Pickering Courts
Detailed Engineering Evaluation Report

BU 0611-001 EQ2 Block A Qualitative
BU 0611-002 EQ2 Block B Quantitative
BU 0611-003 EQ3 Block C Quantitative

Prepared for Christchurch City Council (Client)

By Beca Carter Hollings & Ferner Ltd (Beca)

17 April 2013

Revision History

Revision Nº	Prepared By	Description	Date
A	Andrew Franklin	Draft for CCC review	25 March 2013
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Document Acceptance

Action	Name	Signed	Date
Prepared by	Andrew Franklin		17 April 2013
Reviewed by	Jonathan Barnett	Barnett	17 April 2013
Approved by	David Whittaker		17 April 2013
on behalf of	Beca Carter Hollings & Ferner Ltd		

Pickering Courts
BU 0611 EQ2

Detailed Engineering Evaluation
Qualitative and Quantitative Report – SUMMARY
Version 1

Address
40 Bristol St
St Albans
Christchuch

Background

This is a summary of the Qualitative and Quantitative Assessment reports for the building structures, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

The format and content of this report follows a template provided by CCC, which is based on the EAG document.

Block A

Block A is a single storey building built in 1978 and has an approximate internal floor area of 210m^2. The structure comprises five units separated by concrete masonry block fire walls. The primary structural systems for all units comprise reinforced concrete masonry block walls and timber framed, GIB lined walls. The roof consists of profiled metal sheeting on sarking and timber rafters. A partial set of architectural drawings by Christchurch City Council Architect's Division and structural drawings by Christchurch City Council Engineer's Division, both dated 1976, were made available. The seismic capacity of Block A was qualitatively assessed using the Initial Evaluation Procedure based on available information. No calculations were carried out.

Block B

Block B is a two storey building built in 1978 with an approximate internal floor area of 200m^2. The structure comprises two ground floor units and two first floor units, with the external stairs between separating the units. The primary structural system for the ground floor is reinforced concrete masonry block walls while the first floor comprises timber frame with concrete masonry block veneer. The first floor slab is precast unispan with mesh reinforced topping. The roof consists of timber rafters, timber purlins, ply sarking, and profiled metal sheeting. A set of partial architectural drawings by CCC Architect's Division and partial structural drawings by CCC Engineer's Division, both dated 1976 were made available. Calculations have been undertaken as part of the Quantitative Assessment.

Block C

Block C is a two storey building built in 1978 with an approximate internal floor area of 780m^2. The structure comprises eight ground floor units and eight first floor units. There are four external stairs that divide the block into two end units and three middle units, (refer figure 1 in Appendix A). The middle units have a central reinforced concrete masonry block fire wall. The primary structural system for the ground floor is reinforced concrete masonry block walls while the first floor comprises timber frame with concrete masonry block veneer. The first floor slab is precast unispan with a mesh reinforced topping. The roof consists of timber rafters, timber purlins, ply sarking, and profiled metal sheeting. A set of partial architectural drawings by CCC Architect's Division and partial structural drawings by CCC Engineer's Division, both dated 1976 were made available. Calculations have been undertaken as part of the Quantitative Assessment.

Key Damage Observed

Visual inspections on 13 December 2012 indicate the buildings have suffered minor earthquake damage. The key damage observed includes:

Block A

- Vertical cracks in the mortar to the block work cladding.
- Cracking and separation of internal wall and ceiling linings.

Block B

- Cracking of up to 0.2mm in the mortar of the concrete masonry block walls.
- Minor cracking to concrete masonry block units.
- Cracking of first floor concrete balcony.
- Cracking and separation of internal wall and ceiling linings.

Block C

- Cracking of up to 1.2mm in the mortar of the concrete masonry block work.
- Cracking of concrete masonry block units.
- Cracking of the first floor slab stair landings.
- Cracking of first floor concrete balcony.
- Cracking of up to 1.8mm to the first floor concrete stair landings.
- Cracking in external patio up to 3.5mm wide.
- Cracking and separation of internal wall and ceiling linings.

Critical Structural Weaknesses (CSW)

The following Critical Structural Weaknesses have been identified:

Block A

- Site characteristics, due to minor liquefaction potential.

Block B and Block C

- No seismic gap between units at first floor level at stair landings.
- Site characteristics, due to minor liquefaction potential.

Indicative Building Strength

Block A (From Qualitative Assessment)

The building has been assessed to have a seismic capacity of 50% NBS using the NZSEE Initial Evaluation Procedure (IEP) and is therefore classified as Earthquake Risk and Seismic Grade C.

Block B (From Quantitative Assessment)

The building has been assessed to have an indicative seismic capacity of 37%NBS using the New Zealand Society for Earthquake Engineering (NZSEE) Detailed Assessment guideline 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006, and Standards New Zealand 'Design of Reinforced Concrete Masonry Structures' (NZS 4230:2004), 2004, and is therefore Earthquake Risk and classified as Seismic Grade C.

