Hei Hei Community Centre

BU 1559-001 EQ2

Detailed Engineering Evaluation

Quantitative Report

Version FINAL

16 Wycola Avenue, Hei Hei

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

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Detailed Engineering Evaluation
Quantitative Report
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8-12 Wycola Avenue, Hei Hei

Christchurch City Council

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Date
17/12/12

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Hei Hei Community Centre

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Detailed Engineering Evaluation

Quantitative Report - SUMMARY

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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 and visual inspections on 26 January 2012 and available drawings as stated in 5.3.

Building Description

The Hei Hei Community Centre is located at 12 Wycola Avenue bordered by Wycola Avenue to the south and Wycola Recreational Park to the north. It was constructed in 1961 with minor alterations and refurbishment carried out in 1992.

The building is currently used for various community activities which consists of a main hall with two (2) 'lean-to' facilities at the east and west sides of the main hall and a mezzanine level on the north. The 'lean-to' facilities are used as kitchen/dining and storage.

Key Damage Observed

Key damage observed includes:-

Cracking along blockwork mortar lines was noted in several locations around the building.

Building Capacity Assessment

Based on the site inspection, available drawings and the results of quantitative assessment, the building overall capacity is only 1% NBS. The critical elements mostly are the reinforced concrete (RC) columns and unreinforced masonry walls which scores less than 34% NBS. In addtition to these critical elements, the steel rafters above the mezzanine level scores less than 34% NBS also. The overall building is therefore classified as 'Earthquake Prone' and falls under NZSEE's Risk Classifications as a 'High Risk Building'.

Building Strength

Based on the analysis, the RC columns and the unreinforced masonry walls were found to be the most vulnerable elements and these achieved scores as low as 29% NBS and 1% NBS respectively. For the wall, the critical element is located in the kitchen/dining and storage areas at the eastern and western sides of the building.

Recommendations

GHD found that the structure achieves an overall score of 1% New Building Standard (NBS) with a seismic grade of E and therefore the building falls within the Earthquake Prone category. A building with a % NBS score below 20% NBS is 25 times more likely than a similar building constructed to current loading standards to cause loss of life or serious injury during a seismic event.

GHD recommend that a seismic strengthening scheme is prepared and the building strengthened to a minimum of 67% NBS.

1. Background

GHD has been engaged by Christchurch City Council (CCC) to undertake a detailed engineering evaluation of Hei Hei Community Centre.

This report is a Quantitative Assessment of 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.

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 another property could collapse or otherwise cause injury or death; or
- The 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 building's capacity based on a comparison of loading codes from when the building was designed to those used 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	Improvement of Structural Performance: 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 Hei Hei Community Centre, located at 12 Wycola Avenue, was constructed in 1961 with minor alterations and refurbishment carried out in 1992. The site is bordered by Wycola Avenue to the south and Wycola Recreational Park to the north. Single storey commercial premises are located on the western side of the building, whilst the Hei Hei community link building is located to the east.

The site is predominantly flat with insignificant variations in ground level throughout.

The building is currently used for various community activities.

The main hall area of the building consists of steel portal frames with timber framed infill panels between the frames. High level windows are located above the infill panels up to building eaves level. There is mezzanine viewing level at the south end of the building. The structure for the mezzanine viewing area comprises a timber floor supported on steel joists. The north and south gable ends of the building consist of unreinforced blockwork masonry with reinforced concrete posts.

In addition there are two 'lean-to' facilities to the east and west sides of the main hall. These are used for kitchen/dining and storage. The construction of these two 'lean-to' areas consist of unreinforced masonry walls with high level windows over, supporting timber framed roofing (See Photograph 8). The 'lean-to' rafters are supported on timber stub posts bolted to a reinforced bond beam at the top of the unreinforced masonry wall. Timber framed internal walls divide these areas up into separate spaces.

The building has a light weight corrugated iron roof. The foundations for the building consist of pad footings for the portal frame with the external walls of the 'lean-to' supported a strip foundations (See Photograph 13, 14, 17 and 18).

Key structural details of the building are shown in Figure 2 below.

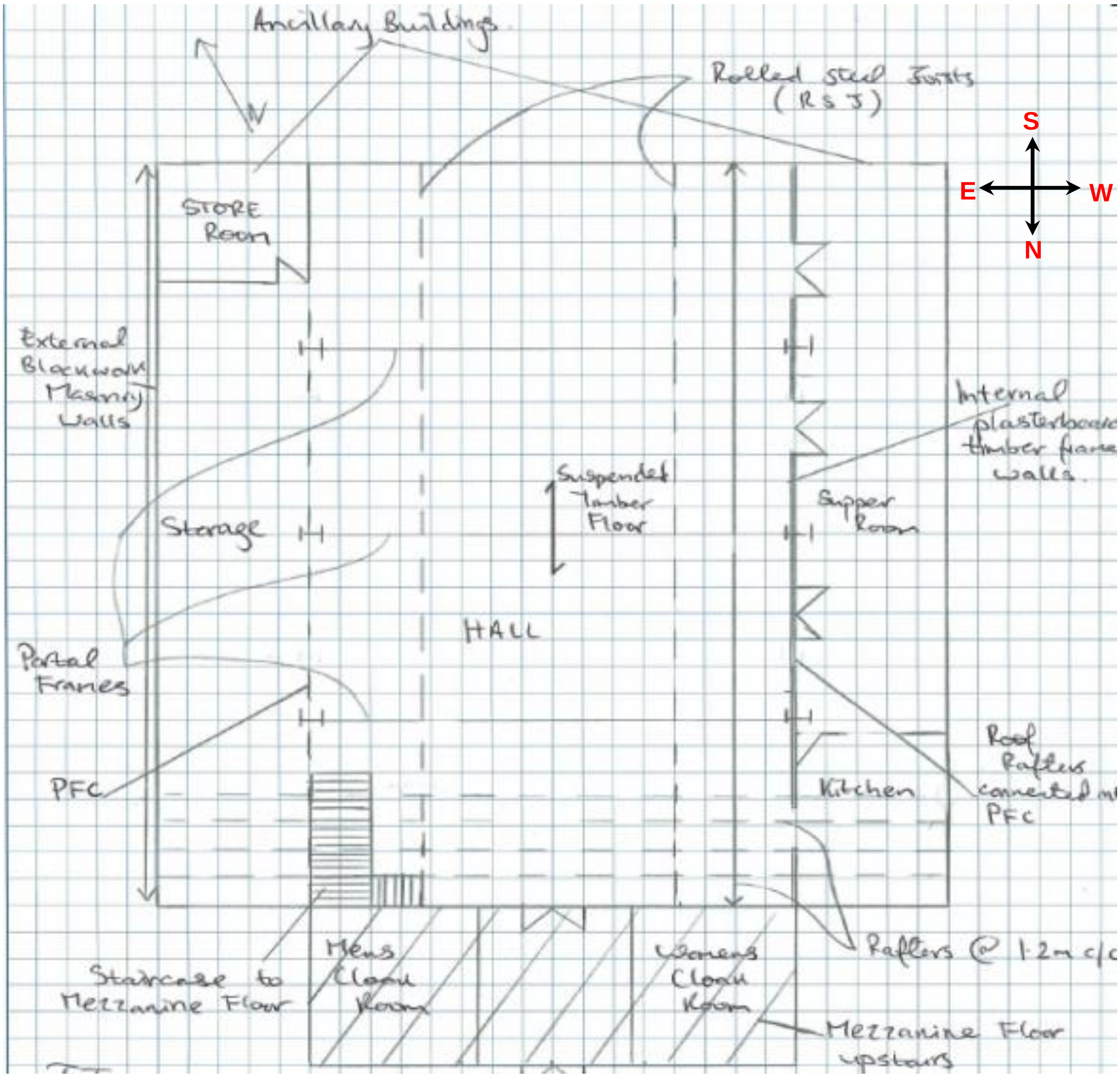


Figure 2 Plan Sketch Showing Key Structural Elements

The dimensions of the main hall area are approximately 24.6m long x 14.4m wide by 7.1m high to roof apex. The ‘lean-to’ areas extend approximately 4.5m from the main hall at east and west sides of the building. The ‘lean-to’ roof has a maximum height of 3.9m. The dimensions covering the mezzanine floor area at the front face of the building are approximately 14.4m long x 3.7m wide with the same height as the main hall area. The overall footprint of the building is approximately 630m^2.

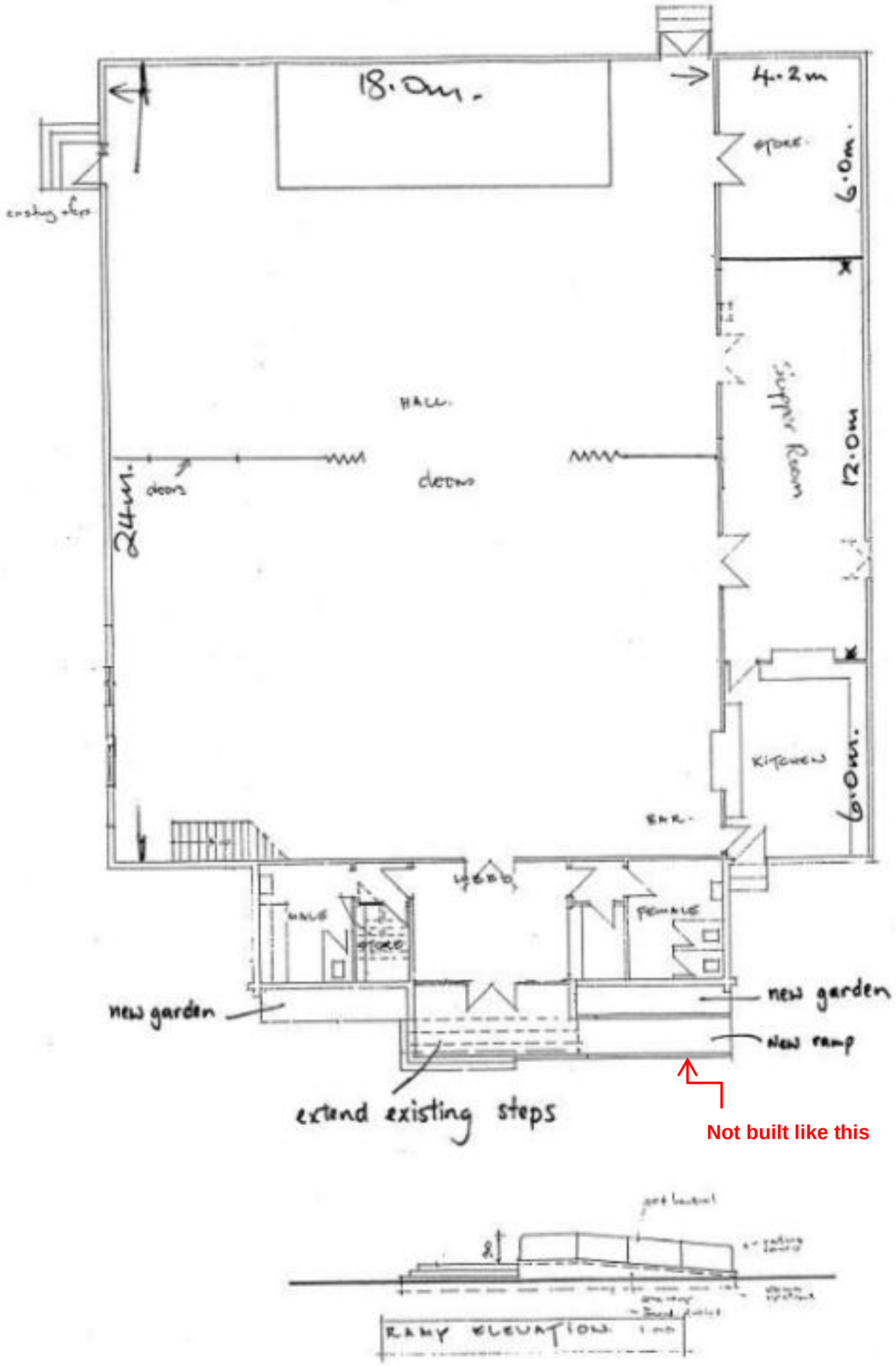


Figure 3 Plan Sketch Showing Ground Floor Layout as per 1992 Alterations

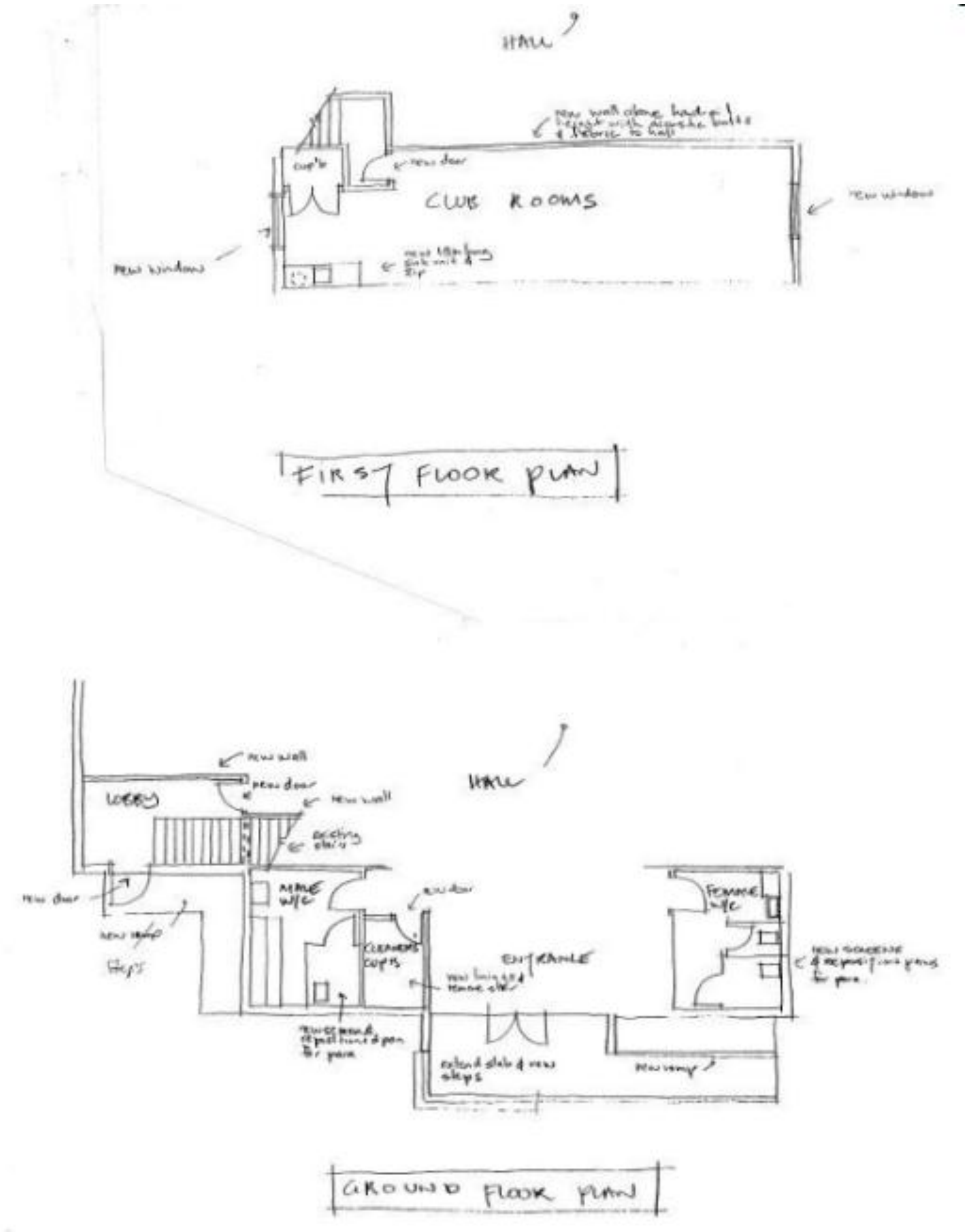


Figure 4 Plan Sketch Showing Ground/Mezzanine Floor Area as per 1992 Alterations

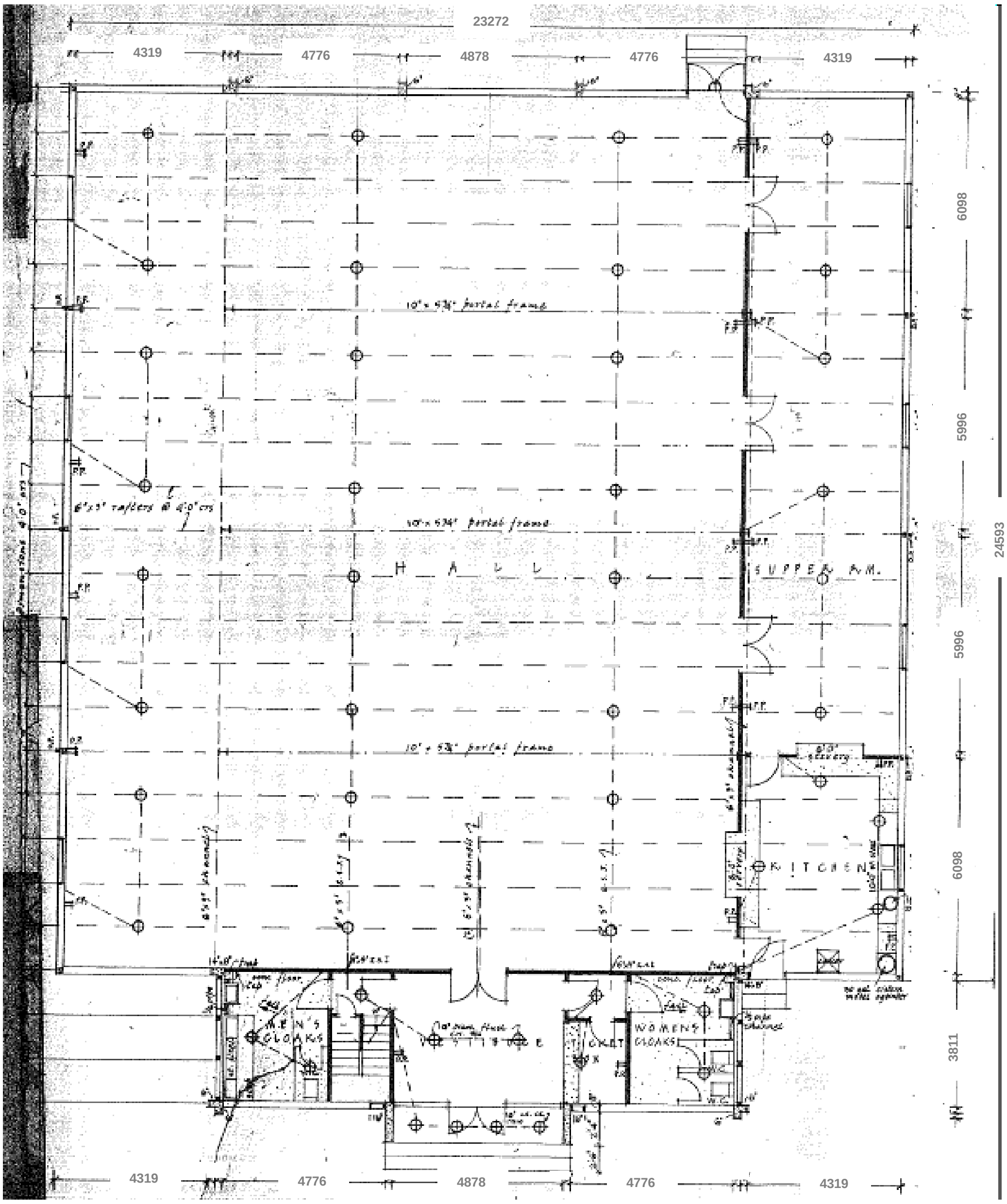


Figure 5 Plan Showing Roof and Mezzanine Floor Key Structural Elements

4.2 Gravity Load Resisting System

The roof structure for the hall area consists of a light weight roofing system supported by 150mm x 75mm steel channel (RSC) and rolled steel joist (RSJ) purlins on top of the steel portal frames which then transfer the loads to the foundation. For the 'lean-to' areas specifically located at the west and east sides of the hall, the roof structure consists of a similar light weight roofing system supported by 150mm x 75mm timber rafters spanning between 75mm x 50mm timber stub posts in the blockwork external wall and a 150mm x 75mm channel spanning between portal frames. The mezzanine floor area consists of 200mm x 50mm timber joists supported by 225mm x 100mm RSJ on unreinforced masonry walls.

Reinforced concrete columns and steel beams at the front area of the building support the mezzanine floor/viewing area.

4.3 Lateral Load Resisting System

In the transverse direction, the lateral forces are resisted by the steel portal frames, together with the reinforced concrete frames with unreinforced masonry infill panels located at the north and south gable ends of the building. In addition the portal frames resist lateral loading from the roof structures of the 'lean-to' areas. The 75mm x 50mm timber stub posts acting in conjunction with the unreinforced masonry block walls resist lateral forces on the 'lean-to' external walls (Photograph 11 in Appendix B). The unreinforced masonry external walls are acting as a vertical cantilever due to the lack of connection to the roof diaphragm. The light weight roofing system with corrugated iron sheeting acts as a diaphragm transmitting the lateral forces to the portal frames.

In the longitudinal direction, the light weight corrugated iron roof acts as a stiff diaphragm transmitting wind and seismic forces to the portal frame legs. The roof of the 'lean-to' structure similarly acts as a stiff diaphragm transmitting lateral loads from the weak axis of the portal frame legs to the longitudinal external walls of the 'lean-to' structures. Stability in the longitudinal direction is also assisted by the unreinforced masonry panel walls of the entrance structure. The lateral forces from the portal frames being transmitted by the eaves purlin acting as a tie member. It noted that this simple steel portal frame structure of the main hall does not have a specific eaves and ridge tie members.

5. Assessment

5.1 Inspection

A visual inspection of the building was undertaken on 26 January 2012. Both the interior and exterior of the building were inspected. The building was observed to have a green placard in place. A number of structural aspects were not able to be examined due to the closed nature of the structure.

