full report with this summary?	yes

Site

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

Building

No. of storeys above ground:	1	single storey = 1		Ground floor elevation (Absolute) (m):	
Ground floor split?	no			Ground floor elevation above ground (m):	
Storeys below ground	0				
Foundation type:	strip footings			if Foundation type is other, describe:	Strip footings to perimeter/ pad found
Building height (m):	5.00			height from ground to level of uppermost seismic mass (for IEP only) (m):	4.5
Floor footprint area (approx):					
Age of Building (years):	26			Date of design:	1976-1992
Strengthening present?	no			If so, when (year)?	
				And what load level (%g)?	
Use (ground floor):	public			Brief strengthening description:	
Use (upper floors):					
Use notes (if required):					
Importance level (to NZS1170.5):	IL2				

Gravity Structure

Gravity System:	frame system		
Roof:	timber framed	rafter type, purlin type and cladding	rafters 100x50, counter battens 75x50, metal cladding
Floors:	concrete flat slab	slab thickness (mm)	100
Beams:	steel non-composite	beam and connector type	203x152x6.3RHS
Columns:	structural steel	typical dimensions (mm x mm)	203x152x6.3RHS
Walls:			

Lateral load resisting structure

Lateral system along:	lightweight timber framed walls		**Note: Define along and across in detailed report!**	note typical wall length (m)	with plasterboard bracing
Ductility assumed, μ:	2.00				
Period along:	0.20	0.00		estimate or calculation?	calculated
Total deflection (ULS) (mm):				estimate or calculation?	
maximum interstorey deflection (ULS) (mm):				estimate or calculation?	
Lateral system across:	lightweight timber framed walls			note typical wall length (m)	+
Ductility assumed, μ:	2.00				
Period across:	0.20	0.00		estimate or calculation?	calculated
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):		
south (mm):		
west (mm):		

Non-structural elements

Stairs:			
Wall cladding:	other light	describe	Timber weatherboard
Roof Cladding:	Metal	describe	
Glazing:	timber frames		
Ceilings:	strapped or direct fixed		Hardiflex cement sheeting/ Plasterboard
Services(list):			

Available documentation

Architectural	partial	original designer name/date	City Architects (CCC)
Structural	partial	original designer name/date	City Architects (CCC)
Mechanical		original designer name/date	
Electrical		original designer name/date	
Geotech report		original designer name/date	

Damage

Site:	Site performance:		Describe damage:	
(refer DEE Table 4-2)				
	Settlement:	none observed	notes (if applicable):	
	Differential settlement:	none observed	notes (if applicable):	
	Liquefaction:	none apparent	notes (if applicable):	Liquefaction Potential
	Lateral Spread:	none apparent	notes (if applicable):	
	Differential lateral spread:	none apparent	notes (if applicable):	
	Ground cracks:	none apparent	notes (if applicable):	
	Damage to area:	none apparent	notes (if applicable):	

Building:

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

Recommendations

	Level of repair/strengthening required:			Describe:	
	Building Consent required:			Describe:	
	Interim occupancy recommendations:	full occupancy		Describe:	
Along	Assessed %NBS before:	100%	0% %NBS from IEP below	If IEP not used, please detail assessment methodology:	Detailed Analysis
	Assessed %NBS after:	100%			
Across	Assessed %NBS before:	100%	0% %NBS from IEP below		
	Assessed %NBS after:	100%			

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): 1976-1992

h_n from above: 4.5m

Seismic Zone, if designed between 1965 and 1992: B

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

	along	across
Period (from above):	0.2	0.2
(%NBS)nom from Fig 3.3:	0.0%	0.0%
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		1.00
Note 2: for RC buildings designed between 1976-1984, use 1.2		1.0
Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)		1.0
Final (%NBS)$_{nom}$:	**0%**	**0%**

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6: 1.00

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

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3: 0.30
Z_{1992}, from NZS4203:1992:
Hazard scaling factor, **Factor B:** 3.333333333

2.4 Return Period Scaling Factor

Building Importance level (from above): 2
Return Period Scaling factor from Table 3.1, **Factor C**: 1.00

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	2.00	2.00
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:	1.00	1.00
Ductility Scaling Factor, **Factor D**:	1.00	1.00

2.6 Structural Performance Scaling Factor:

Sp:	0.700	0.700
Structural Performance Scaling Factor **Factor E**:	1.428571429	1.428571429

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

%NBS$_b$:	**0%**	**0%**

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

3.1. Plan Irregularity, factor A: 1

3.2. Vertical irregularity, Factor B: 1

3.3. Short columns, Factor C: 1

3.4. Pounding potential

Pounding effect D1, from Table to right: 1.0
Height Difference effect D2, from Table to right: 1.0

Therefore, Factor D: 1

3.5. Site Characteristics significant 0.7

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	1.0	1.0
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)	**0.70**	**0.70**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**0%**	**0%**
4.4 Percentage New Building Standard (%NBS), (before)		**0%**

GHD

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
FINAL	Jo Ann Gumilao	Stephen Lee		Nick Waddington		27/2/13