The structural damage observed is predominantly minor and the seismic capacity is not considered to have significantly diminished from its pre-earthquake level.

Our assessment has identified the structural component that has governed/limited the building's seismic performance, and the potential failure mechanisms, are as follows:

- Longitudinal ground floor concrete masonry block walls at 37%NBS, governed by in-plane flexural capacity.

Block C (From Quantitative Assessment)

The building has been assessed to have an indicative seismic capacity of 35%NBS using the New Zealand Society for Earthquake Engineering (NZSEE) Detailed Assessment guideline 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006, and Standards New Zealand 'Design of Reinforced Concrete Masonry Structures' (NZS 4230:2004), 2004, and is therefore Earthquake Risk and classified as Seismic Grade C.

The structural damage observed is predominantly minor and the seismic capacity is not considered to have significantly diminished from its pre-earthquake condition.

The building has suffered cracking to the first floor stair landings and temporary propping has been installed. Details of the temporary propping solution were provided by email dated 21 December 2012.

Our assessment has identified the structural component that has governed/limited the building's seismic performance, and the potential failure mechanisms, are as follows:

- Longitudinal ground floor concrete masonry block walls at 35%NBS, governed by in-plane flexural capacity.

Recommendations

In order for the owner to make an informed decision about the on-going use and occupancy of their building the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

Block A, Block B and Block C are considered to be earthquake risk, having a qualitatively assessed capacity of between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

Block C has suffered damage to the seismic or gravity load resisting system of the first floor stair landings that is sufficient to impair or significantly reduce their ability to resist further loads. A temporary propping solution has been provided as per email sent to CCC, dated 21 December 2012, and as a result no restrictions on use or occupancy are recommended.

It is recommended that for each Block:

- A full damage assessment is carried out for insurance purposes.
- A verticality and level survey could be carried out to determine the extent of any settlement of the buildings for insurance purposes.
- Intrusive investigation is carried out to determine whether the block work veneer has ties to the first floor timber framing.
- According to the recent CCC Instructions to Engineers document (16 October 2012), Council's insurance provides for repairing damaged elements to a condition substantially as new. We suggest you consult further with your insurance advisor.

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Appendices

1 Background

Beca Carter Hollings & Ferner Ltd (Beca) has been engaged by Christchurch City Council (CCC) to undertake a Qualitative Detailed Engineering Evaluation (DEE) of Block A, and Quantitative DEEs of Block B and Block C, located at 40 Bristol St, St Albans, Christchurch.

This report is a Qualitative Assessment of Block A building structure and a Quantitative Assessment of Block B and Block C building structures, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

A Qualitative Assessment involves inspections of the building, a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available and an assessment of the level of seismic capacity against current code using the Initial Evaluation Procedure (IEP).

A Quantitative Assessment involves analytical calculations of the building's strength and may involve material testing, geotechnical testing and intrusive investigation.

The purpose of these assessments is to determine the likely building performance and damage patterns, to identify any potential Critical Structural Weaknesses (CSW) or collapse hazards, and to make an assessment of the likely building strength in terms of percentage of New Building Standard (%NBS).

A set of partial architectural and structural drawings was made available and has been used in our assessment of the buildings. The building descriptions below are based on a review of the drawings and our visual inspections.

The format and content of this report follows a template provided by CCC, which is based on the EAG document.

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 understood that CERA is adopting the Detailed Engineering Evaluation Procedure document (draft) issued by the Engineering Advisory Group on 19 July 2011, which sets out a methodology for both qualitative and quantitative assessments. We understand this report will be used in response to CERA Section 51.

The qualitative assessment includes a thorough visual inspection of the building coupled with a desktop review of available documentation such as drawings, specifications and IEP's. The quantitative assessment involves analytical calculation of the building's 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 that was assigned during the state of emergency following the 22 February 2011 earthquake
- 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.

Section 121 – Dangerous Buildings

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

- In the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- In the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- There is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- There is a risk that that other property could collapse or otherwise cause injury or death; or

- A territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

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.

It is understood 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.

On 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

a. Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)

b. 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.