The visual 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 for the structure type observed and noting any general damage observed throughout the building in both structural and non-structural elements. Site assessment also included the ground condition observation.

5.2 Investigation & Opening Up Work

Further inspections were carried out on the 22nd of May 2012 to confirm the structural connection between the rolled steel joists and steel portal frames (See Photograph 27). Further, inspections were undertaken to confirm foundations for the unreinforced masonry walls and steel portal frames (See Photographs 13, 14, 17, 18 and 19). Also, the connections between the roof steel members to the reinforced concrete frame located at the mezzanine floor area of the building (See Photographs 21, 22, 23 and 24) and between the RSC and timber frames at the ‘lean-to’ areas (See Photographs 31 and 32) were identified.

5.3 Available Drawings

Existing drawings and sketches are provided in Appendix C.

5.4 Analysis and Modelling Methodology

Mathematical Modelling

The three-dimensional frame modelling of the Hei Hei Community Center structure was performed to realistically simulate the effects of the applied loads on the structure under different conditions such as normal operation, earthquake and combinations thereof.

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

Each section, member and node of the model was defined using the physical dimensions, material properties and connection details from the available drawings described in Section 5.3. Using Etabs Version 9.7.2 structural analysis software, a computer model that incorporates all the properties of the steel portal frame and reinforced masonry structure was prepared.

Loading Conditions

The loading conditions and load combinations used in the analysis of the structure were in accordance with the AS/NZS 1170.

Determination of % NBS

Upon determination of the critical loading conditions, each of the members that make up the Hei Hei Community Centre was checked to determine % NBS of the members indicated in the available drawings. Member demand and capacity ratio were computed and % NBS was calculated accordingly.

Seismic Design

The Hei Hei Community Centre structure was checked to the seismic design standards in accordance with the AS/NZ 1170.5, NZBC Clause B1 Structure and New Zealand Society of Earthquake Engineering Guidelines for Assessment and Improvement of the Structural Performance of Buildings in Earthquakes (NZSEE).

6. Damage Assessment

6.1 Surrounding Buildings

Hei Hei Community Centre is located in a residential area with buildings adjacent to the site on the west and the car park and community link building to the east. During the inspection there was no apparent damage to the surrounding buildings or adjoining properties.

6.2 Residual Displacements and General Observations

No significant residual displacements of the structure were noticed during the inspection of the building.

There was no damage noted to the interior of the building including the portal frames, kitchen areas, mezzanine floor, internal timber framed walls and the visible roof structure.

It was noted that bolts connecting the rolled steel joists (RSJ's) to the portal frames were missing (See Photograph 27). In addition, the connection between the RSJ's and the concrete frames at the front and rear of the building (See Photograph 23 and 24) could not be confirmed due to the presence of ceiling linings.

Cracking along blockwork mortar lines was noted in several locations around the building. These appear to be existing cracks that may have opened up slightly during the recent seismic activity. Observations on site indicate that blockwork walls are potentially of partial filled construction.

As discussed in Section 4.3, the exterior blockwork walls provide in-plane stability but the lack of adequate structural connection between the blockwork walls and roof structure is of concern. It is possible that the walls are tied to the suspended floor via a ribbon plate, though this was not observed on site. No damage was evident at the junction between the walls and floor.

No cracking to the perimeter strip footing was noted. The sub-floor was not inspected due to a lack of access.

6.3 Ground Damage

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

7. Structural Analysis

7.1 Seismic Parameters

Earthquake loads shall be calculated using New Zealand Code.

◗ Site Classification	D
◗ Seismic Zone factor (Z)	
(Table 3.3, NZS 1170.5:2004 and NZBC Clause B1 Structure)	0.30 (Christchurch)
◗ Annual Probability of Exceedance	
(Table 3.3, NZS 1170.0:2002)	1/500 (ULS) Importance Level 2
◗ Annual Probability of Exceedance	
(Table 3.3, NZS 1170.0:2002)	1/25 (SLS)
◗ Return Period Factor (Ru)	
(Table 3.5, NZS 1170.5:2004)	1.0 (ULS)
◗ Return Period Factor (Rs)	
(Table 3.5, NZS 1170.5:2004 and NZBC Clause B1 Structure)	0.33 (SLS)
◗ Ductility Factor (μ) - Longitudinal Direction	1.25
◗ Ductility Factor (μ) - Transverse Direction	2.0
◗ Performance Factor (Sp) - Long Direction	0.90
◗ Performance Factor (Sp) - Short Direction	0.81 (Interpolated value)
◗ Gravitational Constant (g)	9.81 m/s^2

An increased Z factor of 0.3 for Christchurch has been used in line with recommendations from the Department of Building and Housing recommendations resulting in a reduced % NBS score.

7.2 Structural Ductility Factor

In longitudinal direction of the building, a structural ductility factor of 1.25 has been based on the unreinforced masonry wall system as indicated on the available drawings and photohraphs. The unreinforced masonry walls have been assessed as the limiting structural elements in terms of the ductility of the structure and the ability to dissipate energy during an earthquake.

In transverse direction of the building, a structural ductility factor of 2.0 has been assumed based on the steel portal frame system along with the reinforced concrete frame system with unreinforced masonry infill at the north and south ends of the building as indicated on the available drawings and photographs. The steel portal frames and reinforced concrete frames with masonry infill have been assessed as the limiting structural elements in terms of the ductility of the structure and the ability to dissipate energy during an earthquake.

8. Geotechnical Consideration

8.1 Site Description

The Hei Hei Community Centre is located in the suburb of Hei Hei and is accessed from Wycola Avenue. The site is predominantly flat and approximately 30m above mean sea level. The roadside site is bordered to the east by the Community link building and its car park, and by residential properties to the west.

8.2 Published Information on Ground Conditions

8.2.1 Published 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, which comprise alluvial gravel, sand and silt of historic river flood channels.

8.2.2 Environment Canterbury Logs

Information from Environment Canterbury (ECan) indicates that six boreholes are located within a 200m radius of the site. Of these boreholes, all of them had lithographic logs and the two within 20m of the site are summarised below. The site geology described in these logs shows the area is predominantly layers of silt, sand and gravel.

Table 2 ECan Borehole Summary

Bore Name	Log Depth	Groundwater	Distance & Direction from Site
M36/16580	~25.9m	N/A	20m E
M36/14763	~73m	N/A	20m S

It should be noted the quality of soil logging descriptions included on the boreholes is unknown and were likely written by the well driller and not a geotechnical professional or to a recognised geotechnical standard. In addition strength data is not recorded.

8.2.3 EQC Geotechnical Investigations

The Earthquake Commission has not undertaken geotechnical testing in this area.

8.2.4 Land Zoning

Canterbury Earthquake Recovery Authority (CERA) has zoned the site as green, indicating that repair and rebuild may take place.

[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.

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 Not Applicable (TCN/A). Non-residential properties in urban areas have not been given a Technical Category. However, nearby land has been classified as Technical Category 1 (TC1) which means that liquefaction is unlikely in future earthquake events.

8.2.5 Post February Aerial Photography

Aerial photography taken following the 22 February 2011 earthquake (Figure 6) shows no signs of liquefaction outside the building footprint or adjacent to the site.

Figure 6 Post February 2011 Earthquake Aerial Photography [2]

8.2.6 Summary of Ground Conditions

The ground conditions as encountered from the ECan borehole investigations undertaken in vicinity to the site show shows the area is predominantly silt, sand and gravel, with some clay.

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.

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

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

Known Active Fault	Distance from Site (km)	Max Likely Magnitude	Avg Recurrence Interval
Alpine Fault	130 NW	8.3	~300 years
Greendale (2010) Fault	13 W	7.1	~15,000 years
Hope Fault	100 N	7.2~7.5	120~200 years
Kelly Fault	107 NW	7.2	~150 years
Porters Pass Fault	54 NW	7.0	~1100 years

Recent earthquakes since 4 September 2010 have identified the presence of a new active fault system / zone underneath Christchurch City and the Port Hills. Research and published information on this system is in development and not generally available and average recurrence intervals are yet to be estimated.

8.3.2 Ground Shaking Hazard

The 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. This has resulted in widespread liquefaction throughout Christchurch.

New Zealand Standard NZS 1170.5:2004 now 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 Field Investigations

In order to further understand the ground conditions at the site, intrusive testing comprising one piezocone CPT investigation was conducted at the site on 02 April 2012.

The location of the test is tabulated in Table 4.

Table 4 Coordinates of Investigation Locations

Investigation	Depth (m bgl)	Easting (NZMG)	Northing (NZMG)
CPT 001	0.9	2471362	5741208

The CPT investigation was undertaken by McMillan Drilling Service on 04 April 2012, to a target depth of 20m below ground level. However, refusal was reached at depth of between 0.9m due to the presence of dense gravels. Please refer to the attached CPT results for detail (Appendix A).

[3] 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.
[4] GNS Active Faults Database

Interpretation of output graphs[5] from the investigation showing Cone Tip Resistance (q_c), Friction Ratio (Fr), Inferred Lithology and Inferred Liquefaction Potential are presented in Table 2.

8.5 Ground Conditions Encountered

8.5.1 Summary of CPT-Inferred Lithology

Table 5 Summary of CPT-Inferred Lithology

Depth (m)	Lithology [1]	Cone Tip Resistance q_c (MPa)	Friction Ratio Fr (%)
0 – 0.9	Surface soill	5 - 15	~0.5
>0.9	Gravel	> 20	~0

8.6 Interpretation of Ground Conditions

8.6.1 Liquefaction assessment

Based on an overall assessment of the following the site is considered unlikely to be susceptible to liquefaction, confirming the CERA TC1 classification.

- No previous liquefaction or settlement at the site following the February (Mw 6.3, 2.0g) and June (Mw 6.0-6.3, 1.5g) events. The inspection undertaken on 18 January 2012 of the site noted that there was no liquefaction observed on the property; and,
- The identified ground conditions confirmed by CPT;

However the ground conditions encountered do highlight saturated sand layers, and such layers may be highly liquefiable.

8.6.2 Slope Failure and/or Rockfall Potential

The site is located within Hei Hei, a flat suburb in western Christchurch. Global slope instability risk is considered negligible. However, any localised retaining structures and/or embankments should be further investigated to determine the site-specific slope instability potential.

8.6.3 Foundation Recommendations

Based on the information presented above, we recommend the following for the subject site:

- A site subsoil Class of D, Deep or Soft Soil, should be adopted for the site (in accordance with NZS 1170.5:2004).

[5] McMillans Drilling CPT data plots, Appendix X.

- An allowable bearing Capacity of 100KPa can be used for standard shallow foundation solutions using timbre and concrete floors, in accordance with New Zealand Building regulations and NZS 3604.
- If a rebuild is deemed necessary a shallow investigation specific to the new building footprint should be undertaken with bearing capacity investigation. Shallow ground improvement is not required.

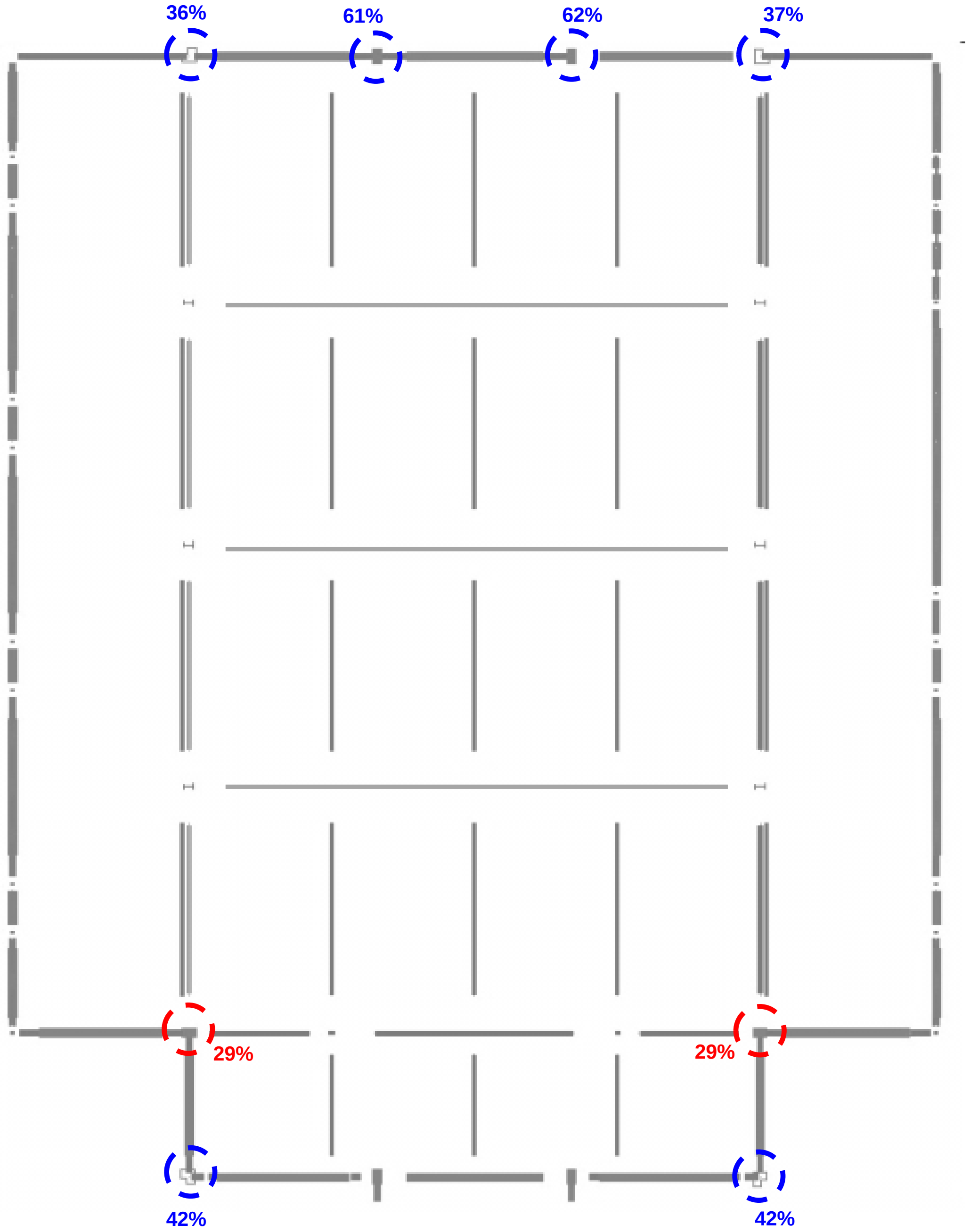
9. Results of Analysis

The following sections provide results of structural analysis of Hei Hei Community Centre structure.

9.1 Results

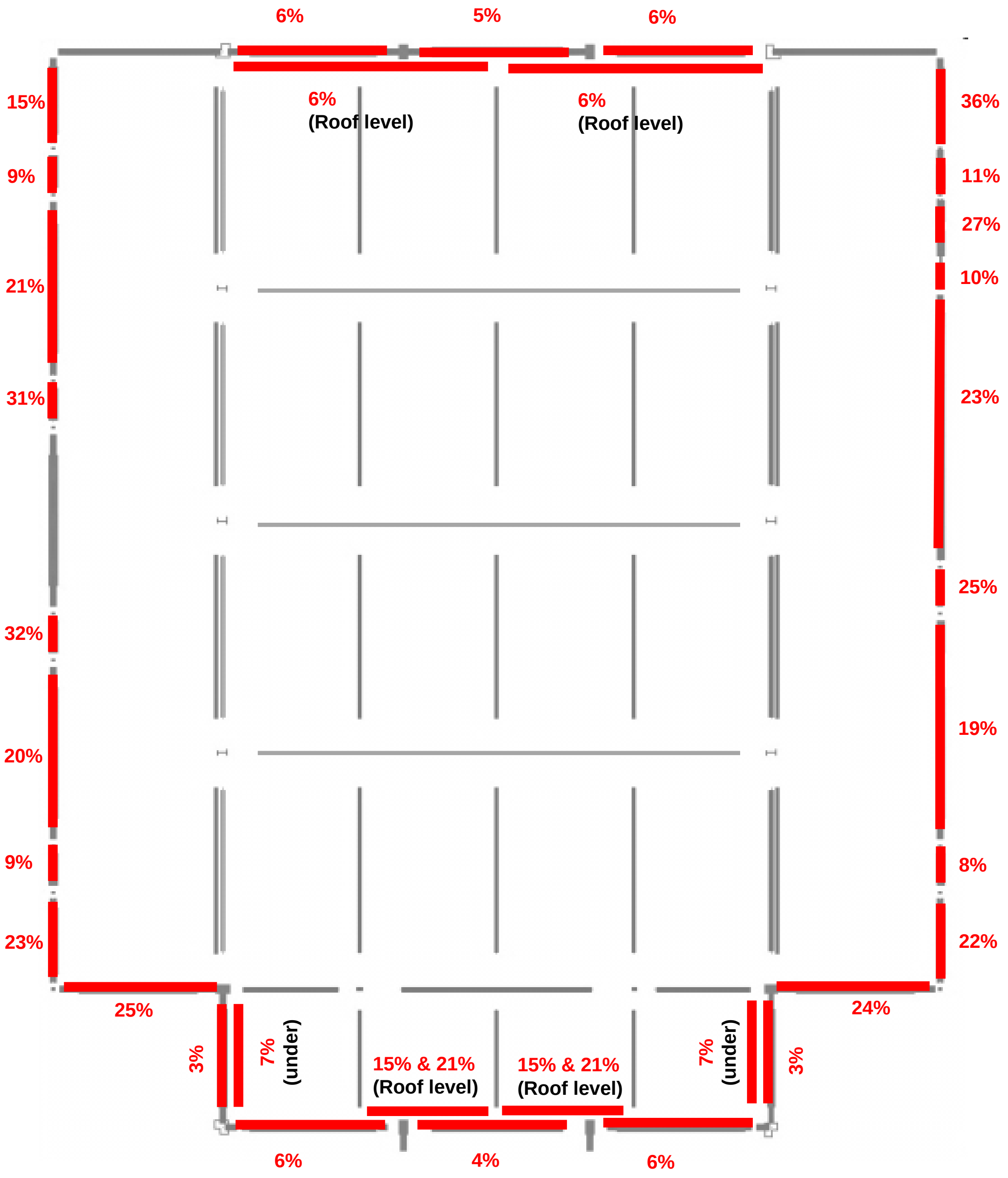
RC Columns

Two (2) reinforced concrete columns scored below 34% NBS with another six (6) scoring below 67% NBS.



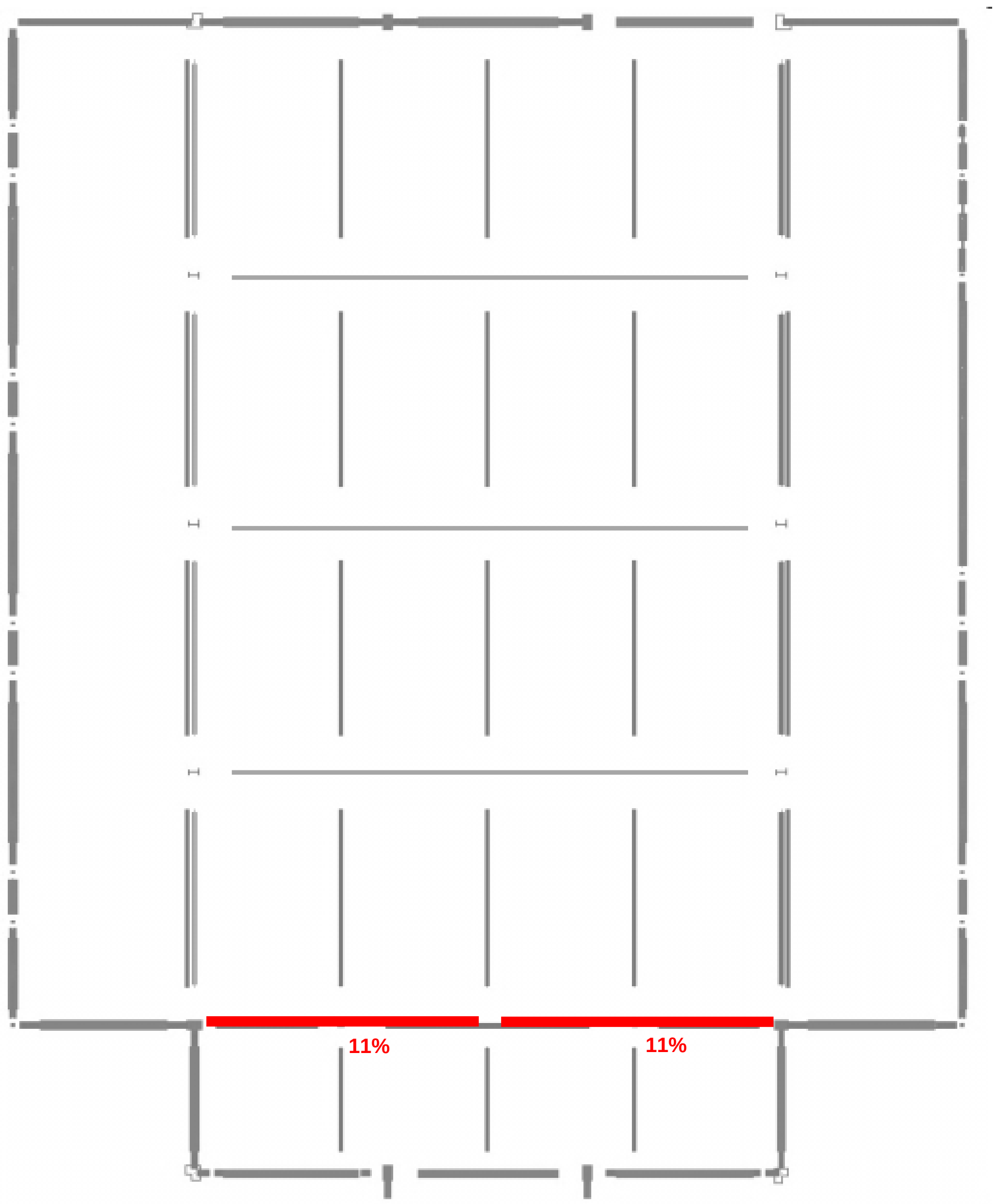
RC Beams/Bond Beams

Nearly all RC beams/bond beams scored below 34% NBS and are highlighted in red.



Steel Columns/Rafters/Portal Frames/Beams/Purlins

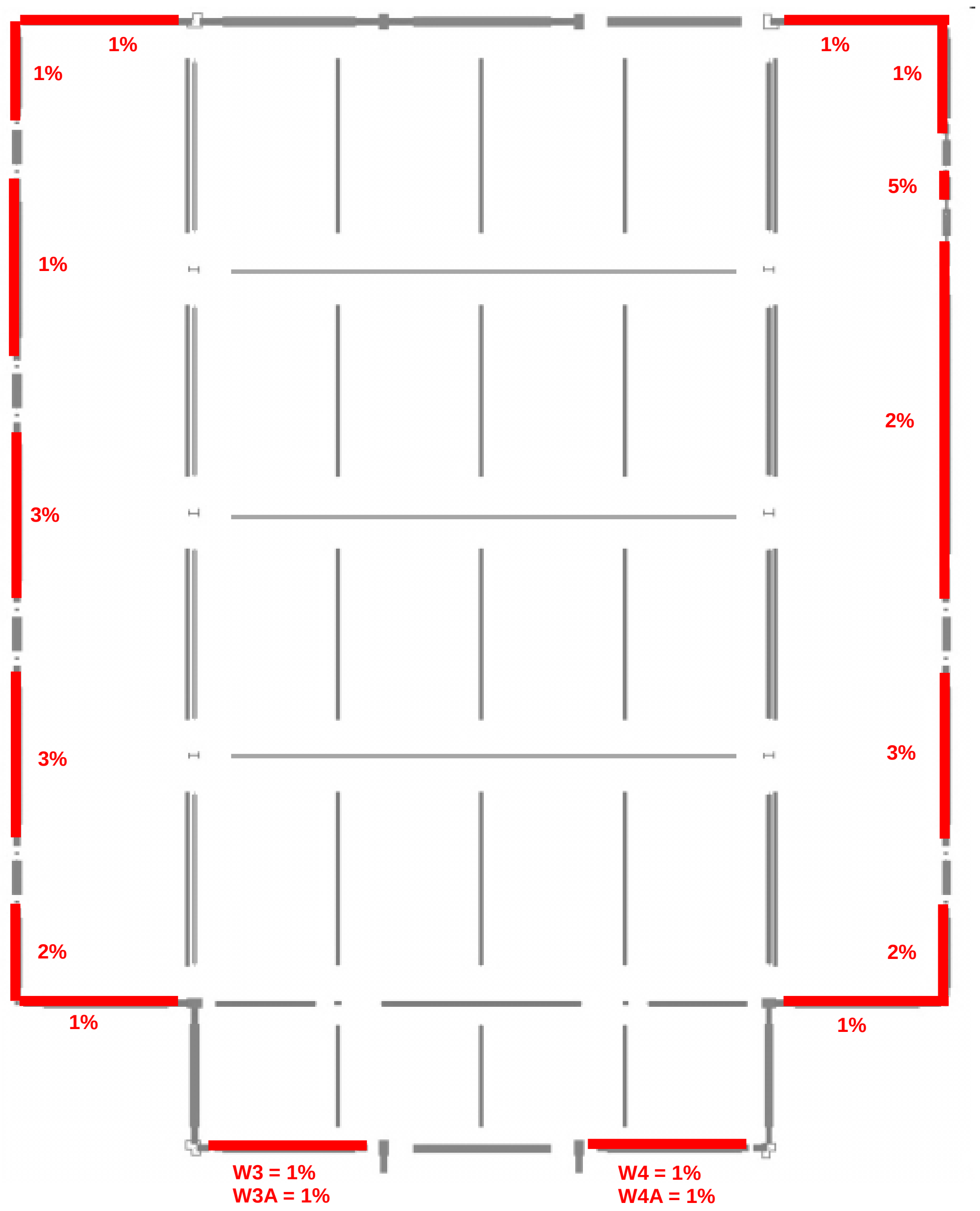
Two (2) steel rafters scored below 34% NBS and are highlighted in red below.



Masonry Walls

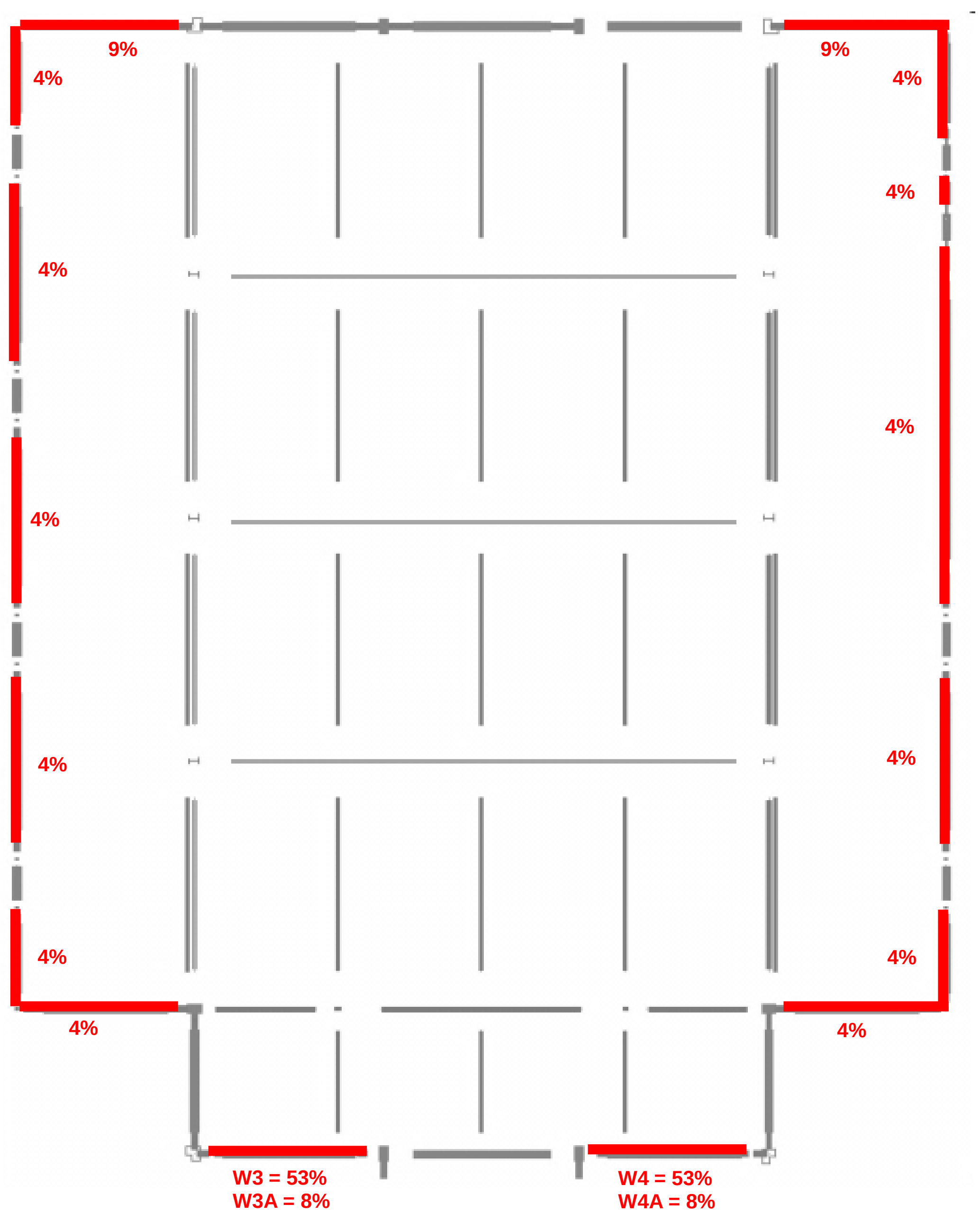
In-plane

All unreinforced masonry walls scored below 34% NBS and are highlighted in red.



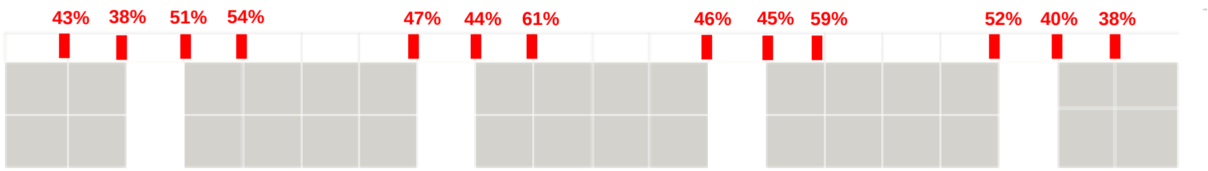
Out-of-plane

All unreinforced masonry walls scored below 34% NBS and are highlighted in red.

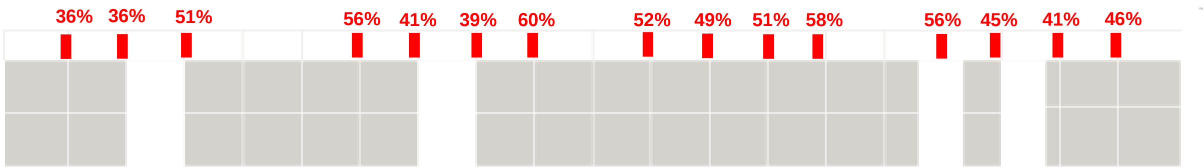


Timber Frames

The timber stub posts all scored above 33% NBS. However, twenty-eight (28) timber stub posts scored below 67% NBS. These are shown in red below.



East-side Elevation



West-side Elevation

9.2 Discussion of Results

The results obtained from the analysis are consistent with those expected for a building of this age and construction type founded on Class D soils.

The building was constructed in 1961 and was likely to be designed to the loading standard current at the time, NZS 95. The design loads used in this code were less than those required by the current loading standard. In addition, the detailing requirements for ductile seismic behaviour that are present in the current codes were not used in the design of this building. As a result, it would be expected that the building would not achieve 100% NBS. The increase in the hazard factor for Christchurch to 0.3 further reduces the % NBS score and as a result, it is reasonable to expect the building to be classified as Earthquake Prone.

10. Conclusion

10.1 Building Capacity Assessment

The structure has been assessed to have a seismic capacity of 1% NBS and therefore classified as 'Earthquake Prone'. The critical structural weaknesses for this structure are the reinforced concrete columns, unreinforced masonry walls and the connection to the timber stub posts and timber frames of the 'lean-to' areas.

The unreinforced masonry walls are considered the most critical structural elements for scoring 1% NBS. The unreinforced masonry wall intends to act as a vertical cantilever due to the lack of connection to the roof diaphragm.

The reinforced concrete columns scored a minimum of 29% NBS and were located at the mezzanine area.

11. Recommendations

GHD found that the structure achieves an overall score of 1% New Building Standard (NBS) with a seismic grade of E and therefore the building falls within the Earthquake Prone category. A building with a % NBS score below 20% NBS is 25 times more likely than a similar building constructed to current loading standards to cause loss of life or serious injury during a seismic event.

GHD recommend that a seismic strengthening scheme is prepared and the building strengthened to a minimum of 67% NBS.

12. Limitations

12.1 General

This report has been prepared subject to the following limitations:

- Available drawings in Appendix C were used in the assessment.
- No level or verticality surveys have been undertaken.
- No material testing has been undertaken.
- Foundations were not checked.
- Minimum reinforcement ratio was used in the analysis of reinforced concrete members.
- Masonry walls were assumed to be unreinforced.

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.

12.2 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.

Appendix A

Geotechnical Investigation Reports and Analysis

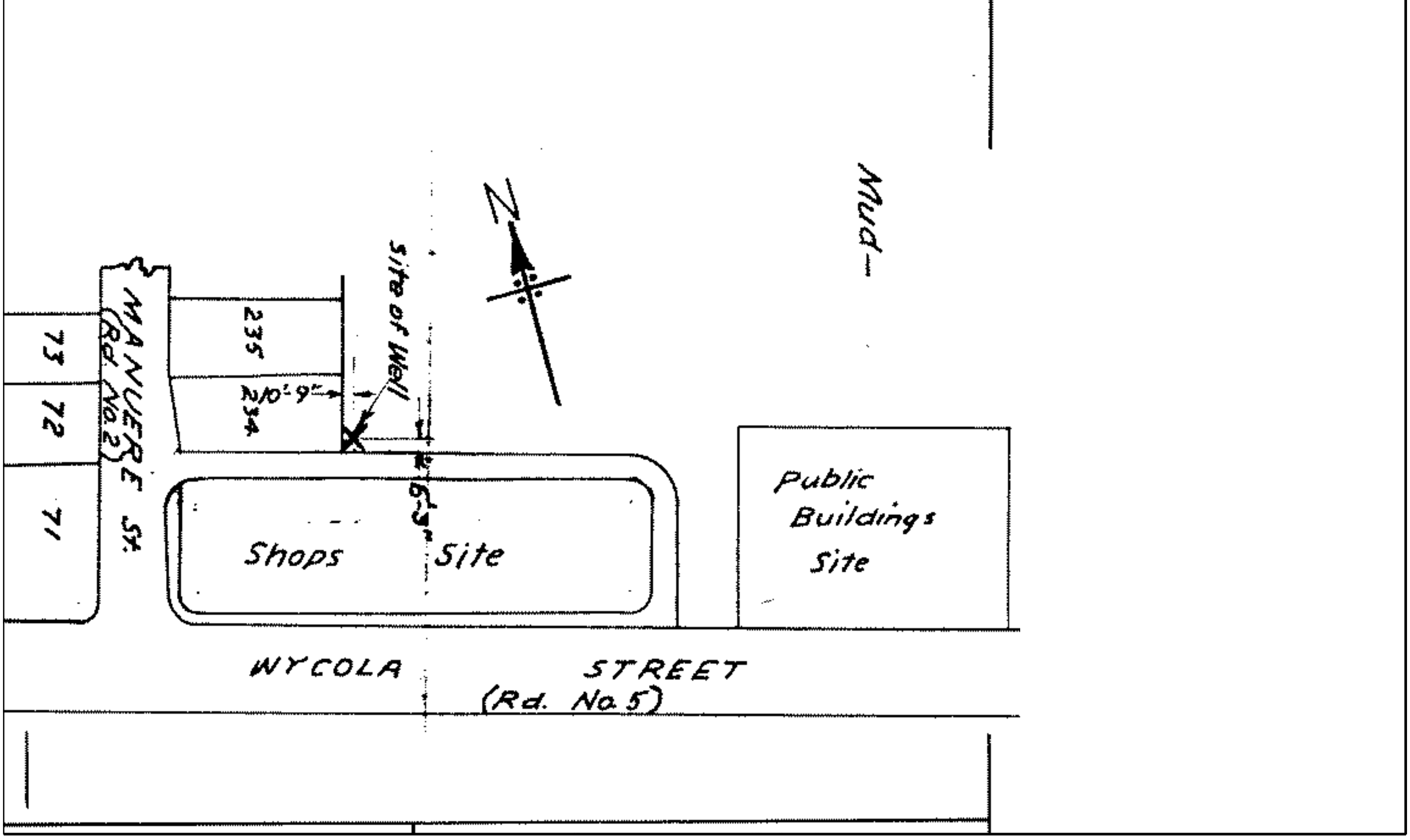
Bore or Well No: M35/1868
Well Name:
Owner: CHRISTCHURCH CITY COUNCIL

Street of Well:	WYCOLA AVENUE	**File No:**	
Locality:	HEI HEI	**Allocation Zone:**	Christchurch/West Melton
NZGM Grid Reference:	M35:713-412 QAR 4		
NZGM X-Y:	2471300 - 5741200		
Location Description:	BEHIND SHOPS	**Uses:**	Public Water Supply
ECan Monitoring:			
Well Status:	Not Used		

Drill Date:	09 Dec 1954	**Water Level Count:**	0
Well Depth:	72.80m -GL	**Strata Layers:**	19
Initial Water Depth:	-9.60m -MP	**Aquifer Tests:**	0
Diameter:	178mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	30.40m MSD QAR 3	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:	Job Osborne (& Co/Ltd)	**Calc. Min. GWL:**	-14.80m -MP
Drilling Method:	Driven Pipe	**Last Updated:**	21 Sep 2006
Casing Material:	STEEL	**Last Field Check:**	
Pump Type:	Unknown		
Yield:	0 l/s	**Screens:**	
Drawdown:	0 m	**Screen Type:**	
Specific Capacity:		**Top GL:**	57.90m
		Bottom GL:	71.60m
Aquifer Type:	Unknown		
Aquifer Name:	Linwood Gravel		

Date	Comments
24 Oct 2002	NO.1 WELL.ALSO M35/1862,1863,1841. Ex Paparua County Council
24 Oct 2002	Presumably grouted up around or before this decommisioning time.

LOCATION SKETCH



Borelog for well M35/1868 page 1 of 2

Gridref: M35:713-412 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 30.4 +MSD
Driller : Job Osborne (& Co/Ltd)
Drill Method : Driven Pipe
Drill Depth : -72.5m Drill Date : 9/12/1954

Water Level: -14.8CalcMin

Depth(m)	Full Drillers Description	Formation Code
- 21.9m	Medium to coarse gravels - traces of water at 13.7m	sp-ri
- 22.5m	Very tight clay and gravels	ri
- 34.1m	Alternate tight and loose gravels	ri
- 35.0m	Medium Brown gravel	ri
- 35.6m	Medium Black gravel	ri
- 36.7m	Medium Brown gravel, good recovery	ri

Scale(m): -5, -10, -15, -20, -25, -30, -35

Borelog for well M35/1868 page 2 of 2

Environment Canterbury Regional Council

Gridref: M35:713-412 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 30.4 +MSD
Driller : Job Osborne (& Co/Ltd)
Drill Method : Driven Pipe
Drill Depth : -72.5m Drill Date : 9/12/1954

Depth(m)	Full Drillers Description	Formation Code
- 39.3m	Medium Brown gravel, good recovery	ri
- 42.9m	Medium tight gravel	ri
- 43.2m	Very tight Blue gravel	ri
- 48.4m	Blue pug and silty mud	br
- 49.0m	Tight Blue gravel	li
- 49.3m	Hard Blue sandstone, mud	li
- 54.2m	Very sandy Brown gravel	li
- 56.9m	Very tight clay and gravel	li
- 61.8m	Medium gravel and sand	li
- 62.4m	Black gravel	li
- 67.3m	Medium to coarse gravel	li
- 67.9m	Claybound gravel	li
- 71.6m	Free medium to coarse gravel	li
- 72.6m	Blue gravel to peat and pug	li

Unknown No: M35/16580
Well Name: CCC BorelogID 6148
Owner: CCC borelog

Environment Canterbury
Your regional council

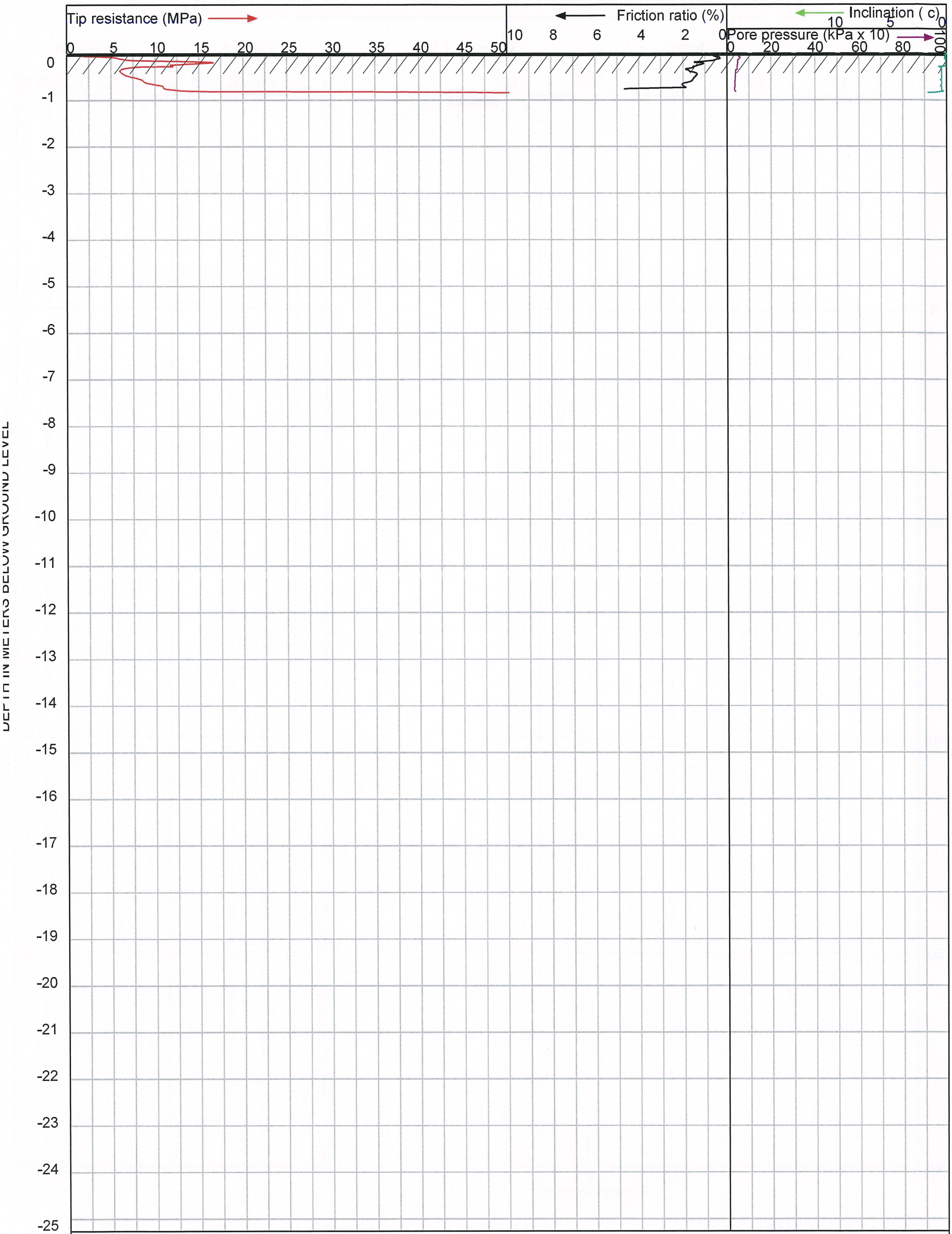
Street of Well:	Wycola Avenue	**File No:**	
Locality:	Hei Hei	**Allocation Zone:**	Christchurch/West Melton
NZGM Grid Reference:	M35:71430-41174 QAR 3		
NZGM X-Y:	2471430 - 5741174		
Location Description:		**Uses:**	Foundation/Investigation Bore
ECan Monitoring:			
Well Status:	Filled in		