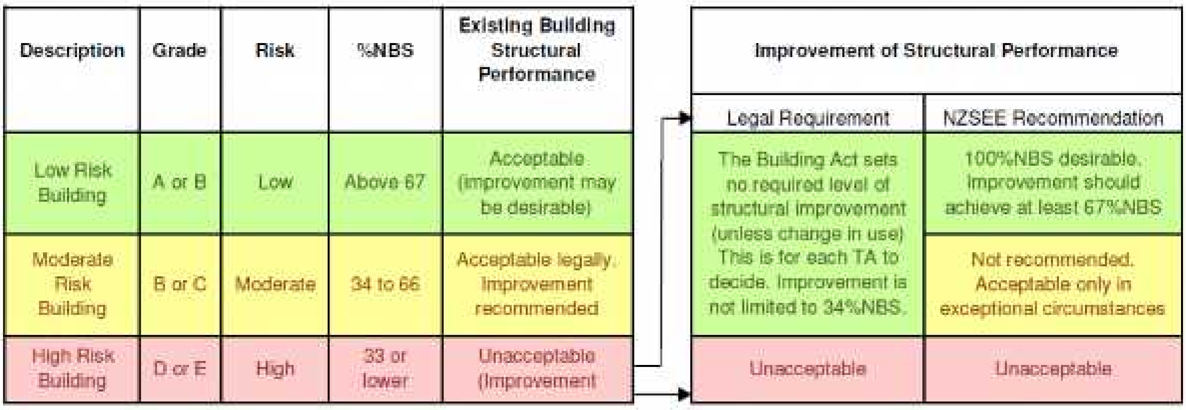
3 Earthquake Resistance Standards

For this assessment, the building's Ultimate Limit State 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).

No consideration has been given at this stage to checking the level of compliance against the increased Serviceability Limit State requirements.

The likely ultimate 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 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 3.1 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 circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement	Unacceptable	Unacceptable

Figure 3.1: NZSEE Risk Classifications Extracted from Table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 3.1 below 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. on average 0.2% in any year). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance in the next year.

Table 3.1: %NBS Compared to Relative Risk of Failure

Building Grade	Percentage of New Building Standard (*%NBS*)	Approx. Risk Relative to a New Building
A+	>100	<1
A	80-100	1-2 times
B	67-80	2-5 times
C	33-67	5-10 times
D	20-33	10-25 times
E	<20	>25 times

4 Building Description

4.1 General

Summary information about the buildings are given in the following tables.

Table 4.1: Building Summary Information – Block A

Item	Details	Comment
Building name	Pickering Courts - Block A.	
Street Address	40 Bristol St, St Albans.	
Age	35 years. 1978 construction, 1976 design.	Based on information received from CCC.
Description	Single storey, stand-alone residential units.	
Building Footprint / Floor Area	Internal floor area = $210m^2$ Overall dimensions = 6.6m x 32m in plan	Dimensions taken from drawings.
No. of storeys / basements	1 storey / No basement.	
Occupancy / use	Residential.	Importance Level 2.
Construction	190mm filled reinforced concrete block masonry firewalls and GIB lined and timber framed walls with unreinforced block veneer cladding. Timber framed roof with profiled metal sheeting.	Structural details taken from drawings. Concrete block walls typically are lightly reinforced based on limited drawing information, architectural only, and have bond beams.
Gravity load resisting system	Gravity loads from the roof structure are supported by the timber framed walls and transferred into the slab on grade foundations.	

Item	Details	Comment
Seismic load resisting system	Lateral loads acting across the structure (north-south) are resisted by the concrete masonry block walls, and braced timber framed walls. Lateral loads acting along the structure (east-west) are resisted by the timber framed walls and their associated linings. Loads are then transferred into slab on grade foundations.	Timber walls in the north-south direction are GIB lined and have a diagonal timber braces notched in.
Foundation system	Slab on grade.	
Stair system	N/A	
Other notable features	90mm concrete masonry block veneer cladding, unreinforced.	On architectural drawings only, no reinforcement indicated.
External works	Asphalt paths surrounding building. Asphalt car park to the west.	
Construction information	Partial architectural and structural drawings (CCC Architect's Division, 1976; CCC Engineer's Division, 1976). Site inspection.	
Likely design standard	Possibly NZS 4203:1976 but conservatively assumed to be NZSS 1900, Chapter 8:1965.	Inferred from age of building.
Heritage status	No heritage status.	
Other		

Table 4.2: Building Summary Information – Block B

Item	Details	Comment
Building name	Pickering Courts - Block B.	
Street Address	40 Bristol St, St Albans.	
Age	35 years. 1978 construction, 1976 design.	Based on information received from CCC.
Description	Two storey, stand-alone residential units.	
Building Footprint / Floor Area	Internal floor area = 200m^2 Building footprint = 100m^2 Overall dimensions = 15.3m x 6.4m in plan	Dimensions taken from drawings.
No. of storeys / basements	2 storey / No basement.	
Occupancy / use	Residential.	Importance Level 2.