Drill Date:	24 Aug 2006	**Water Level Count:**	0
Well Depth:	0.60m -GL	**Strata Layers:**	3
Initial Water Depth:		**Aquifer Tests:**	0
Diameter:		**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	25.97m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:		**Calc. Min. GWL:**	
Drilling Method:		**Last Updated:**	05 Dec 2008
Casing Material:		**Last Field Check:**	
Pump Type:	None Installed		
Yield:		**Screens:**	
Drawdown:		**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Water Table		
Aquifer Name:	Springston Formation		

Borelog for well M35/16580

Gridref: M35:71430-41174 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 25.97 +MSD
Well name : CCC BorelogID 6148
Drill Method : Not Recorded
Drill Depth : -0.6m Drill Date : 24/08/2006

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			topsoil	
-0.2		-0.20m	brown sandy silt and gravel	
-0.4				
		-0.50m	gravel	
-0.6		-0.60m		



CLIENT : GHD
LOCATION : Christchurch Various (CCC Properties)
DATE : 2-4-2012
OPERATOR : H. Pardoe
REMARK 1 : CPTu13
REMARK 2 : Effective Refusal

JOB # : 10386
TEST # : 13

McMILLAN DRILLING SERVICES
120 High St Southbridge CANTERBURY NZ
Ph +64 3 324 2571 Fax +64 3 324 2431
www.drilling.co.nz

PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT

Job No:	10386	Date:	2-4-2012
CPT No:	CPTu13	Operator:	H. Pardoe
Project:	GHD	Remark:	Effective Refusal
Location:	Christchurch Various (CCC Properties)		

McMILLAN DRILLING SERVICES

Appendix B

Photographs

Photograph 1: South (front) and East (side) Elevations

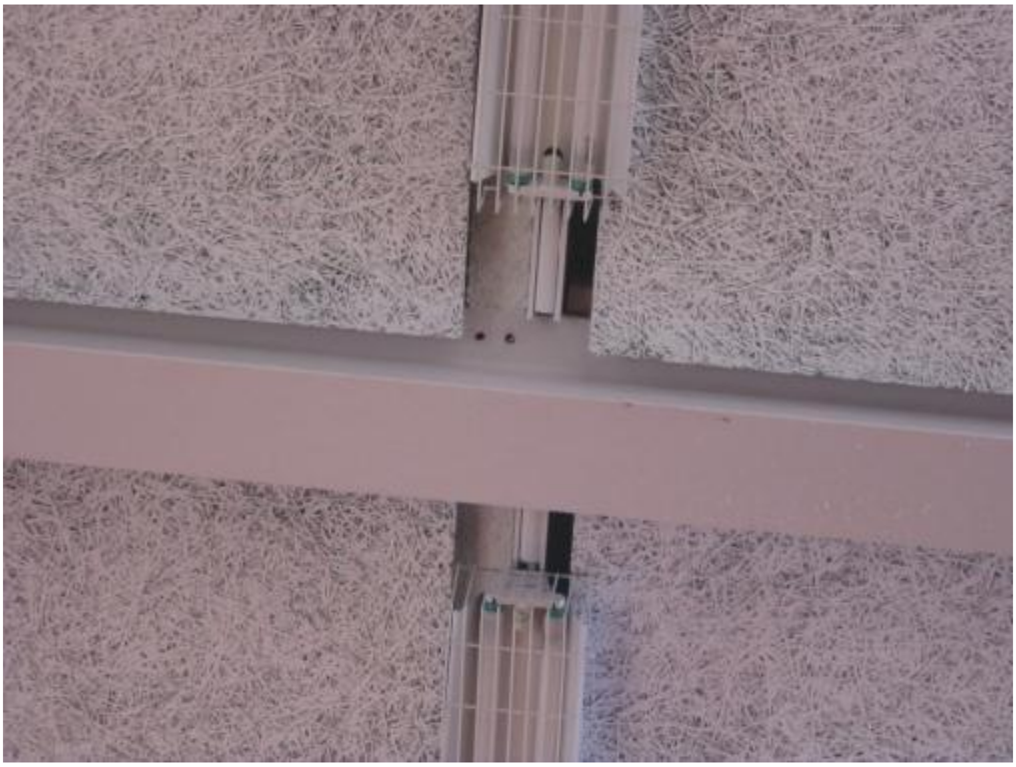
Photograph 2: North Elevation

Photograph 3: West Elevation

Photograph 4: Hall Interior

Photograph 5: Interior timber frame walls checked for adequate bracing

Photograph 6: Staircase to mezzanine floor



Photograph 7: No bolts in connections between portal frame and RSJ’s

Photograph 8: Ancillary building blockwork not directly connected into roof

Photograph 9: Minor cracking along mortar lines to concrete blockwork

Photograph 10: As above

Photograph 11: Lack of adequate structural connection between the roof framing and exterior blockwork walls

Photograph 12: As above

Photograph 13: Opening up works at exterior masonry wall showing the connection to foundation

Photograph 14: As above

Photograph 15: Opening up works showing the timber floor system and foundation support

Photograph 16: As above

Photograph 17: Opening up work showing the foundation support under the steel portal frame

Photograph 18: As above

Photograph 19: Opening up works showing the timber floor system and foundation support

Photograph 20: Opening up works on roof within the mezzanine floor area

Photograph 21: Opening up works on roof showing connections between the steel frame and reinforced concrete column

Photograph 22: Opening up works on roof within the mezzanine floor area. Shows the connection between the steel frame

Photograph 23: Opening up works on roof showing steel and concrete frame connections

Photograph 24: As above

Photograph 25: Opening up works on roof showing the connection between the angle and box steel frame.

Photograph 26: Minor cracking along mortar lines to exterior blockwork walls located at mezzanine floor area

Photograph 27: Opening up works on roof showing the connection between steel portal frame and RSJ's

Photograph 28: Steel portal frame connections

Photograph 29: Steel portal frame connections

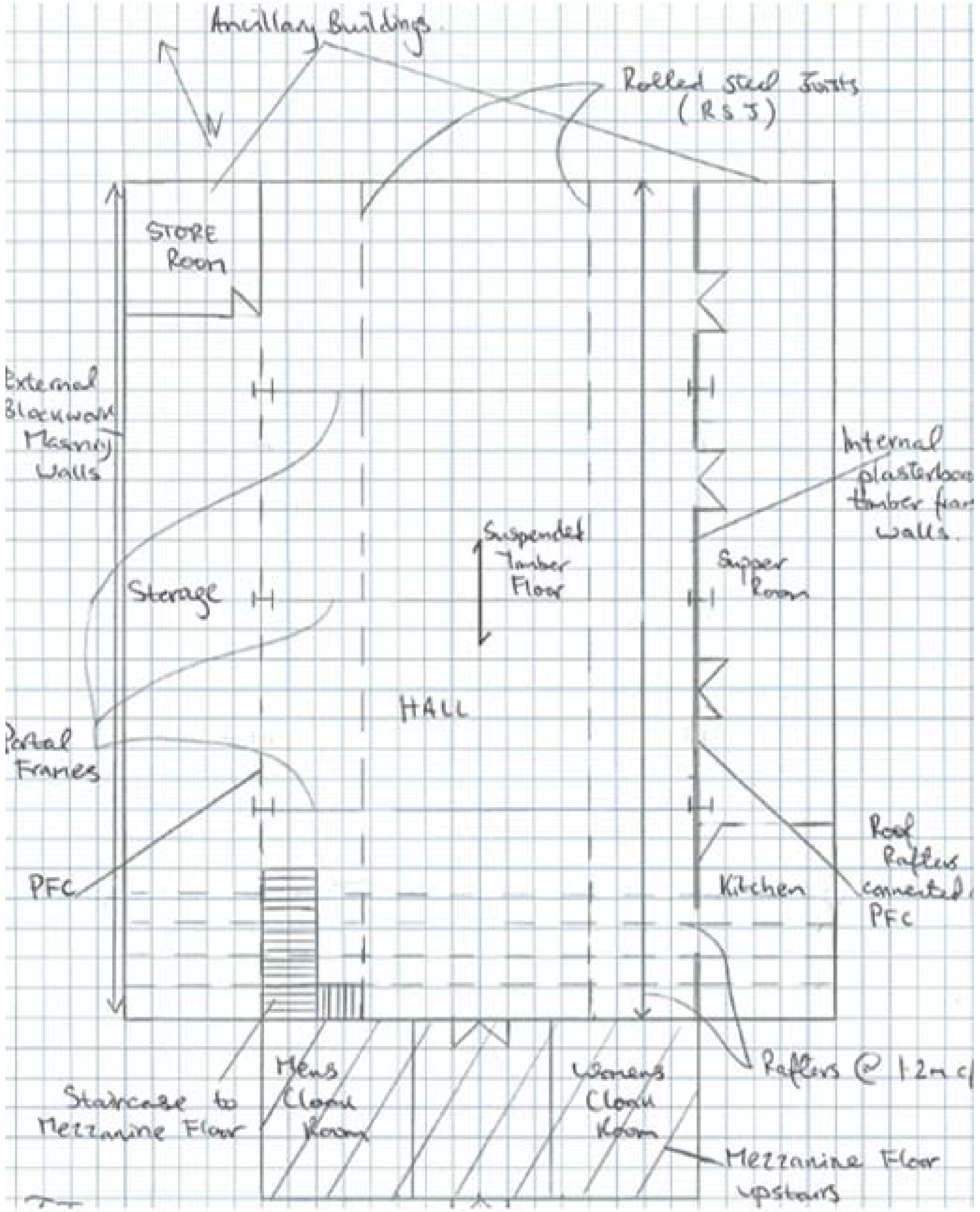
Photograph 30: Connection between the PFC and concrete frame

Photograph 31: Timber frame connections to PFC

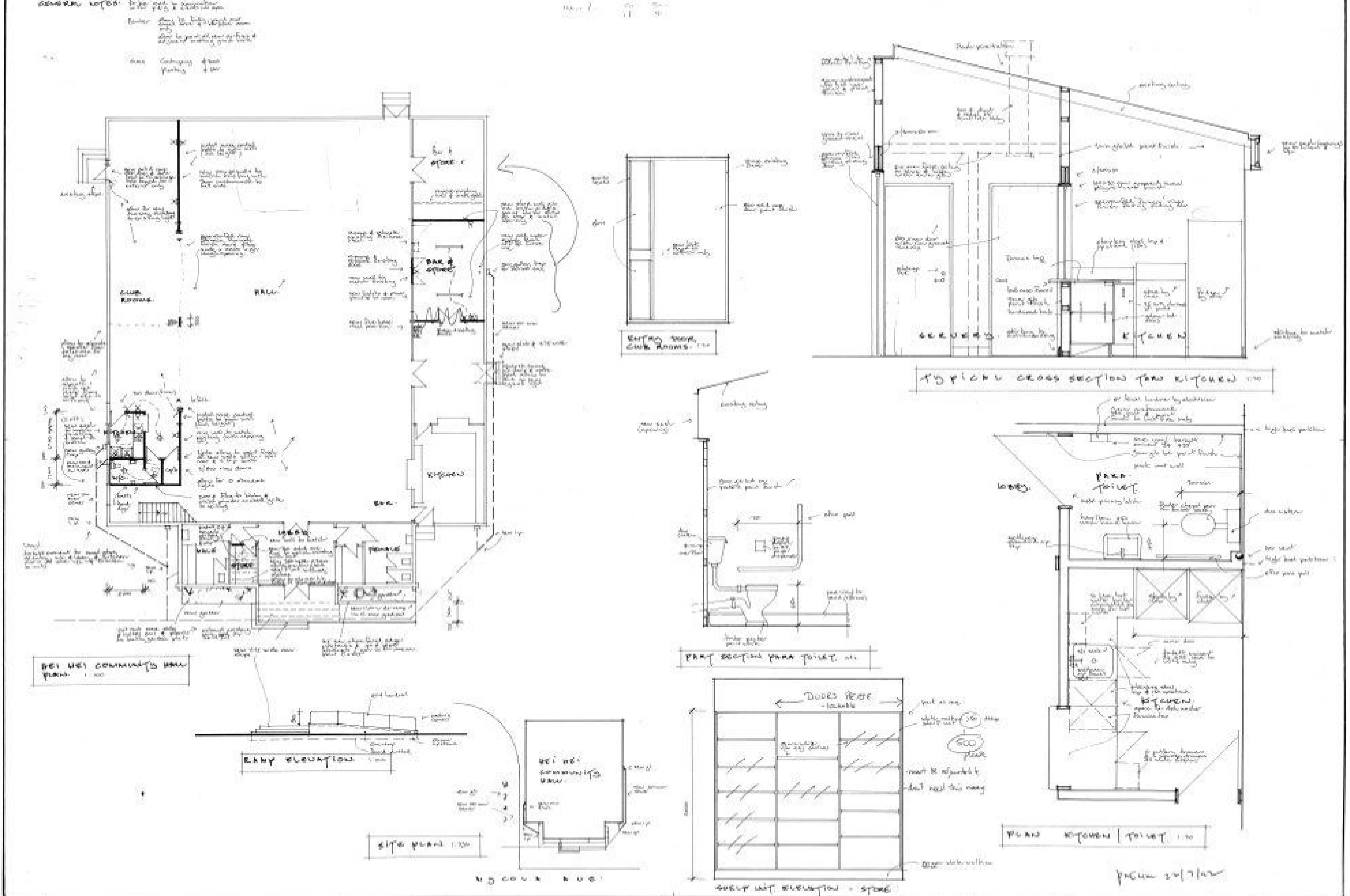
Photograph 32: As above

Appendix C

Existing Drawings/Sketches


Ancillary Buildings
Rolled steel Joists (RSJ)
STORE Room
External Blockwork Masonry Walls
Internal plasterboard timber frame walls
Suspended Timber Floor
Storage
Supper Room
HALL
Portal Frames
PFC
Roof Rafters connected PFC
Kitchen
Staircase to Mezzanine Floor
Mens Cloak Room
Womens Cloak Room
Rafters @ 1.2m c
Mezzanine Floor upstairs

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK

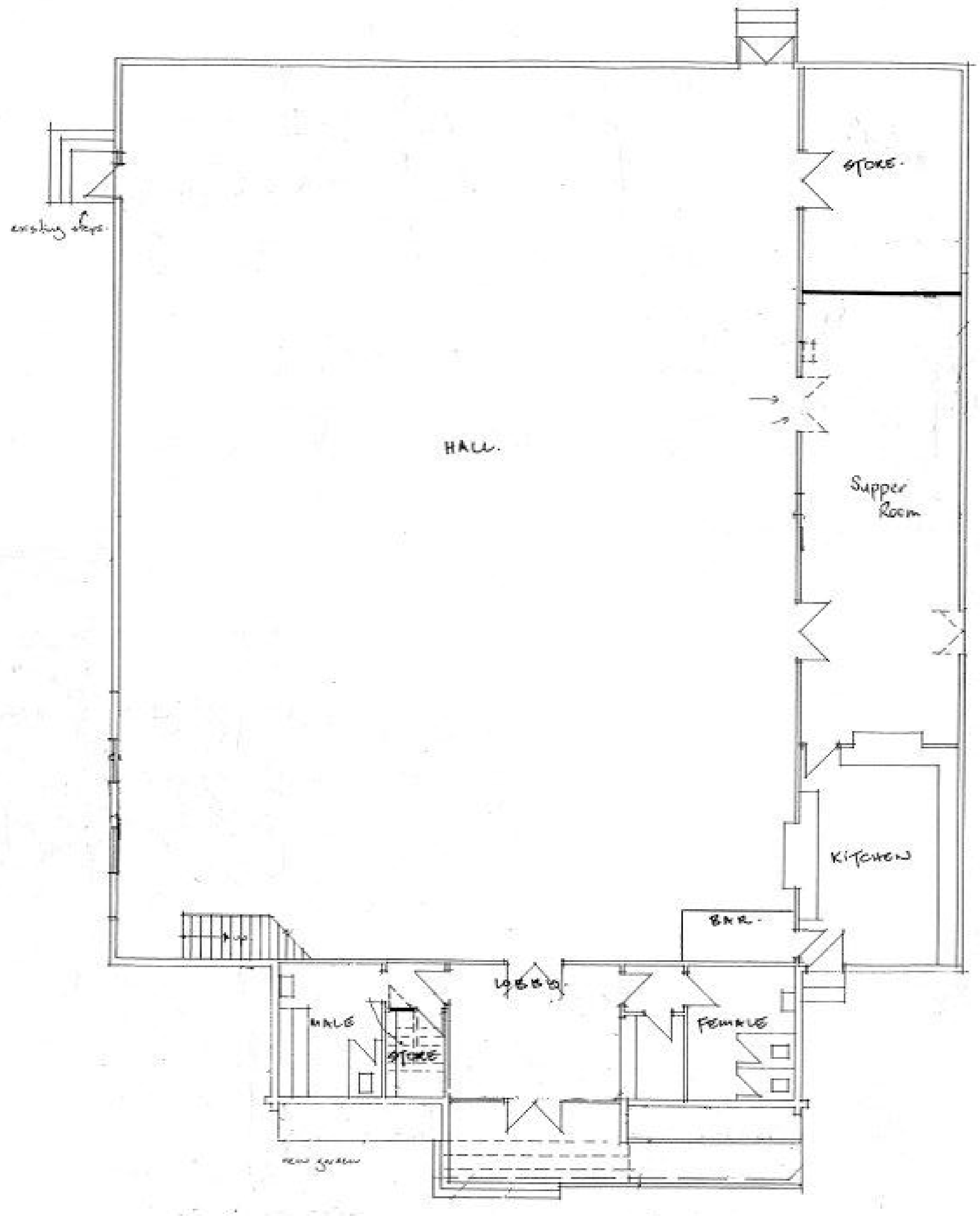


CHRISTCHURCH CITY COUNCIL
TECHNICAL SERVICES GROUP - DESIGN SERVICES UNIT : ARCHITECTS

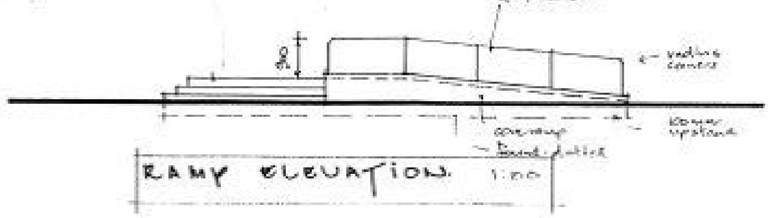
ALTERATIONS AT HEI HEI COMMUNITY CENTRE 1992