Item	Details	Comment
Construction	Ground floor has GIB lined cavity block wall consisting of 140mm reinforced fully filled concrete block masonry walls inner skin with 90mm reinforced partially filled concrete block masonry veneer outer skin . First floor has timber framed walls with unreinforced 90mm masonry veneer cladding. First floor slab is Unispan with 75mm seating and 665M mesh.Timber framed roof with profiled metal sheeting.	Structural details taken from drawings. The 140mm concrete block masonry is typically reinforced with D12@600 each way approx. fully filled. The ground floor and the1st floor adjacent to the stairs only, 90mm concrete block masonry veneer is typically reinforced with D10@600 approx. vertically only and partially filled.
Gravity load resisting system	Gravity loads are supported by the first floor timber framed walls and ground floor concrete masonry block walls. Loads are then transferred into slab on grade foundation.	
Seismic load resisting system	First floor level lateral loads acting in both directions are resisted by the timber framed walls and their associated linings. At the ground floor level lateral loads acting in both directions are resisted by the concrete masonry block walls and transferred into the slab on grade foundation.	
Foundation system	Slab on grade.	
Stair system	Timber treads and stringers with concrete landings.	Note: Drawings show concrete stairs.
Other notable features	In-situ reinforced concrete balcony on western side of first floor apartments.	
External works	Asphalt paths surrounding building.	
Construction information	Partial architectural and structural drawings (CCC Architect’s Division, 1976; CCC Engineer’s Division, 1976). Site inspection.	
Likely design standard	Possibly NZS 4203:1976 but conservatively assumed to be NZSS 1900, Chapter 8:1965.	Inferred from age of building
Heritage status	No heritage status.	
Other	Ground floor slab 665M mesh	

Table 4.3: Building Summary Information – Block C

Item	Details	Comment
Building name	Pickering Courts - Block C.	
Street Address	40 Bristol St, St Albans.	
Age	35 years. 1978 construction, 1976 design.	From information received from CCC.
Description	Two storey, stand-alone residential units.	
Building Footprint / Floor Area	Internal floor area = 780m^2 Building footprint = 390m^2 Overall dimensions = 61m x 11.8m in plan	
No. of storeys / basements	2 storey / No basement.	
Occupancy / use	Residential.	Importance Level 2.
Construction	Ground floor has GIB lined cavity block wall consisting of 140mm reinforced fully filled concrete block masonry walls inner skin with 90mm reinforced partially filled concrete block masonry veneer outer skin and a firewall between the middle units consisting of two skins of 140mm reinforced concrete masonry block walls.First floor has timber framed walls with unreinforced 90mm masonry veneer cladding. The middle units also have a 140mm reinforced concrete masonry block fire wall between then. First floor slab is Unispan with 75mm seating and 665M mesh. Timber framed roof with profiled metal sheeting.	Structural details taken from drawings. The 140mm concrete block masonry is typically reinforced with D12@600 each way approx. fully filled. The ground floor and the1st floor adjacent to the stairs only, 90mm concrete block masonry veneer is typically reinforced with D10@600 approx. vertically only and partially filled.
Gravity load resisting system	Gravity loads are supported by the first floor timber framed walls and ground floor concrete masonry block walls. Loads are then transferred into the slab on grade foundations.	

Item	Details	Comment
Seismic load resisting system	Lateral loads acting across the structure (north-south) at the first floor level are resisted by the 140mm fully filled concrete masonry block walls for the middle units, and by the timber framed walls and their associated lining for the end units. Lateral loads acting along the structure (east-west) at the first floor level are resisted by the timber framed walls and their associated linings. At the ground floor level lateral loads acting in both directions are resisted by the concrete masonry block walls and transferred into the slab on grade foundation.	
Foundation system	Slab on grade.	
Stair system	Timber treads and stringers with concrete landings.	Note: Drawings show concrete stairs.
Other notable features	In-situ reinforced concrete balcony on western side of first floor apartments.	From structural drawings.
External works	Asphalt paths surrounding building.	
Construction information	Partial architectural and structural drawings (CCC Architect's Division, 1976; CCC Engineer's Division, 1976). Site inspection.	
Likely design standard	Possibly NZS 4203:1976 but conservatively assumed to be NZSS 1900, Chapter 8:1965.	Inferred from age of building
Heritage status	No heritage status.	
Other	Ground floor slab 665M mesh.	

4.2 Structural 'Hot-spots'

Areas in which damage may be expected to occur from earthquake shaking are outlined below:

Block A

- Connections between walls, floor and roof typically.
- Lateral restraint of block veneer cladding.

Block B and Block C

- First floor concrete stair landings due to insufficient seismic gap and diaphragm discontinuity.
- Connections between walls, floor and roof typically.
- Lateral restraint of block veneer cladding on the first floor.

5 Site Investigations

5.1 Previous Assessments

The buildings had a Level 1 and Level 2 rapid assessment undertaken following the February 2011 earthquake (refer to Appendix D).

5.2 Damage Inspections and Investigations

Visual inspections as part of the Level 4 damage assessment for Block A were undertaken on 13 December 2012.

Visual inspections as part of the Level 5 damage assessments for Block B and Block C were undertaken on 13 December 2012. No intrusive investigations were carried out as part of the Level 5 quantitative assessments for Block B and Block C.

6 Damage Assessment

6.1 Damage Summary

The tables below provide summaries of damage observed during our inspection. Refer to Appendix A for photographs.

Table 6.1: Damage Summary – Block A

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations	✓				None observed during visual inspection. Level survey may be required to confirm.
tilt of building	✓				None observed during visual inspection. Vertical survey may be required to confirm.
liquefaction	✓				None observed during visual inspection. The aerial reconnaissance on 24 February 2011 indicates the extent was minor.
settlement of external ground					None observed during visual inspection.
lateral spread / ground cracks					None observed during our visual inspection.
frame	✓				Inspection of timber frame was not possible as it was concealed.
Concrete / masonry walls	✓				Inspection of reinforced concrete masonry block walls was not possible as they were concealed.
cracking to concrete floors	✓				Inspection of concrete floor was not possible as it was concealed.
bracing		✓			Cracking and separation of internal linings was observed.
precast flooring seating					NA

Damage type	Unknown	Minor	Moderate	Major	Comment
stairs					NA
cladding / envelope		✓			Cracking to the mortar of the concrete masonry block veneer cladding was observed.
internal fit out					NA
building services	✓				No inspection of services was carried out.
other					Movement around door frames was evident.

Table 6.2: Damage Summary – Block B

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations	✓				None observed during visual inspection. Level survey may be required to confirm.
tilt of building	✓				None observed during visual inspection. Verticality survey may be required to confirm.
liquefaction	✓				None observed during visual inspection. The aerial reconnaissance on 24 February 2011 indicates the extent was minor.
settlement of external ground					None observed during visual inspection.
lateral spread / ground cracks					None observed during visual inspection.
frame	✓				Inspection of timber frame was not possible as it was concealed.
Concrete / masonry walls	✓				Inspection of reinforced 15 Series concrete masonry block (inside skin) walls was not generally possible as they were concealed.
cracking to concrete first floors		✓			Cracking of concrete balcony observed.
bracing		✓			Cracking and separation of internal linings was observed.
cladding /envelope		✓			Cracking of concrete block work veneer mortar.
precast flooring seating	✓				Not observed during our inspection as it is concealed.
stairs	✓				None observed during our inspection.
building services	✓				No inspection of services was carried out.
other					

Table 6.3: Damage Summary – Block C

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations	✓				None observed during visual inspection. Level survey may be required to confirm.
tilt of building	✓				None observed during visual inspection. Verticality survey may be required to confirm.
liquefaction	✓				None observed during visual inspection. The aerial reconnaissance on 24 February 2011 indicates the extent was minor.
settlement of external ground	✓				None observed during visual inspection.
lateral spread / ground cracks	✓				Cracking to external asphalt patio observed.
frame	✓				Inspection of timber frame was not possible as it was concealed.
concrete / masonry walls	✓				Inspection of reinforced concrete masonry block walls was not possible as they were concealed.
cracking to concrete floors			✓		Cracking of first floor concrete slab, possibly caused by shear failure or local subsidence of footing. Cracking to concrete balcony.
bracing		✓			Cracking and separation of internal linings was observed.
cladding / envelope		✓			Cracking of concrete block work veneer and block work mortar.
precast flooring seating	✓				Not observed during our inspection as it is concealed.
stairs			✓		Significant cracking to most first floor concrete stair landings (temporary propping has been installed). Timber stairs no damage observed.
building services	✓				No inspection of services was carried out.
other					

6.2 Surrounding Buildings

The Pickering Courts site comprises three structures. Block A is single storey while Blocks B and C are two storey.

Block A

Block A is a stand-alone building with Block B standing approximately 5m to the south-east. Due to this separation, it is unlikely that Block A will be affected during an earthquake.

Block B

Block B is a stand-alone building with Block C standing approximately 7m to the south. Due to this separation, it is unlikely that Block B will be affected during an earthquake.

Block C

Block C is a stand-alone building with Block B standing approximately 7m to the north. Due to this separation, it is unlikely that Block C will be affected during an earthquake.

6.3 Residual Displacements and General Observations

No evidence of permanent settlement or displacements was observed during our visual inspection, however a global settlement survey may reveal movement that may be considered as damage under insurance entitlement.

6.4 Implication of Damage

Based on our visual inspection, the structures appear to have only suffered minor damage and therefore we believe the structural capacities have not been significantly diminished.

The Block C building has suffered cracking to the first floor stair landings and temporary propping has been installed. Details of the temporary propping solution were provided by email dated 21 December 2012.