SCALE as shown | DESIGN | DRAWN | TRACED | CHECKED | JOB NO. | CONTRACT NO. | SHEET

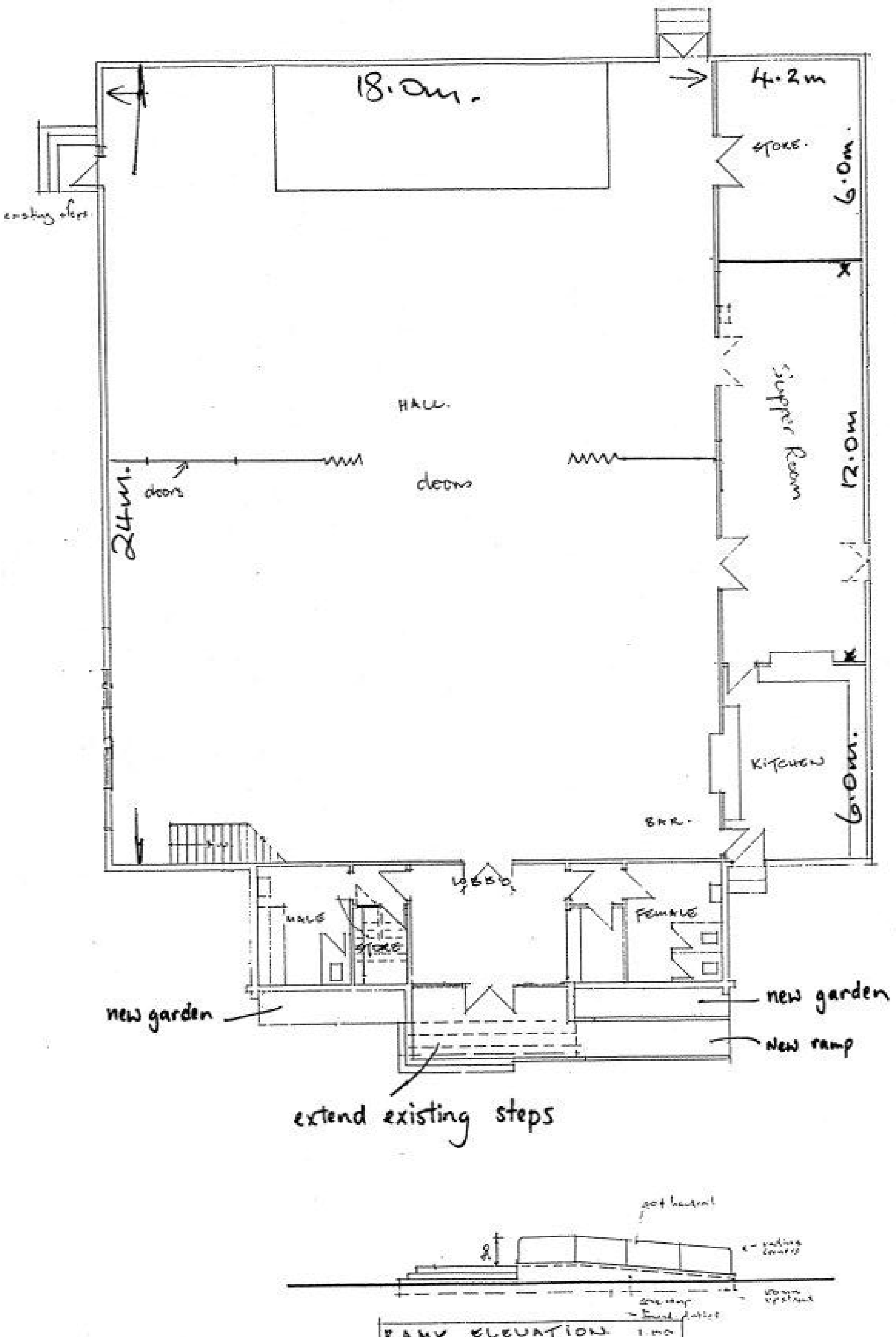
DATE



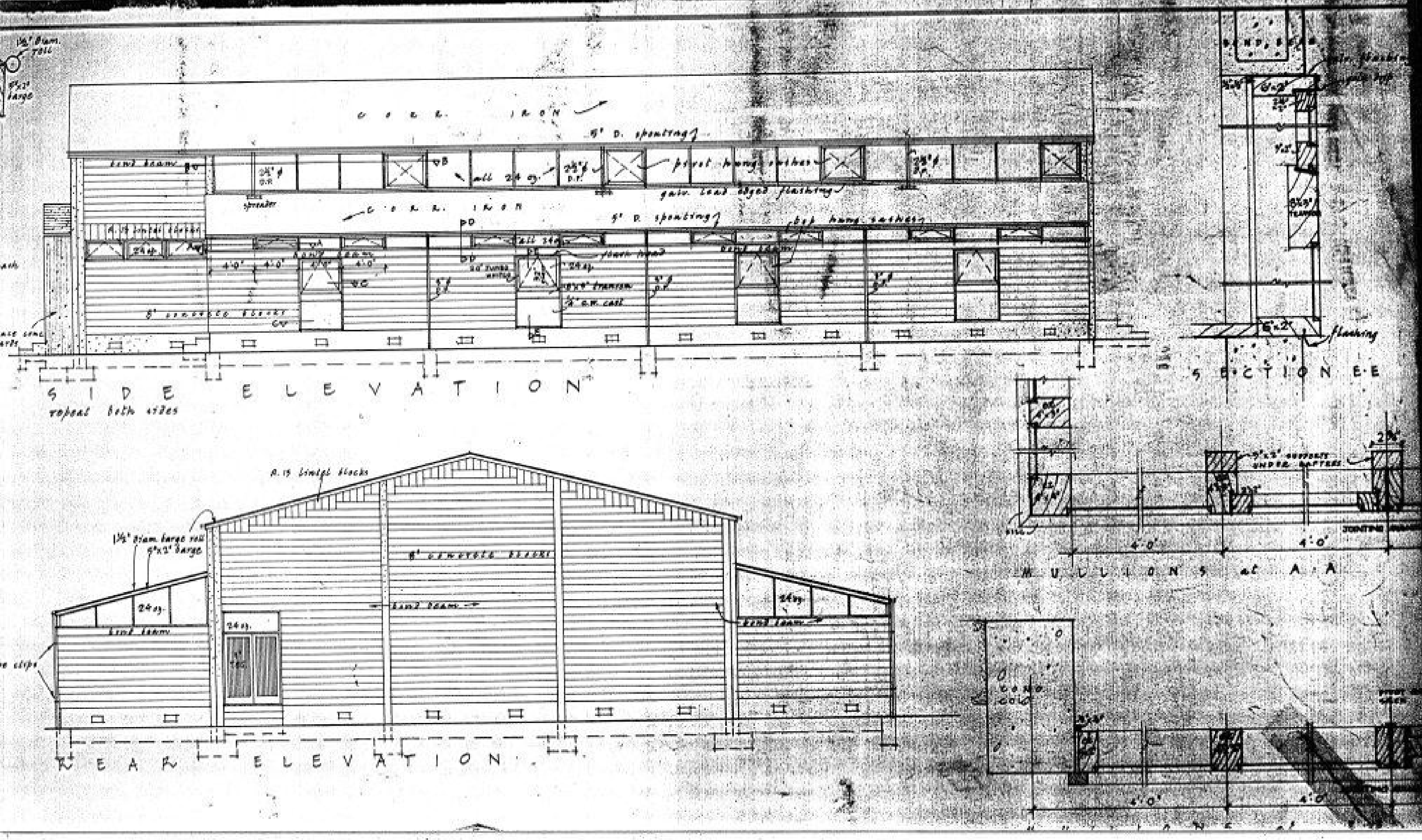
HEI HEI COMMUNITY HALL
PLAN. 1:100



RAMP ELEVATION. 1:100

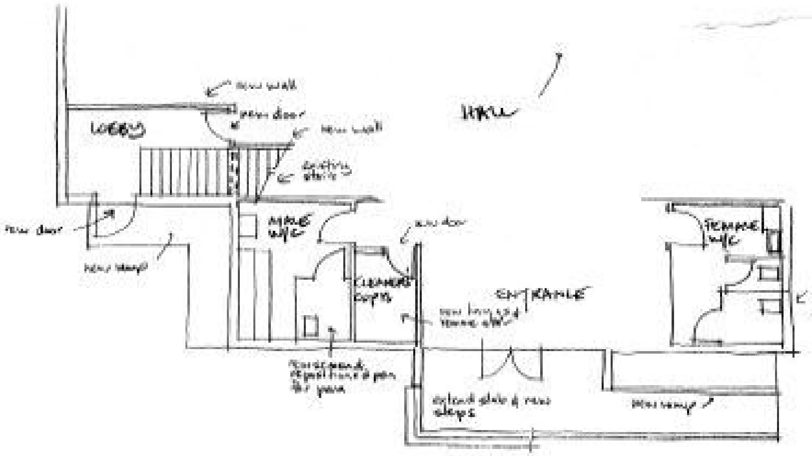


18.0m.
4.2m
STORE.
6.0m
existing steps
HALL.
Supper Room
12.0m
24m.
doors
doors
KITCHEN
6.0m.
BAR.
LOBBY
MALE
STORE
FEMALE
new garden
new garden
New ramp
extend existing steps
RAMP ELEVATION 1:100

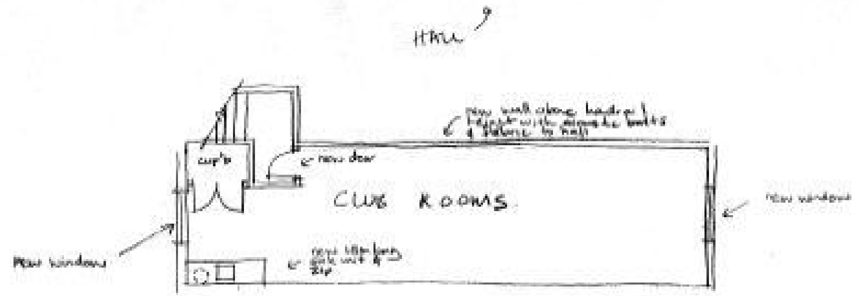


1½" diam. roll
9"x2" barge
C O R R. I R O N
5" D. spouting
bond beam
24 oz.
D.P.
spreader
all 24 oz.
pivot hung sashes
galv. lead edged flashing
C O R R. I R O N
5" D. spouting
top hung sashes
A.15 lintel blocks
24 oz.
bond beam
4'-0"
2" x 4" transom
8" concrete blocks
S I D E E L E V A T I O N
repeat both sides
6"x2"
flashing
S E C T I O N E E
9"x2" supports under rafters
4'-0"
M U L L I O N S at A A
A.15 lintel blocks
1½" diam barge roll
9"x2" barge
24 oz.
bond beam
8" concrete blocks
bond beam
24 oz.
bond beam
R E A R E L E V A T I O N.
conc. cols.
4'-0"

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



GROUND FLOOR PLAN



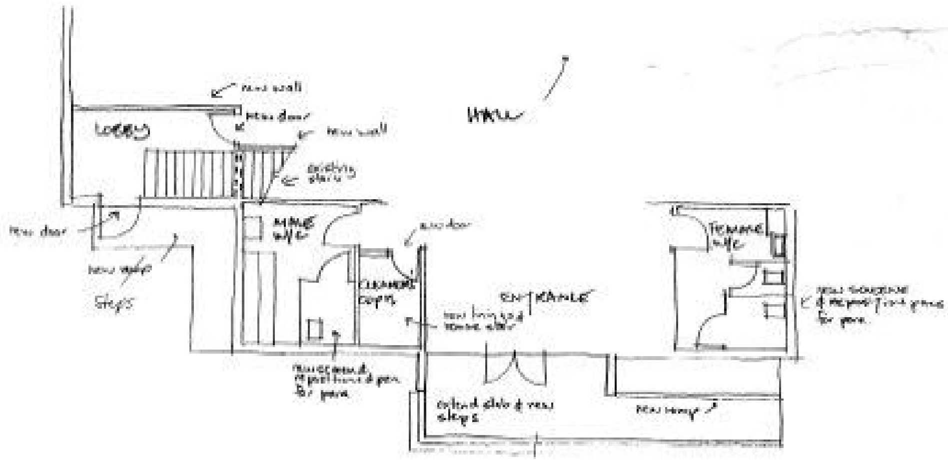
FIRST FLOOR PLAN

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

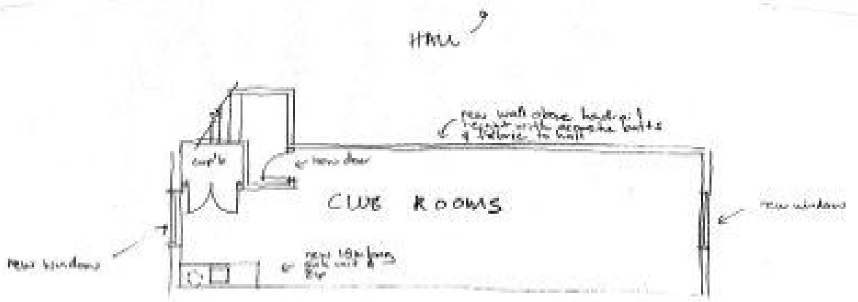
HEI HEI COMMUNITY HALL 1992.

SCALE 1:100 DESIGN DRAWN TRACED JOB NO SHEET NUMBER
DATE 20 11 92 FILE NO OF SHEETS

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



GROUND FLOOR PLAN



FIRST FLOOR PLAN

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

HEI HEI COMMUNITY HALL 1992

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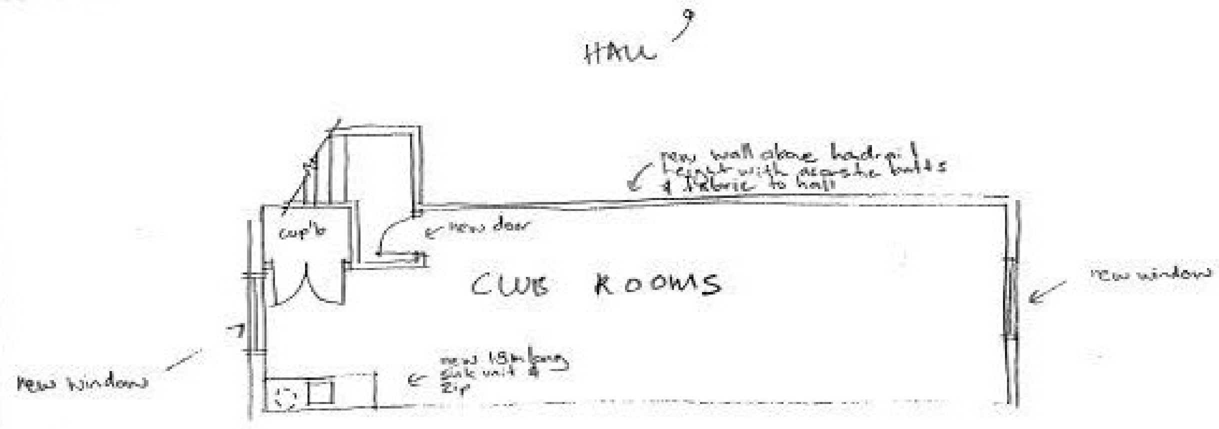
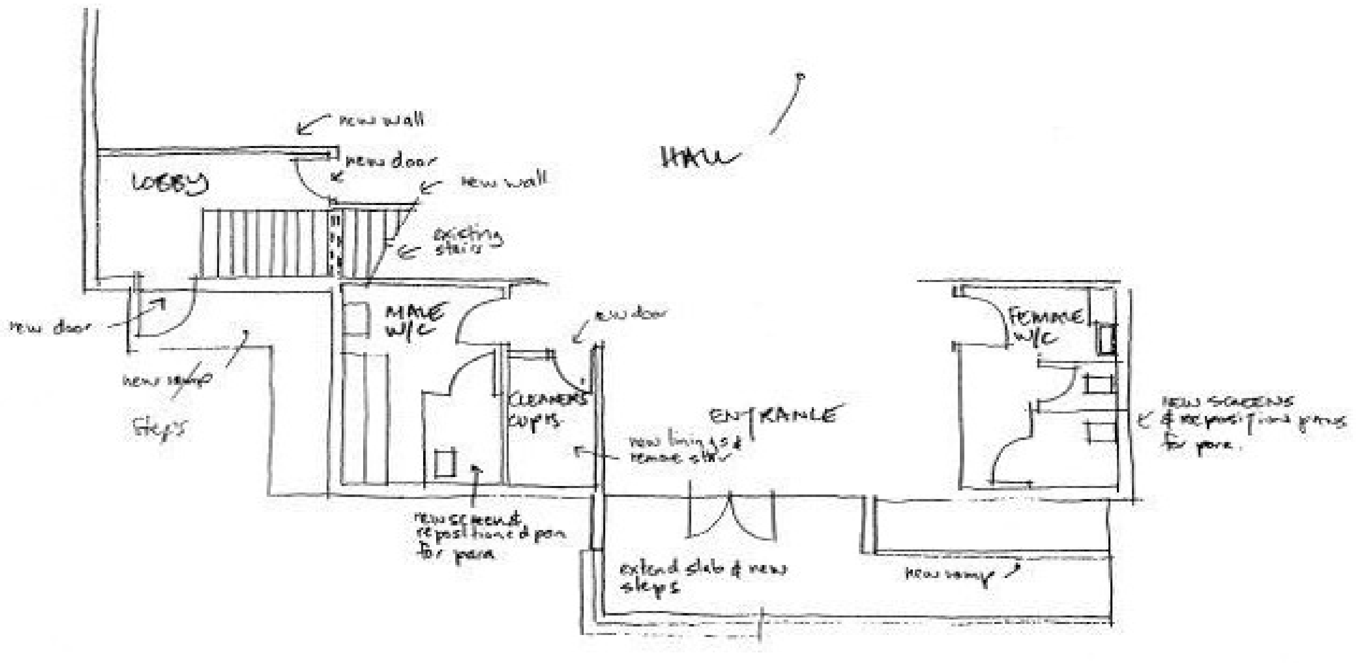


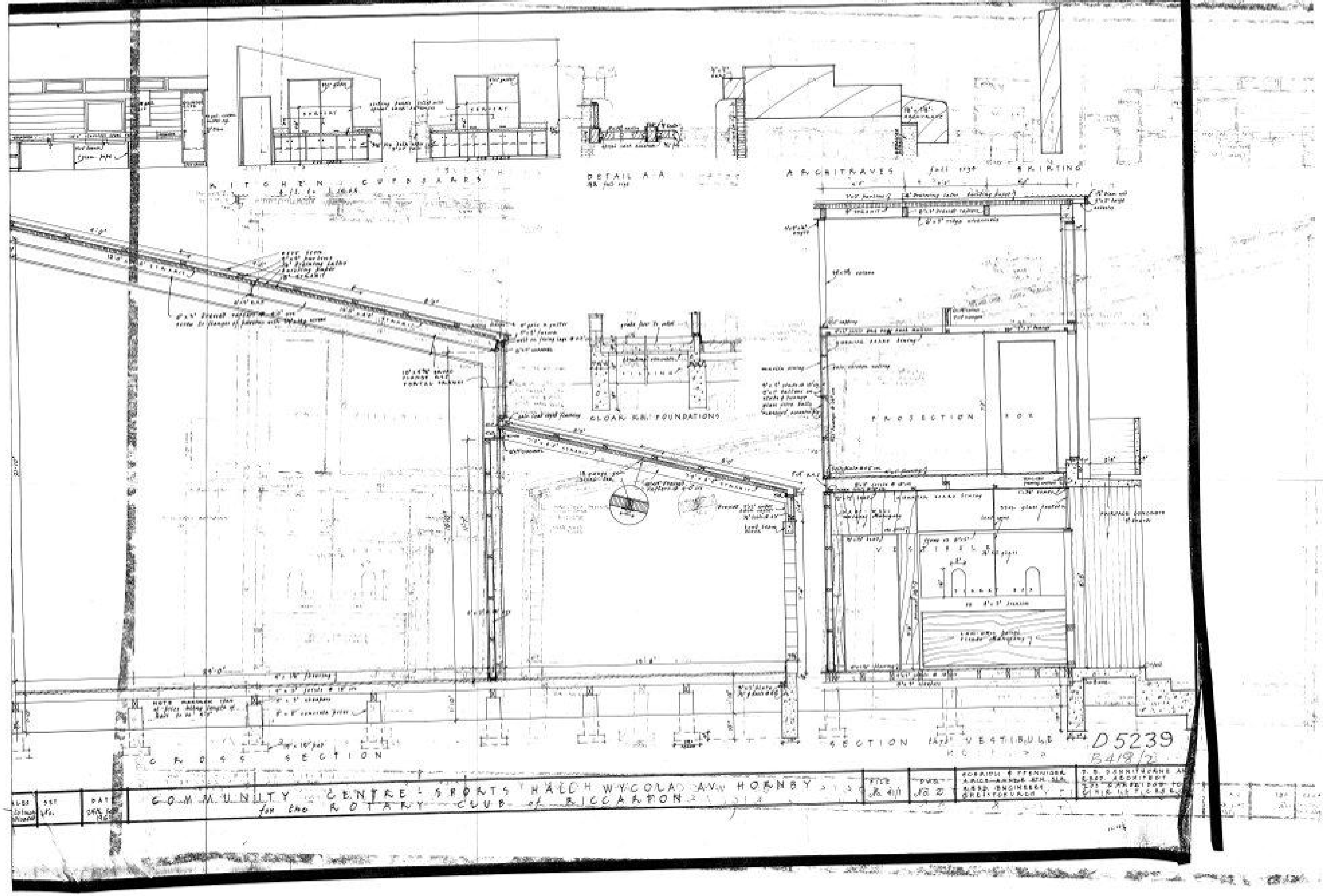
FIRST FLOOR PLAN

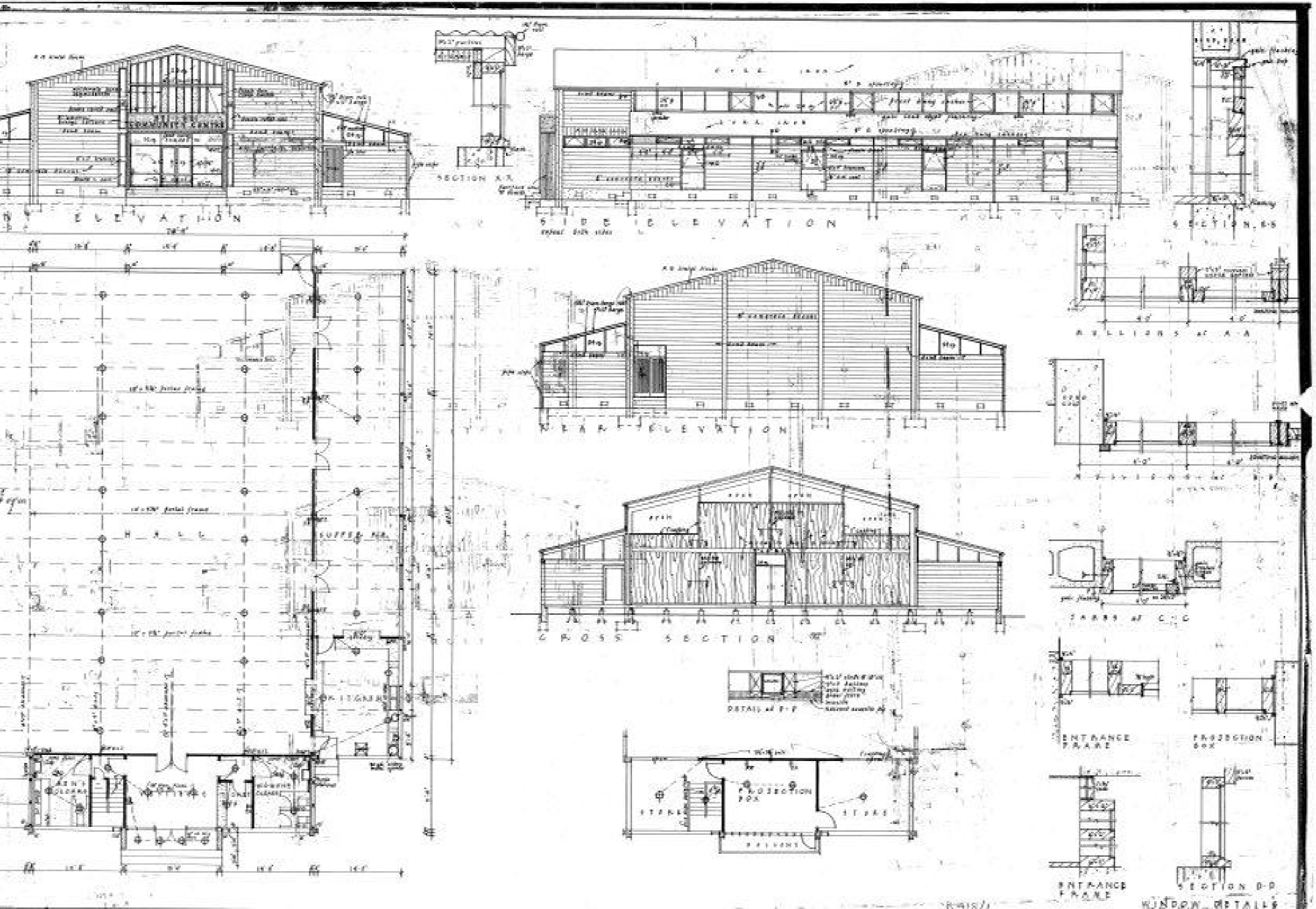


GROUND FLOOR PLAN

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

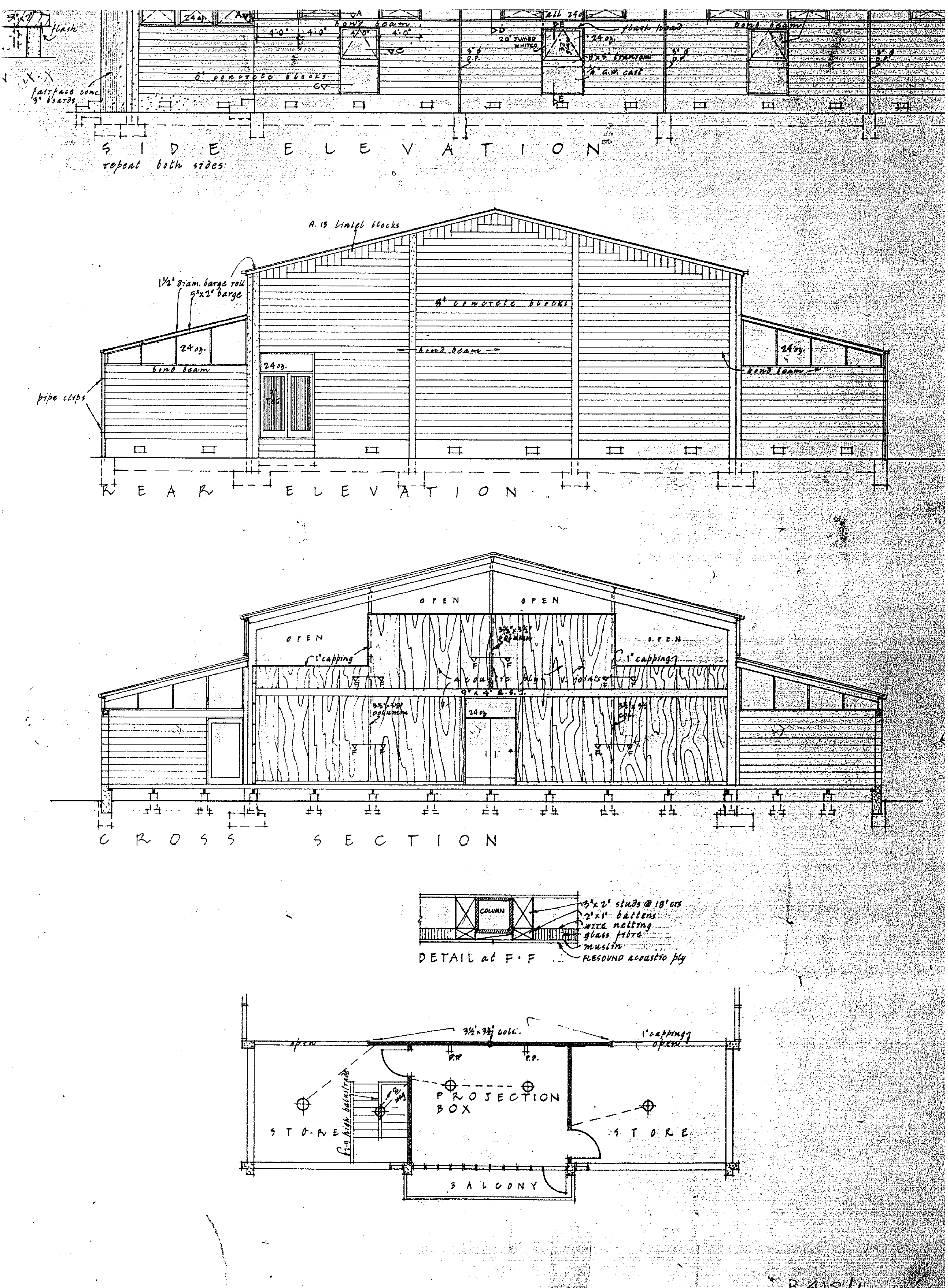
HEI HEI COMMUNITY HALL 1992


KITCHEN CUPBOARDS
DETAIL A-A
ARCHITRAVES
SKIRTING
CLOAK RM. FOUNDATIONS
PROJECTION BOX
VESTIBULE
CROSS SECTION
SECTION THRO' VESTIBULE
D5239
COMMUNITY CENTRE - SPORTS HALL - WYCOLA AV. HORNBY
for the ROTARY CLUB of RICCARTON
FILE
DWG No. 2



COMMUNITY CENTRE - SPORTS HALL : WYCIOLA AV. HORNBY
for the ROTARY CLUB of RICCARTON

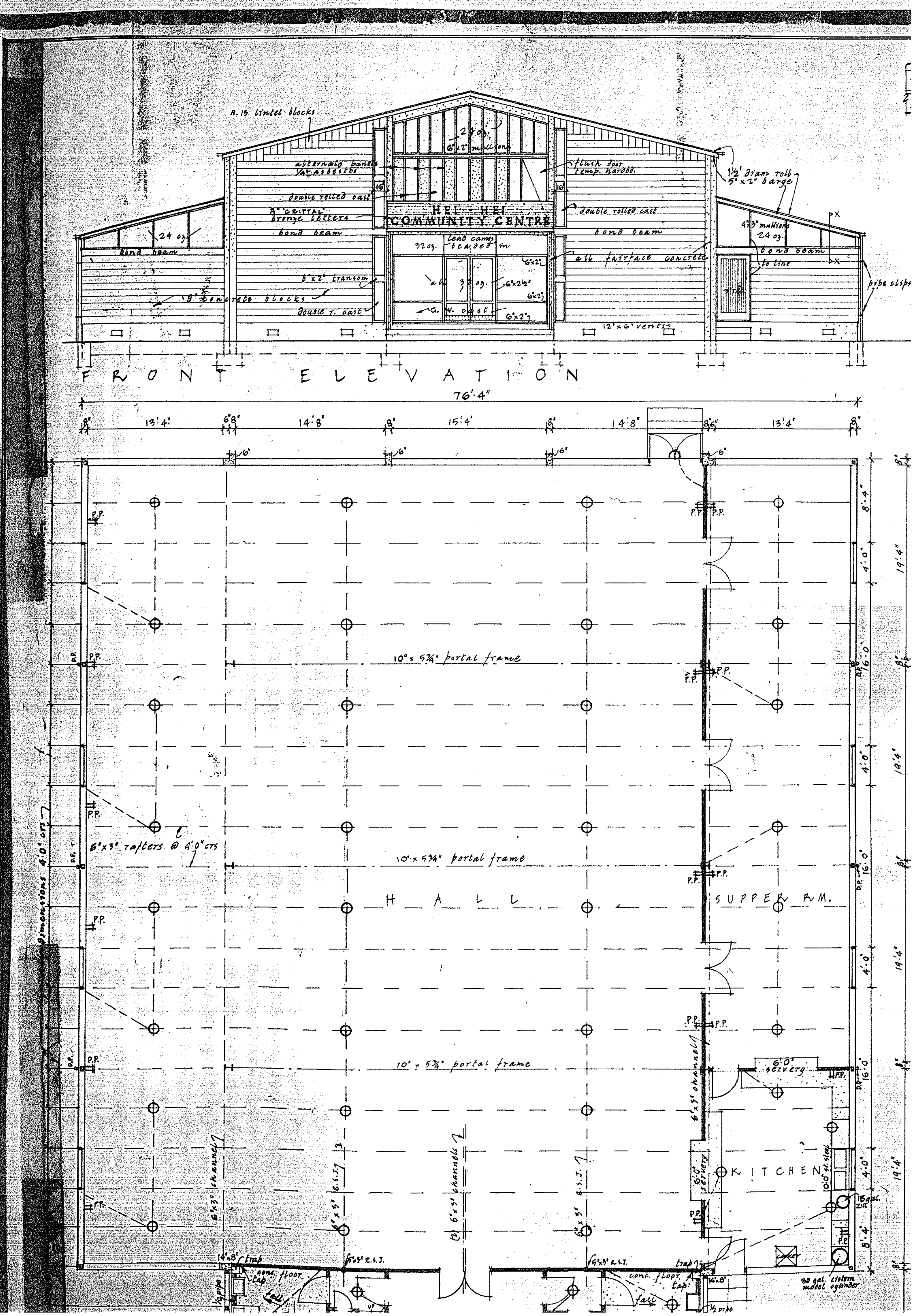
FILE No 41/1 | DWG. No 1



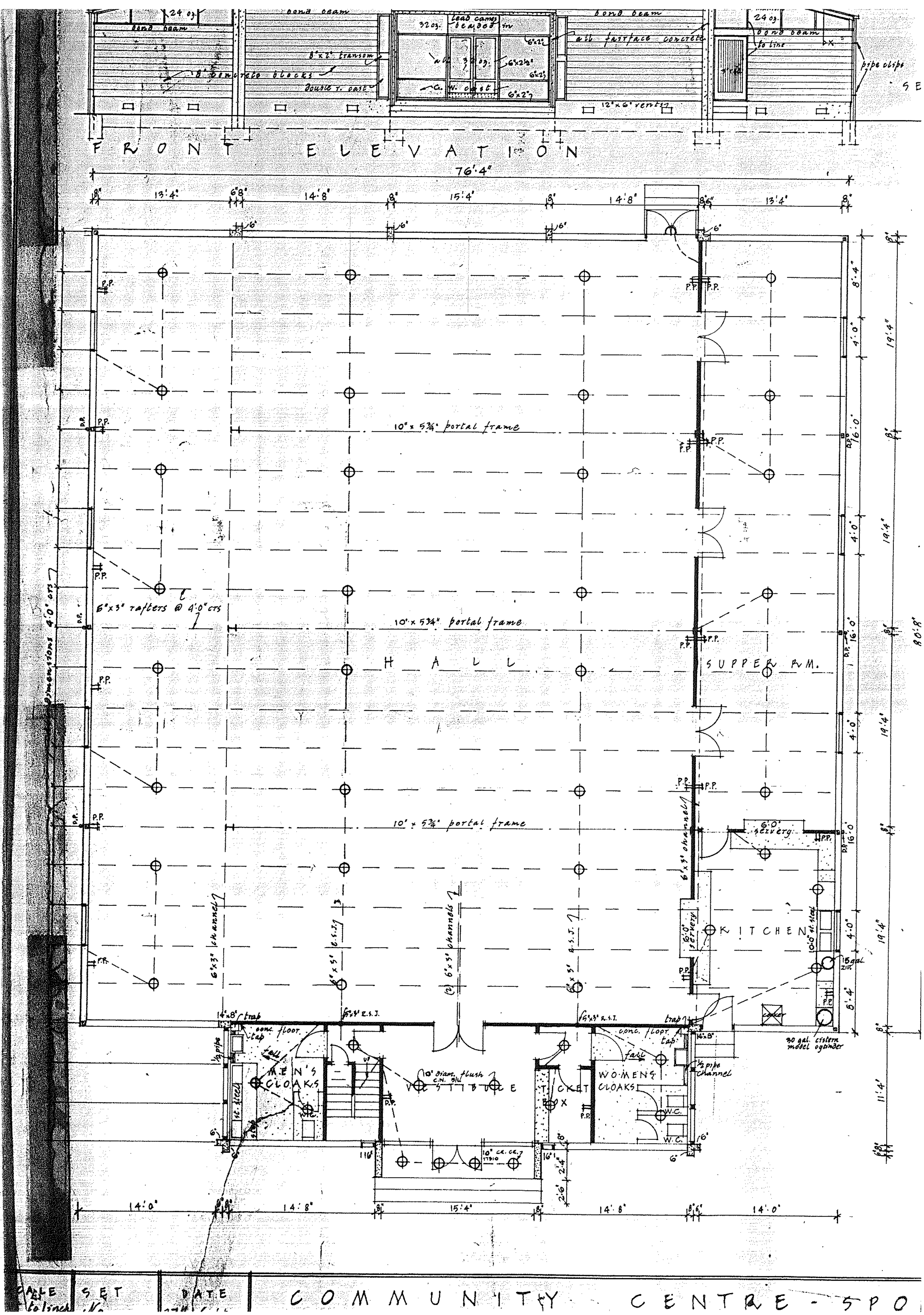
B418/1

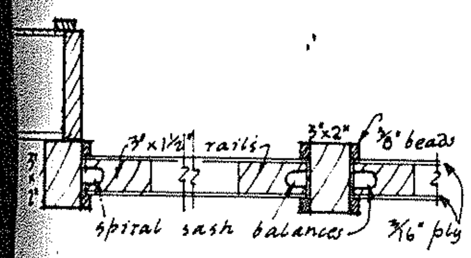
S HALL WYCOLA AV. HORNBY

FILE	DWG.	

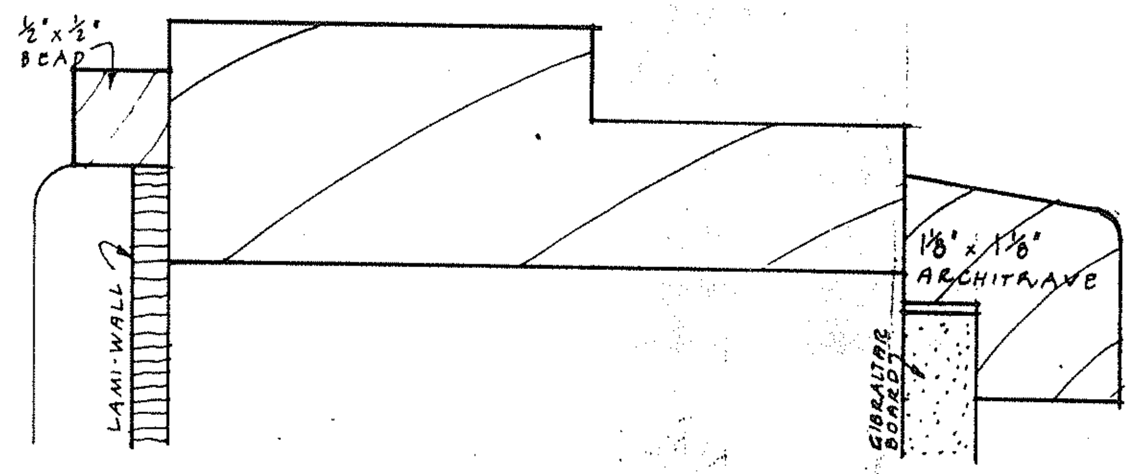


FRONT ELEVATION
HEI HEI COMMUNITY CENTRE
A. 13 lintel blocks
24 oz.
6"x2" mullions
alternate panels 1/4" asbestos
flush door temp. hardbd.
1½" diam roll 5"x2" barge
double rolled cast
8" CRITTAL bronze letters
double rolled cast
bond beam
4"x3" mullions
24 oz.
lead cames beaded in
32 oz.
all fairface concrete
to line
pipe clips
8"x2" transom
8" concrete blocks
double r. cast
G. W. cast
12"x6" vents
76'4"
13'4"
6'8"
14'8"
15'4"
8'6"
10" x 5¾" portal frame
HALL
SUPPER RM.
KITCHEN
6'0" servery
10'0" st. steel
15 gal. zip
30 gal. cistern model cylinder
6"x3" rafters @ 4'0" crs
dimensions 4'0" crs
6"x3" channel
(2) 6"x3" channels
6"x5" R.S.J.
6"x3" R.S.J.
P.P.
D.P.
conc. floor
trap
tap
fall
½" pipe
19'4"
16'0"
4'0"
8'4"


FRONT ELEVATION
76'4"
bond beam
24 oz.
lead came bedded in
32 oz.
6"x2" transom
8" concrete blocks
double r. cast
6"x2"
6"x2½"
6"x2"
all fairface concrete
12"x6" vents
to line
pipe clips
HALL
SUPPER RM.
KITCHEN
10" x 5¾" portal frame
6"x3" rafters @ 4'0" crs
6"x3" channel
(2) 6"x3" channels
6"x5" R.S.J.
6'0" servery
15 gal. zinc
30 gal. cistern model ogbinder
conc. floor
trap
tap
fall
MEN'S CLOAKS
WOMENS CLOAKS
W.C.
st. steel
½ pipe
½ pipe channel
VESTIBULE
TICKET BOX
10" diam. flush
10" ca. ce.
P.P.
D.P.
13'4"
6'8"
14'8"
15'4"
8'6"
14'0"
19'4"
16'0"
4'0"
8'4"
80'8"
11'4"
6'8"
2'4"
2'6"
SCALE
SET No.
DATE
COMMUNITY CENTRE - SPO