Where temporary works have been installed a full ‘as new’ repair, including strengthening as required, will need to be designed and constructed. A Building Consent will be required for any structural repair or strengthening. Fire and Access reports will also be required as part of the Building Consent process and a geotechnical report may also be required.

7 Generic Issues

The following generic issues referred to in Appendix A of the EAG guideline document have been identified as applicable to Block A, Block B and Block C:

- There is potential for some irregularity effects due to variations in structure type and stiffness.
- Mesh reinforcement in ground and first floor slabs making it prone to non-ductile failure.
- Timber walls with block veneer, block ties and head restraint details unknown.

Fully Filled Reinforced Concrete Masonry

- Inadequate shear strength.
- Inadequate connections of floor and roof diaphragms to the walls.
- Inadequate seismic separation

8 Geotechnical Consideration

No specific geotechnical information is currently available for this site; however the CERA residential red zone and Department of Building & Housing (DBH) technical categories maps zone this site as foundation technical category 2 (TC2).

The definition of TC2 is minor to moderate land damage from liquefaction is possible in future large earthquakes. Lightweight construction or enhanced foundations are likely to be required such as enhanced concrete raft foundations (ie, stiffer floor slabs that tie the structure together).

During the inspection, no significant damage to the surrounding ground was noted. No effect to the structure due to ground conditions was considered in the assessment.

9 Survey

No level or verticality surveys were carried out as there was no evidence of settlement or displacement observed during the inspection. CCC may wish to undertake a level survey as part of insurance entitlement considerations.

10 Initial Capacity Assessment (Block A)

10.1 %NBS Assessment

Block A has had its seismic capacity assessed using the Initial Evaluation Procedure based on the information available. The building’s capacity is expressed as a percentage of New Building Standard (%NBS) and is in the order of that shown below in Table 10.1. A factor of 1.35 has been selected for the F factor, which takes into consideration the residential construction type and minor site characteristics. These capacities are subject to confirmation by a quantitative analysis which is more detailed. The post-damage capacity is considered to be the same as the original capacity.

Table 10.1: Indicative Building Capacities

System	Direction	Seismic Performance in *%NBS*	Notes
Timber Frame	Longitudinal	50	NZSEE Initial Evaluation Procedure. IL 2, Z=0.3.
Concrete Masonry Block Walls	Transverse	50	NZSEE Initial Evaluation Procedure. IL 2, Z=0.3.

10.2 Critical Structural Weaknesses

The following Critical Structural Weakness was identified:

- Site characteristics due to liquefaction potential.

10.3 Seismic Parameters

The seismic design parameters based on current design requirements from NZS1170:2004 and the NZBC clause B1 for this building are:

- Site soil class: D – NZS 1170.5:2004, Clause 3.1.3, Soft Soil
- Site hazard factor, Z = 0.3 – NZBC, Clause B1 Structure, Amendment 11 effective from 19 May 2011
- Return period factor Ru = 1 – NZS 1170.5:2004, Table 3.5, Importance level 2 structure with a 50 year design life.
- Near fault factor N(T,D) = 1 – NZS 1170.5:2004, Clause 3.1.6, Distance more than 20 km from fault line.

10.4 Expected Structural Ductility Factor

The timber frame walls in the longitudinal direction have been assumed to have a ductility factor of 2.0 for the IEP assessment.

The reinforced concrete masonry block walls in the transverse direction have been assumed to have a ductility factor of 2.0 for the IEP assessment.

10.5 Discussion of results

Based on the IEP results, Block A is considered Earthquake Risk and seismic grade C as the IEP result is between 34% and 67%NBS. This assessment is qualitative and based on the NZSEE IEP only.

11 Detailed Seismic Capacity Assessment (Block B and Block C)

11.1 Assessment Methodology

Block B and Block C have had their seismic capacities assessed using the Detailed Assessment Procedures in the NZSEE 2006 AISPBE guidelines and NZS 4230:2004, based on the drawings and site measurements.

The structures have suffered minor damage. The post-damage capacities are not considered to have been significantly diminished from their original capacities.

For analysis purposes, the first floor stair landings were deemed to have large enough diaphragm discontinuities that seismic loads could not be transferred across the landing and throughout the structure. This was exemplified by the moderate level of cracking from pounding between the blocks. As a result, Block B was divided into two “blocks” and Block C was divided into five “blocks”; two end blocks and three middle blocks with the stair landings serving as the seismic break, refer Figure 1 in Appendix A.