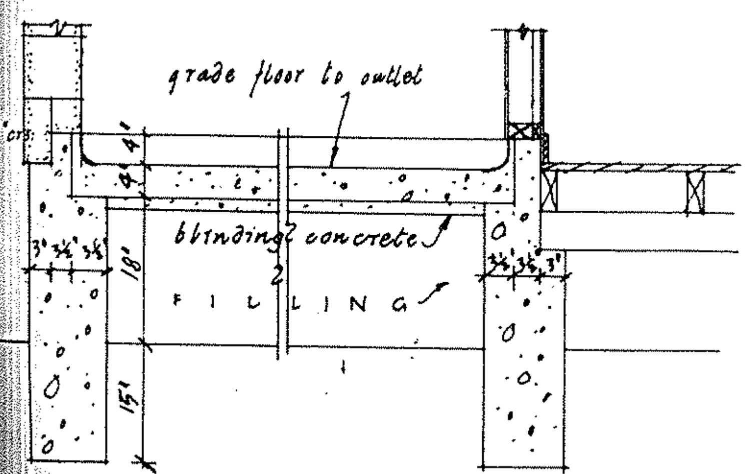


DETAIL A·A
⅛th full size

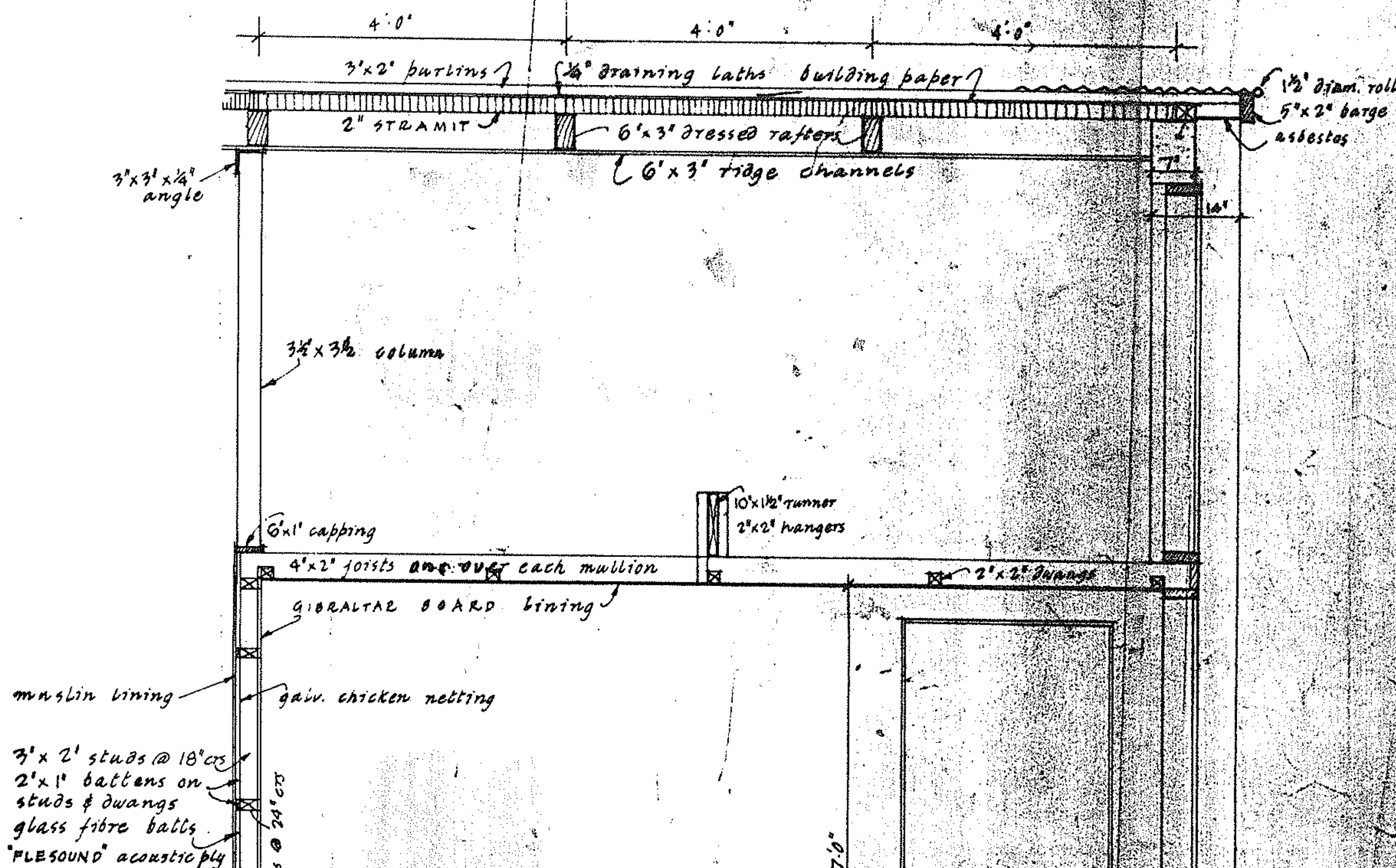


ARCHITRAVES full size

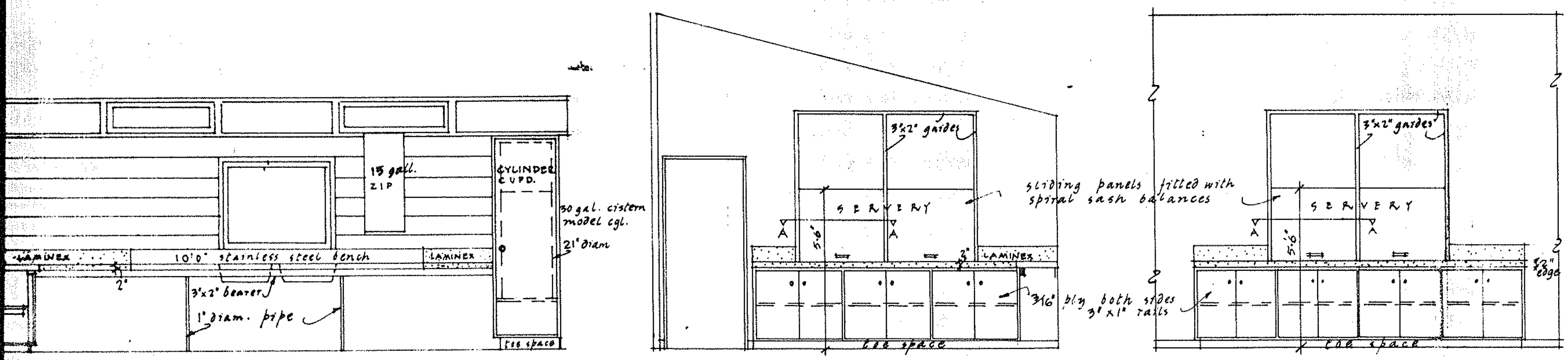
SKIRTING



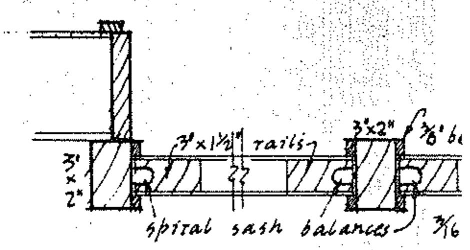
CLOAK RM. FOUNDATIONS



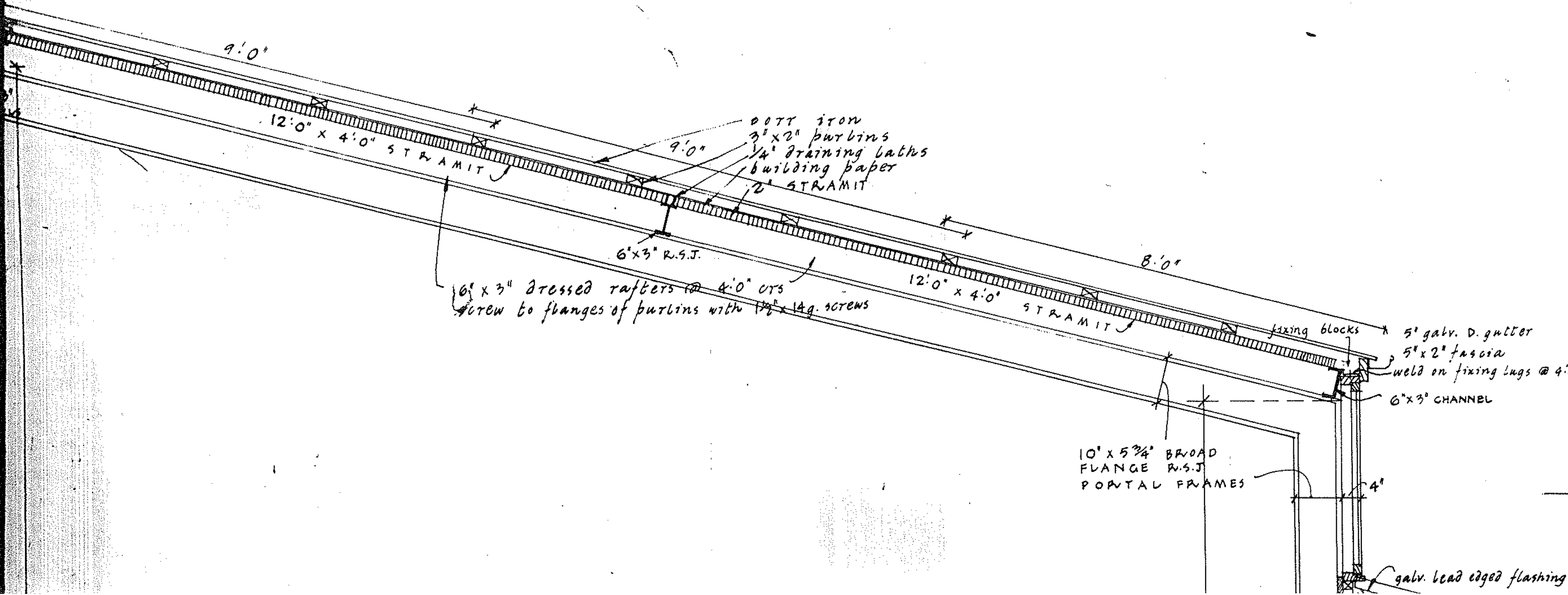
PROJECTION BOX

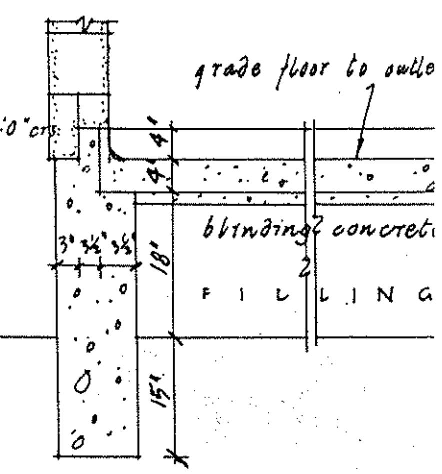


KITCHEN CUPBOARDS
4 ft. to 1 inch



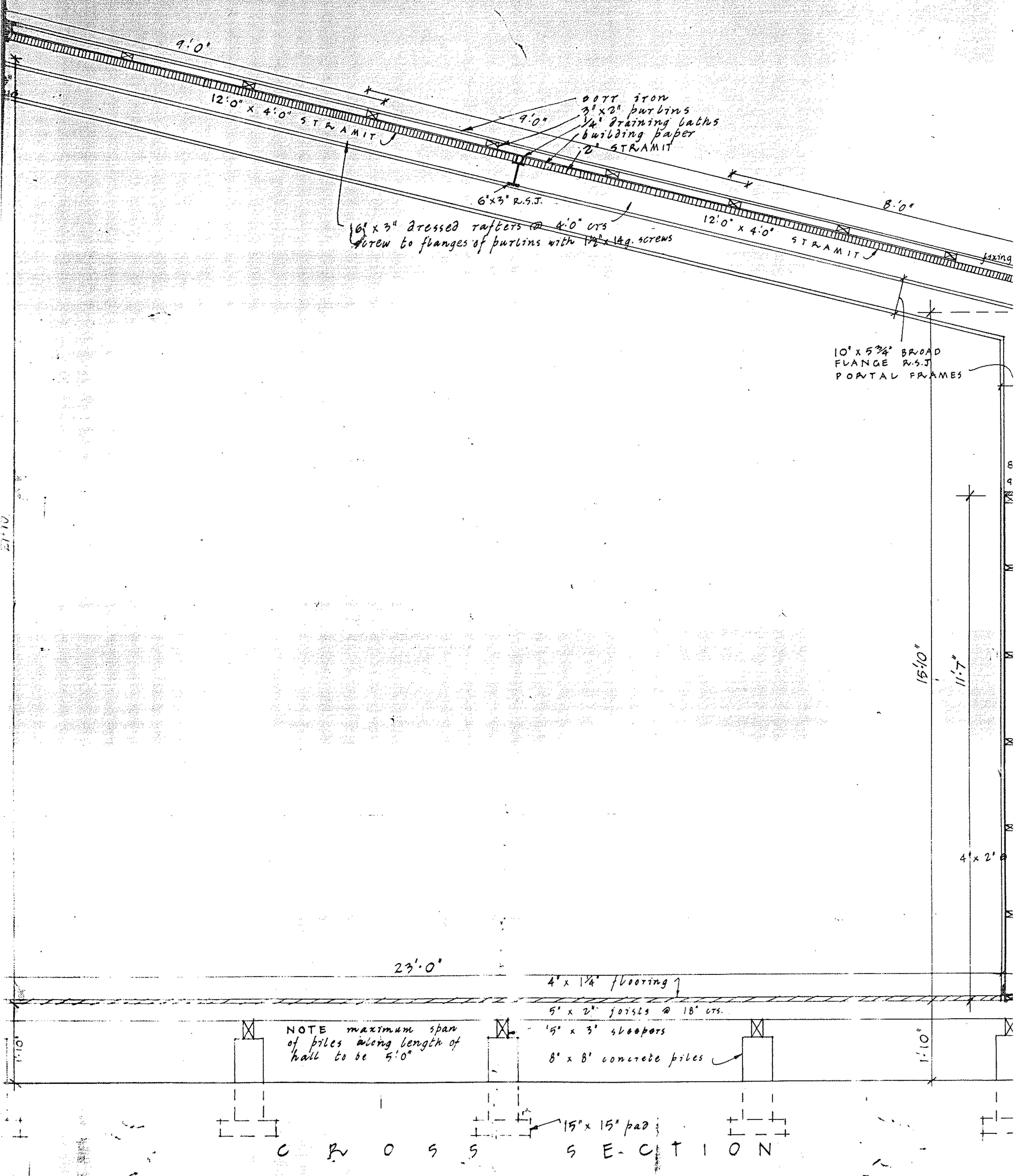
DETAIL A·A
1/8th full size





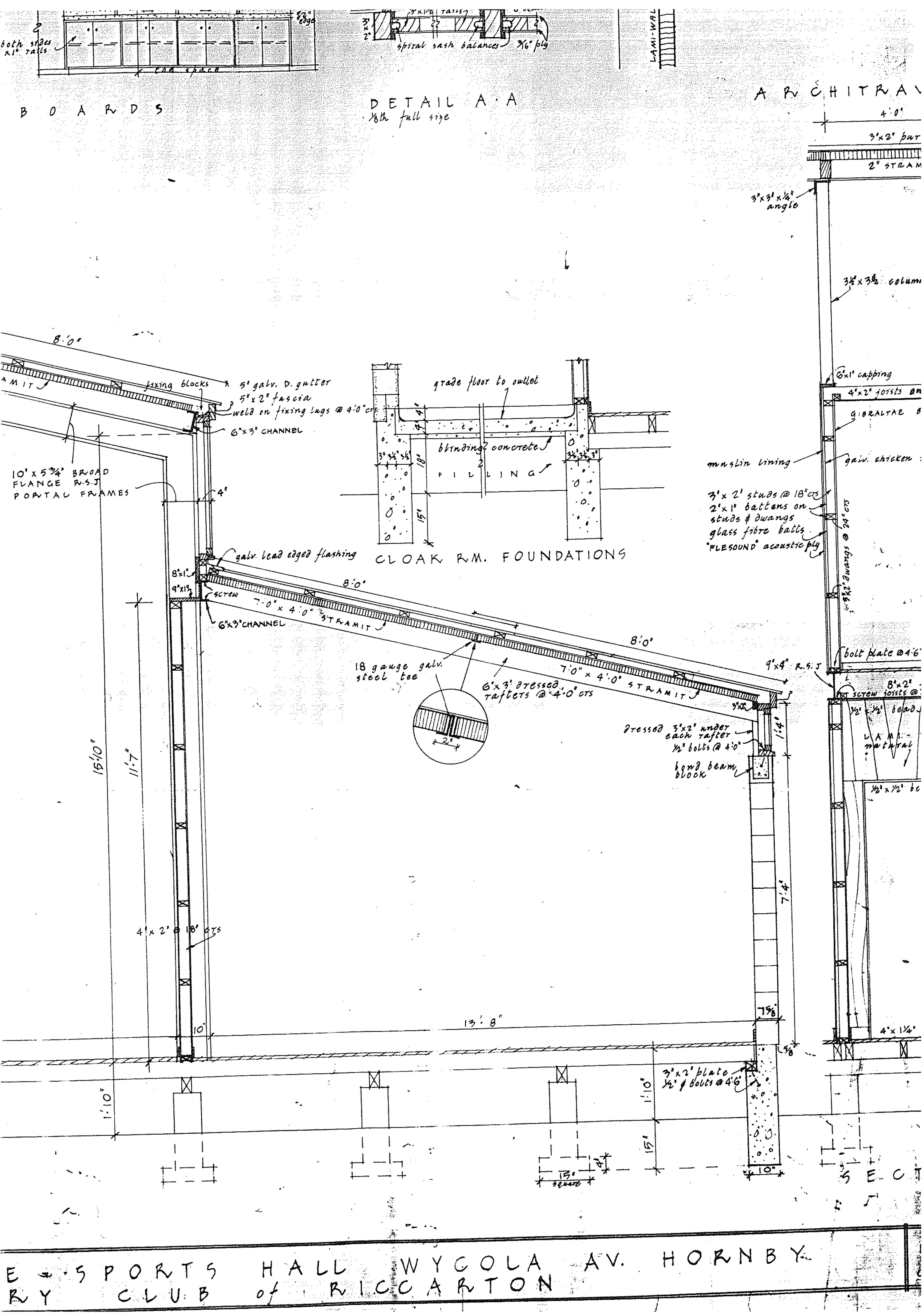
CLOAK RM. FOU

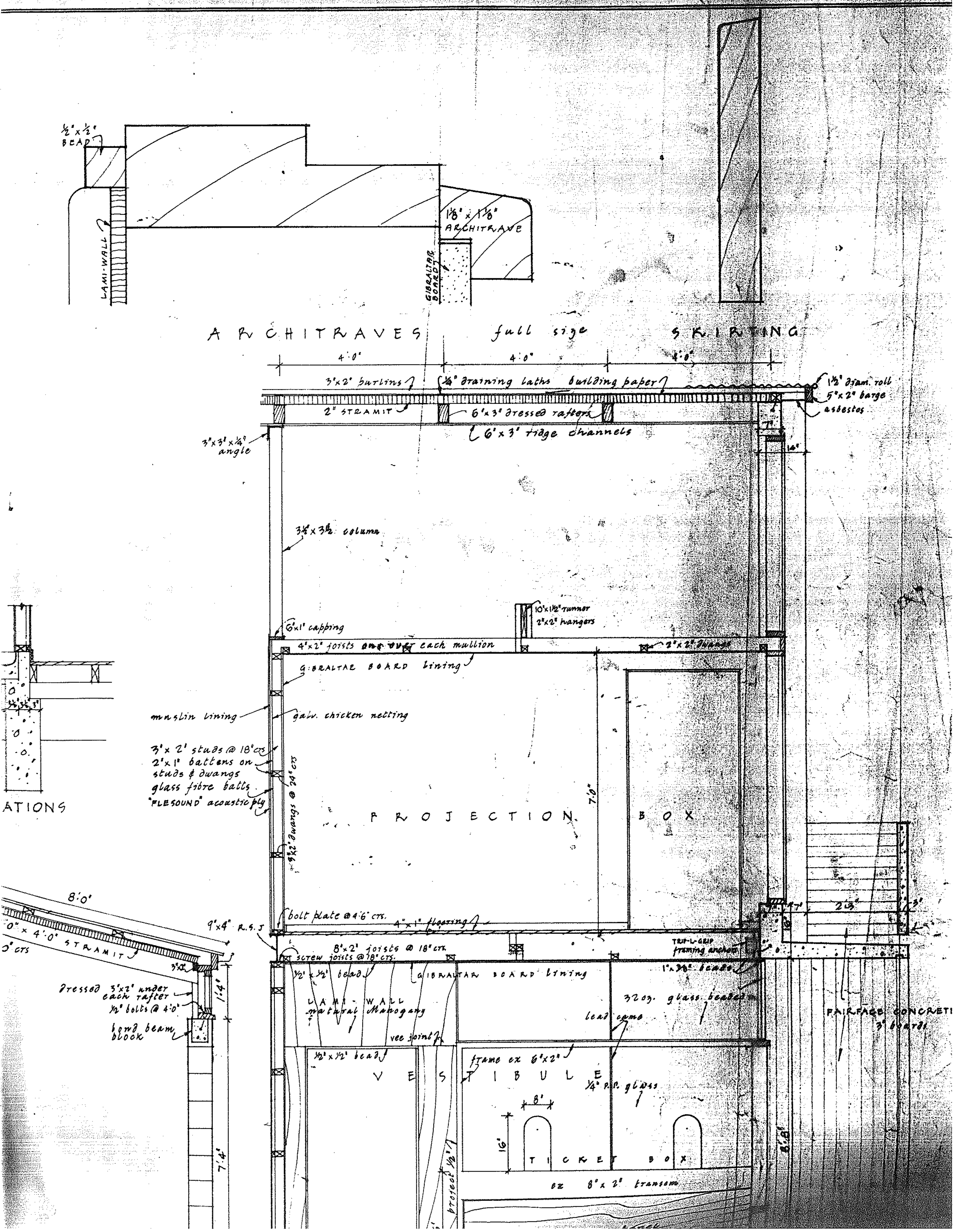
4 ft. to 1 inch



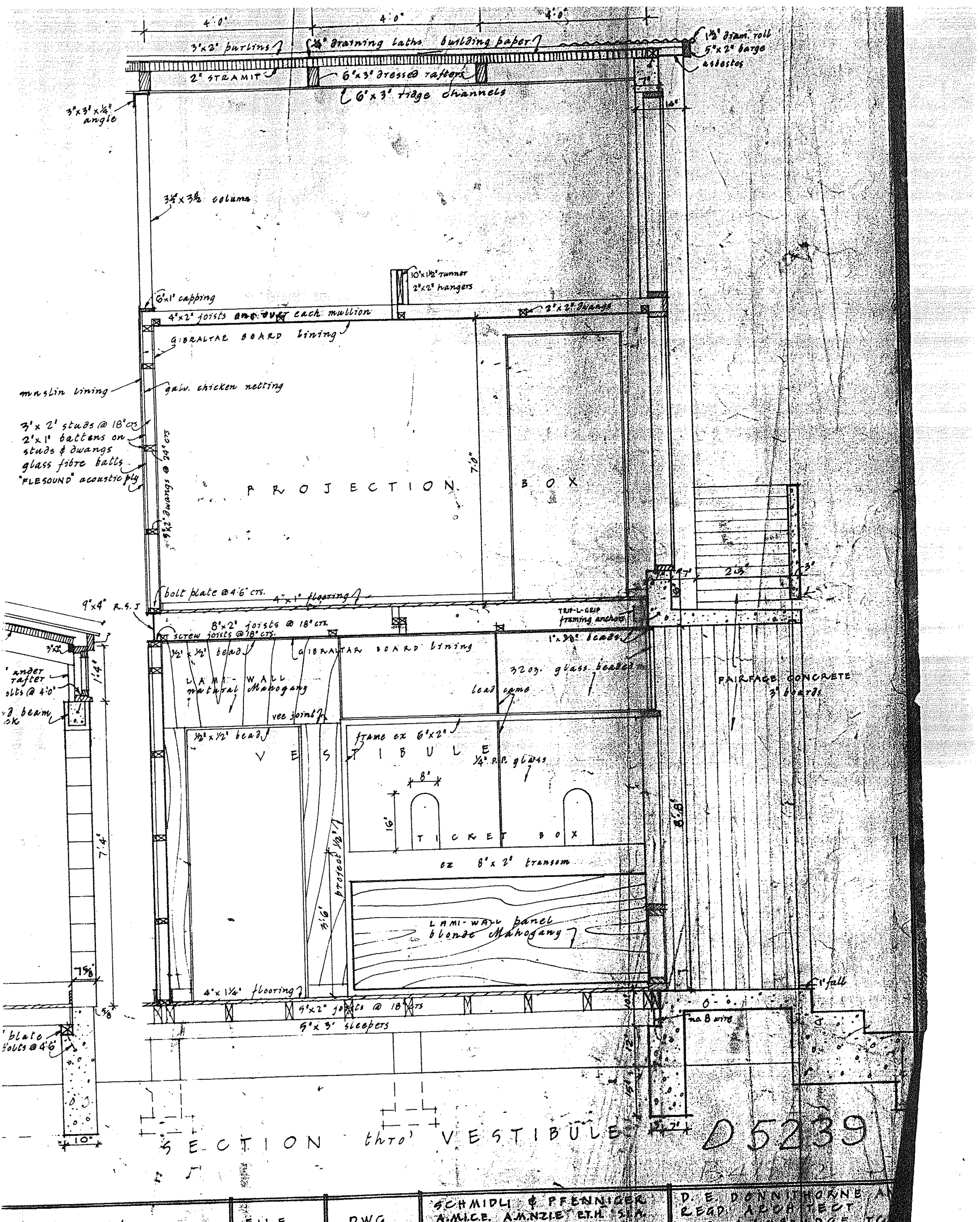
CROSS SECTION

SET No.	DATE 25th Sept 1961	COMMUNITY CENTRE & SPORT for the ROTARY CLU


both sides
x1" rails
BOARDS
spiral sash balances
3/16" ply
DETAIL A·A
1/8th full size
LAMI-WAL
ARCHITRAV
4'0"
3"x2" pur
2" STRAM
3"x3"x1/4" angle
3½"x3½" column
6"x1" capping
4"x2" joists
GIBRALTAR
galv. chicken
muslin lining
3"x2' studs @ 18" cts
2"x1" battens on studs & dwangs
glass fibre batts
"FLESOUND" acoustic ply
2½"dwangs @ 24" cts
bolt plate @ 4'6"
9"x4" R.S.J
8"x2" screw joists
½" bead
LAMI material
½"x½" be
4"x1¼"
8'0"
fixing blocks
5" galv. D. gutter
5"x2" fascia
weld on fixing lugs @ 4'0" cts
6"x3" CHANNEL
10"x5¾" BROAD FLANGE R.S.J PORTAL FRAMES
4"
grade floor to outlet
blinding concrete
FILLING
18'
15'
CLOAK RM. FOUNDATIONS
galv. lead edged flashing
8"x1"
9"x1½"
screw
6"x3" CHANNEL
7'0" x 4'0" STRAMIT
8'0"
18 gauge galv. steel tee
2"
6"x3" dressed rafters @ 4'0" cts
7'0" x 4'0" STRAMIT
dressed 3"x2" under each rafter
½" bolts @ 4'0"
bond beam block
1'4"
7'4"
15'10"
11'7"
4"x2" @ 18" cts
10"
13' 8"
7⅝"
5/8"
3"x2" plate
½" φ bolts @ 4'6"
1'10"
1'10"
15'
15' square
10"
SECT
E SPORTS HALL WYCOLA AV. HORNBY
RY CLUB of RICCARTON