11.2 Assumptions

The following assumptions were used in our quantitative assessment:

- Reinforcing steel yield strength, fy = 275 MPa (as stated on the drawings)
- Mesh reinforcing yield strength, fy = 485 MPa (as stated on the drawings)
- Concrete compressive strength, f’c = 20 MPa (as stated on the drawings)
- Masonry compressive bending strength, f’m = 4.8 MPa
- Young’s Modulus of masonry, Em = 10.3 GPa
- Young’s Modulus of plasterboard, Ep = 2 GPa
- All walls act in their primary axes only, except for forces induced due to self-weight only.
- Each block acts independently as loads cannot be transferred across the stair landing.
- Soil ultimate bearing pressure, fb = 240 MPa (including ϕ = 0.8) (assumed ‘good ground’ as per NZS 3604).

11.3 Critical Structural Weaknesses

The following Critical Structural Weaknesses were identified:

- No seismic gap between unit blocks at the first floor level stair landings where there is diaphragm discontinuity.
- Site characteristics due to liquefaction potential.

The site characteristics have been identified as a potential CSW. Liquefaction is considered a CSW however no specific liquefaction penalty has been imposed in this quantitative assessment.

11.4 Seismic Parameters

The seismic design parameters based on current design requirements from NZS 1170.5:2004 and the NZBC clause B1 for Block B and Block C are:

- Site soil class: D – NZS 1170.5:2004, Clause 3.1.3, Soft Soil
- Site hazard factor, Z = 0.3 – NZBC, Clause B1 Structure, Amendment 11 effective from 19 May 2011
- Return period factor Ru = 1 – NZS 1170.5:2004, Table 3.5, Importance Level 2 structure with a 50 year design life.
- Near fault factor N(T,D) = 1 – NZS 1170.5:2004, Clause 3.1.6, Distance more than 20 km from fault line.

11.5 Results of Seismic Assessment

Block B

The results of our quantitative assessment indicate the building has a seismic capacity of 37%NBS. Table 11.1 presents the evaluated seismic capacity in terms of %NBS of the individual structural systems in each building direction.

Table 11.1: Summary of Seismic Assessment of Structural Systems – Block B

Item	Loading Direction	Ductility, μ	Seismic Capacity	Notes
Overall %NBS adopted from DEE	**Longitudinal**	**2.0**	**37%NBS**	**Governed by in plane flexural capacity of ground floor reinforced concrete masonry**
Ground floor concrete masonry block wall in-plane	Both	2.0	>100%	Shear capacity
Ground floor concrete masonry block wall in-plane	Longitudinal Transverse	2.0 2.0	37% >100%	Flexural capacity Flexural capacity
Ground floor concrete masonry block wall out-of-plane	Both Both	1.25 1.25	>100% >100%	Shear capacity Flexural capacity
First floor timber framed walls	Longitudinal	3.5	40%	Bracing capacity
First floor timber framed walls	Transverse	3.5	53%	Bracing capacity

Item	Loading Direction	Ductility, µ	Seismic Capacity	Notes
Foundations	Transverse	1.25	79%	Bearing Pressure
Foundations	Transverse	1.25	80%	Overturning
First floor slab to masonry wall connection	Both	1.0	>100%	Shear Friction

Note:

- Ductility factors are in accordance with values recommended in the NZSEE 2006 AISPBE guidelines.
- The first floor timber system was considered a 'Part' for seismic force calculations as per NZS 1170.5 Section 8, assuming ductility consistent with the BRANZ report "Engineering Basis of NZS 3604).

Block C

The results of our quantitative assessment indicate the building has a seismic capacity of 35%NBS. Table 11.2 presents the evaluated seismic capacity in terms of %NBS of the individual structural systems in each building direction.

Table 11.2: Summary of Seismic Assessment of Structural Systems – Block C

Item	Loading Direction	Ductility, µ	Seismic Capacity	Notes
Overall %NBS adopted from DEE	**Longitudinal**	**2.0**	**35%NBS**	**Governed by flexural capacity of Ground Floor reinforced concrete masonry walls.**
Ground floor concrete masonry block wall in-plane	Both	2.0	>100%	Shear capacity
Ground floor concrete masonry block wall in-plane	Longitudinal Transverse	2.0 2.0	35% >100%	Flexural capacity Flexural capacity
Ground floor concrete masonry block wall out-of-plane	Both Both	1.25 1.25	>100% >100%	Shear capacity Flexural capacity
First floor timber framed walls	Longitudinal Transverse	3.5 3.5	40% 53%	Bracing capacity (All 'blocks') Bracing capacity (end 'blocks' only).
First floor concrete masonry block wall in-plane	Transverse	2.0	55% 67%	Flexural capacity Shear capacity (middle 'blocks' only)
First floor concrete masonry block wall out-of-plane	Transverse	1.25	>100% 65%	Shear capacity Flexural capacity

Item	Loading Direction	Ductility, μ	Seismic Capacity	Notes
Foundations	Transverse	1.25	79%	Bearing Pressure
Foundations	Transverse	1.25	75%	Overturning

Note:

- Ductility factors are in accordance with values recommended in the NZSEE 2006 AISPBE guidelines.
- The first floor timber system was considered a 'Part' for seismic force calculations as per NZS 1170.5 Section 8, assuming ductility consistent with the BRANZ report "Engineering Basis of NZS 3604).