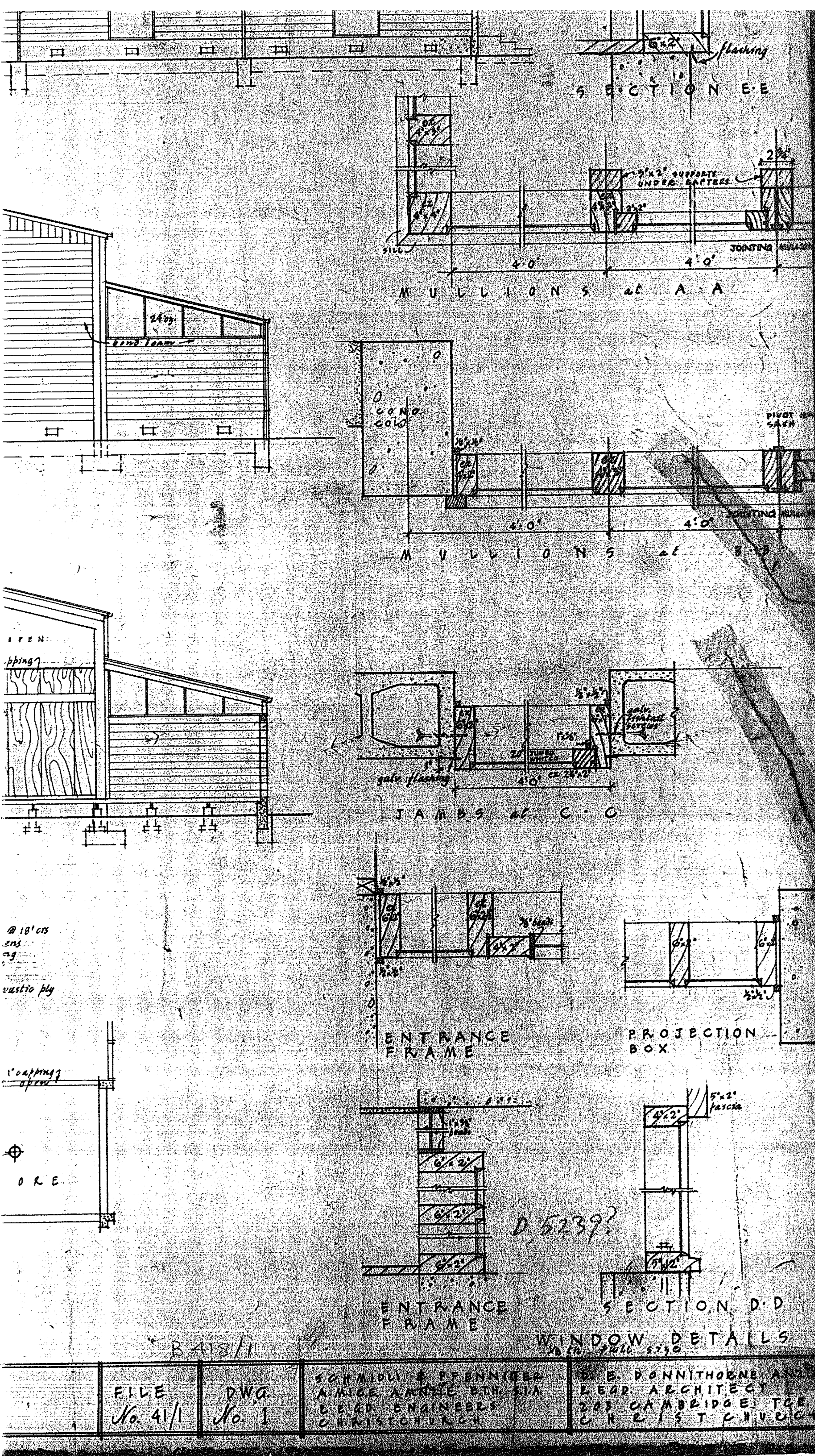


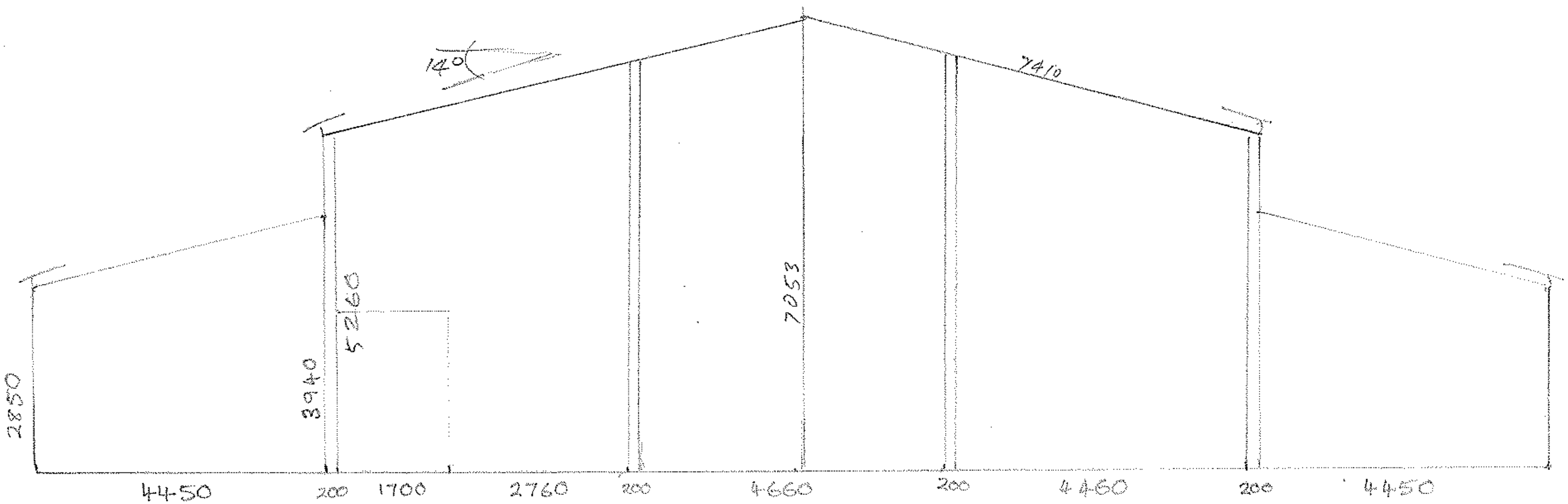
½" x ½" BEAD
LAMI-WALL
1⅛" x 1⅛" ARCHITRAVE
GIBRALTAR BOARD
ARCHITRAVES full size SKIRTING
4'0"
4'0"
4'0"
3"x2" purlins
½" draining laths
building paper
1½" diam. roll
5"x2" barge
asbestos
2" STRAMIT
6"x3" dressed rafters
6"x3" ridge channels
3"x3"x¼" angle
3½"x3½" column
10"x1½" runner
2"x2" hangers
6"x1" capping
4"x2" joists each mullion
2"x2" dwangs
GIBRALTAR BOARD lining
muslin lining
galv. chicken netting
3"x2" studs @ 18" cts
2"x1" battens on studs & dwangs
glass fibre batts
"FLESOUND" acoustic ply
2"x2" dwangs @ 24" cts
PROJECTION BOX
7'0"
ATIONS
8'0"
0" x 4'0" STRAMIT
0" cts
9"x4" R.S.J
bolt plate @ 4'6" cts.
4"x1" flooring
8"x2" joists @ 18" cts.
screw joists @ 18" cts.
TRIP-L-GRIP framing anchors
1"x¾" beads
½"x½" bead
GIBRALTAR BOARD lining
LAMI-WALL natural Mahogany
vee joint
32 oz. glass beaded
lead came
FAIRFACE CONCRETE 3" boards
dressed 3"x2" under each rafter
½" bolts @ 4'0"
bond beam block
1'4"
7'4"
½"x½" bead
frame ex 6"x2"
VESTIBULE
¼" P.P. glass
8"
16"
TICKET BOX
ex 8"x2" transom
protect ½"
8'8"
2'3"
3"



D5239

ORNBY.	FILE No. 41/1	DWG. No. 2	SCHMIDLI & PFENNIGER A.M.I.C.E. A.M.N.Z.I.E. E.T.H. S.I.A. REGD. ENGINEERS CHRISTCHURCH	D. E. DONNITHORNE REGD. ARCHITECT 203 CAMBRIDGE TC CHRISTCHURCH


SECTION E E
flashing
6"x2"
3"x2" SUPPORTS UNDER RAFTERS
2¾"
SILL
JOINTING
4'0"
4'0"
MULLIONS at A A
CONC. COL.
PIVOT SASH
MULLIONS at B B
4'0"
4'0"
galv. flashing
JAMBS at C C
ENTRANCE FRAME
PROJECTION BOX
5"x2" fascia
4½"x2"
6"x2"
D 5239?
ENTRANCE FRAME
SECTION D D
rustic ply
ORE
B 418/1
WINDOW DETAILS
FILE No. 41/1
DWG. No. 1
SCHMIDLI & PFENNIGER A.M.I.C.E. A.M.N.Z.I.E. B.TH. S.I.A. REGD. ENGINEERS CHRISTCHURCH
D. E. DONNITHORNE A.N.Z. REGD. ARCHITECT 203 CAMBRIDGE TCE CHRISTCHURCH

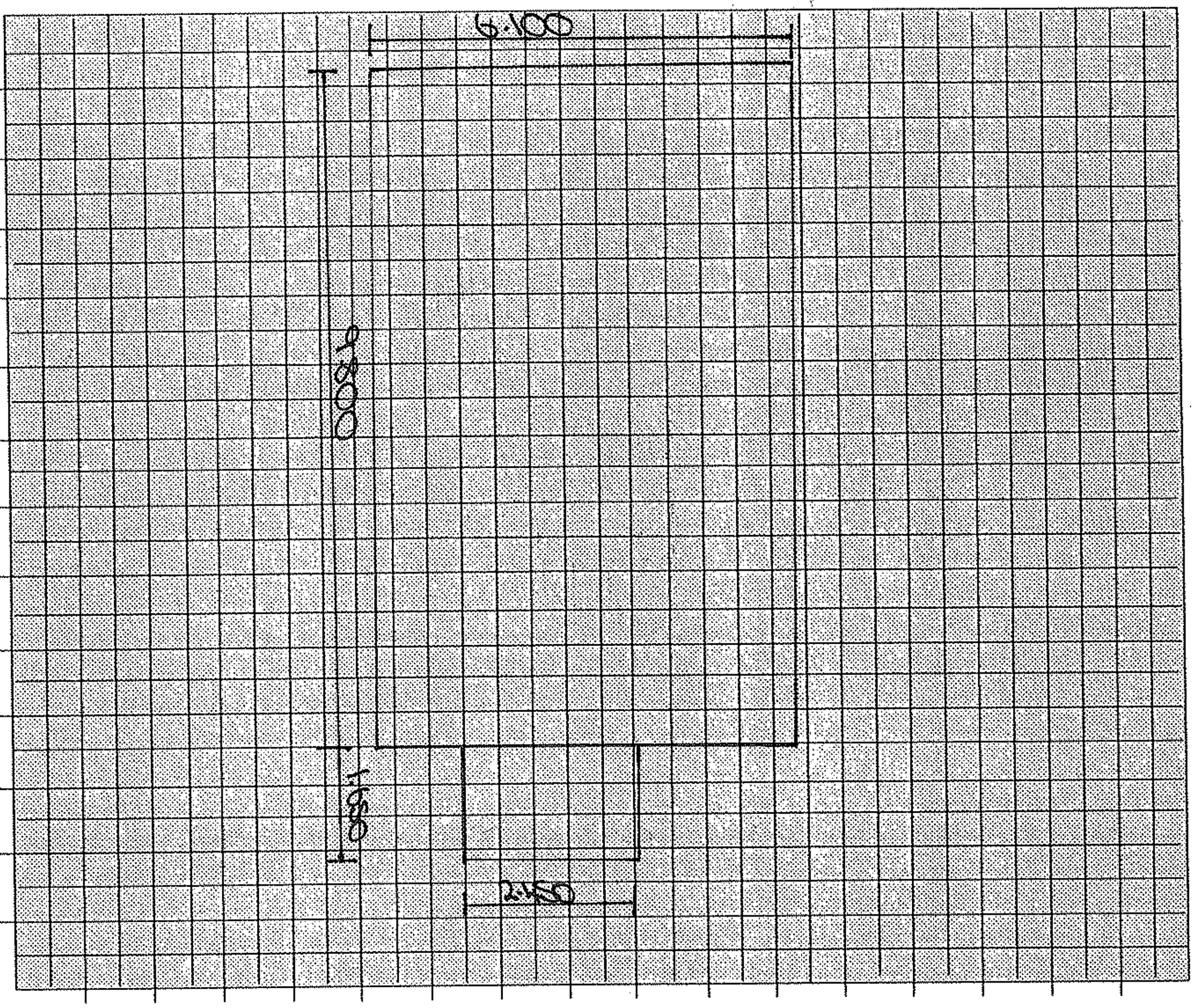


Total length : 23230mm

HORNBY COMMUNITY CENTRE , WYCOLA AVENUE .

Building I.D.: 1559.

Physical



Scale: ______________ Drawing Ref No.: ______________

CONSTRUCTION

Sub-floor: concrete slab

Exterior Walls: block, timber windows

Roof: corr iron

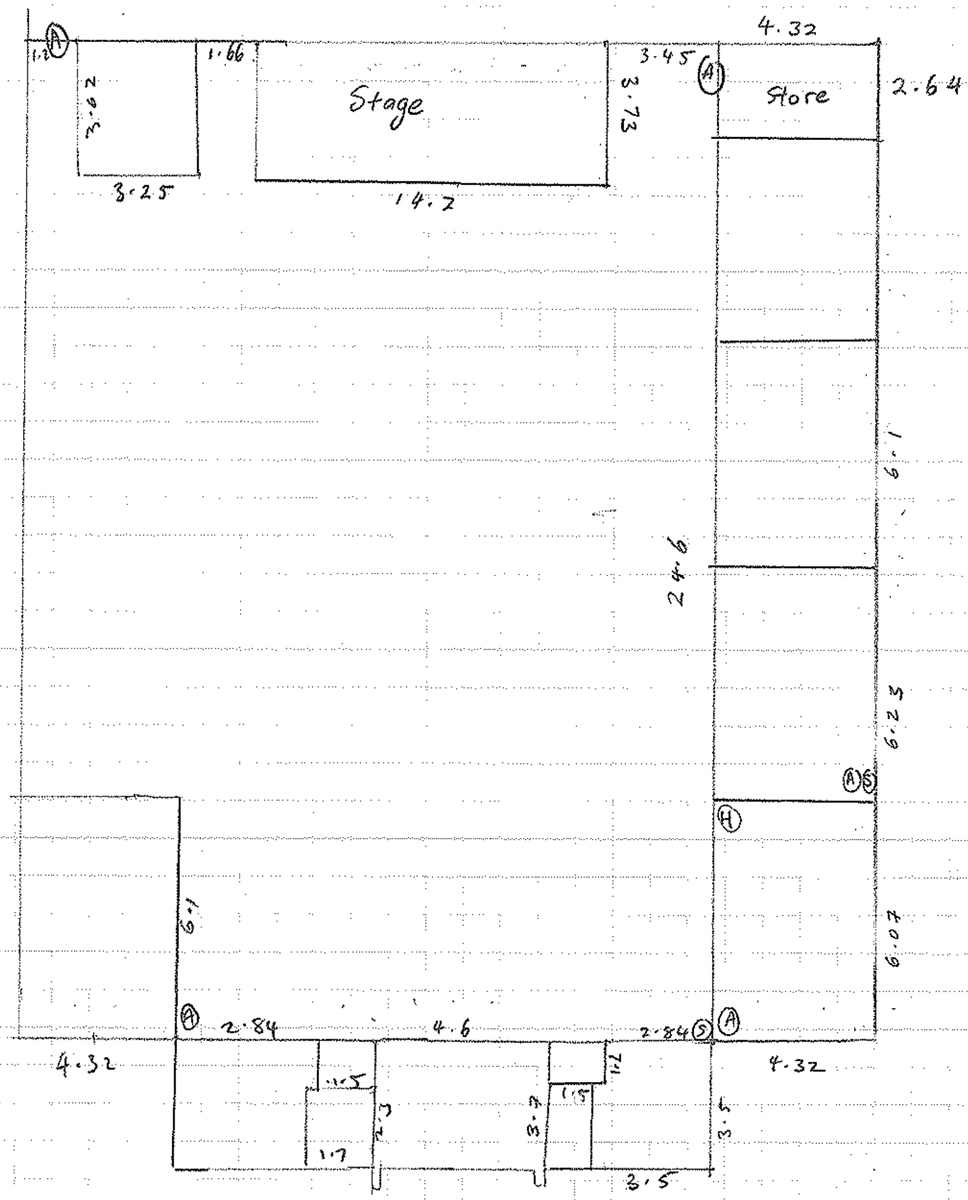
Other: ______________

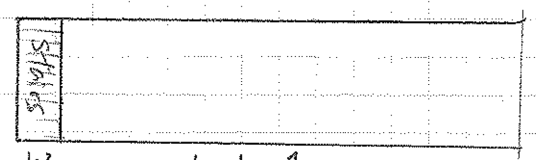
Area:	
______	m^2
______	m^2
______	m^2
______	m^2
______	m^2

General Comments: ______________

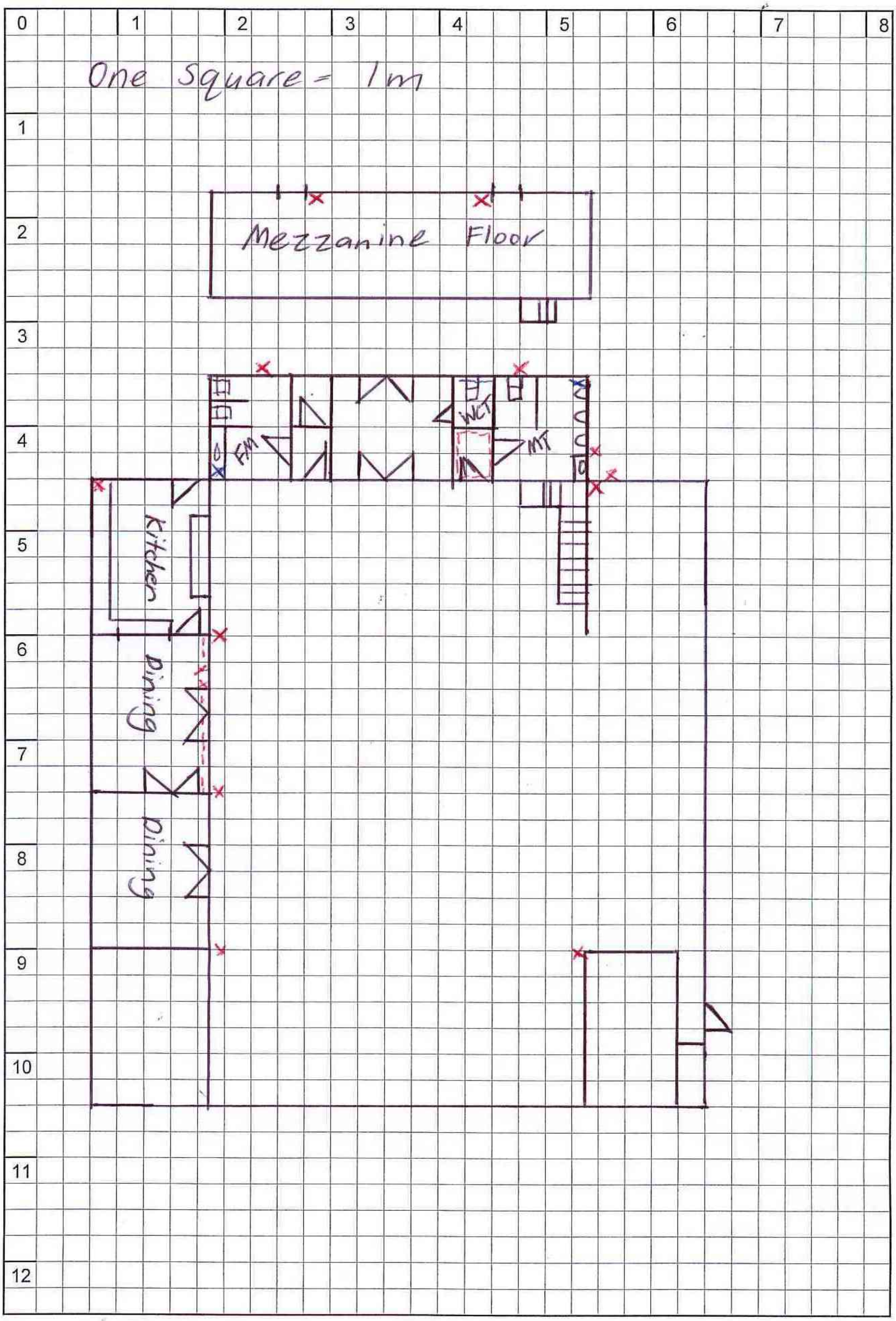
Hei Hei . cc
Wycola
Internal wall Plan

legend
S = Siren
A = Alarm
H = Hose





Site Plan



Scale 1:50

GHD

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Final	Eric Villenas	Stephen Lee		Nick Waddington		17/12/21