11.6 Discussion of results

The key findings of the assessment are as follows:

Block B

The seismic capacity is governed by ground floor concrete masonry block wall at 37%NBS.

Based on the results of our Quantitative Assessment, Block B is considered Earthquake Risk as the seismic capacity was assessed to be between 34% and 67%NBS, and is classified as Seismic Grade C.

Block C

The seismic capacity is governed by ground floor concrete masonry block wall at 35%NBS.

Based on the results of our Quantitative Assessment, Block C is considered Earthquake Risk as the seismic capacity was assessed to be between 34% and 67%NBS, and is classified as Seismic Grade C.

12 Recommendations

12.1 Occupancy

In order for the owner to make an informed decision about the on-going use and occupancy of their buildings the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

Block A

The building is considered to be earthquake risk, having a qualitatively assessed capacity of between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would reduce its ability to resist further loads and therefore no restrictions on use or occupancy are recommended.

Block B

The building is considered to be earthquake risk, having a quantitatively assessed capacity between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would reduce its ability to resist further loads and therefore no restrictions on use or occupancy are recommended.

Block C

The building is considered to be earthquake risk, having a quantitatively assessed capacity between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

The building has suffered damage to the seismic or gravity load resisting system of the first floor stair landings that is sufficient to impair or significantly reduce their ability to resist further loads. A temporary propping solution has been provided as per email sent to CCC, dated 21 December 2012, and as a result no restrictions on use or occupancy are recommended.

12.2 Further Investigations, Survey or Geotechnical Work

It is recommended that for each building:

- A full damage assessment is carried out for insurance purposes.
- A verticality and level survey could be carried out to determine the extent of settlement of the building for insurance purposes.
- Intrusive investigation is carried out to determine whether the block work veneer has ties to the timber framing.

12.3 Damage Reinstatement

According to the recent CCC Instructions to Engineers document (16 October 2012), Council's insurance provides for repairing damaged elements to a condition substantially as new. We suggest you consult further with your insurance advisor.

13 Design Features Report

Repairs will be required to reinstate the existing structural systems for each building, in particular the stair landings. A repair methodology has not been prepared at this stage. No new load paths are expected as a result of the repairs required, however may be developed as a result of strengthening options.

14 Limitations

The following limitations apply to this engagement:

- Beca and its employees and agents are not able to give any warranty or guarantee that all defects, damage, conditions or qualities have been identified.
- Inspections are primarily limited to visible structural components. Appropriate locations for invasive inspection, if required, will be based on damage patterns observed in visible elements, and review of the construction drawings and structural system. As such, there will be concealed structural elements that will not be directly inspected.

- The inspections are limited to building structural components only.
- Inspection of building services, pipework, pavement, and fire safety systems is excluded from the scope of this report.
- Inspection of the glazing system, linings, carpets, claddings, finishes, suspended ceilings, partitions, tenant fit-out, or the general water tightness envelope is excluded from the scope of this report.
- The assessment of the lateral load capacity of the building is limited by the completeness and accuracy of the drawings provided. Assumptions have been made in respect of the geotechnical conditions at the site and any aspects or material properties not clear on the drawings. Where these assumptions are considered material to the outcome further investigations may be recommended. It is noted the assessment has not been exhaustive, our analysis and calculations have focused on representative areas only to determine the level of provision made. At this stage we have not undertaken any checks of the gravity system, wind load capacity, or foundations.
- The information in this report provides a snapshot of building damage at the time the detailed inspection was carried out. Additional inspections required as a result of significant aftershocks are outside the scope of this work.

This report is of defined scope and is for reliance by CCC only, and only for this commission. Beca should be consulted where any question regarding the interpretation or completeness of our inspection or reporting arises.

Appendix A

Photographs

Figure 1: Site Plan (North is to top of page)

Photo 1: Block A – View from north-west.

Photo 2: Block A - view from north east showing surrounding asphalt pavement.

Photo 3: Block B – View from north-west.

Photo 4: Rear of Block C - view from west.

Photo 5: Intra-block stairs. Detail is typical for the three sets of stairs in Block C, as well as the set of stairs in Block B. The stair landings are the dividing feature/seismic separation between each block (refer to Section 11.1).

Photo 6: Pickering Courts driveway.

Damage Description: Possible earthquake damage.

Photo 7: Concrete block masonry veneer – Block A.

Damage Description: Cracking of concrete masonry block veneer mortar.

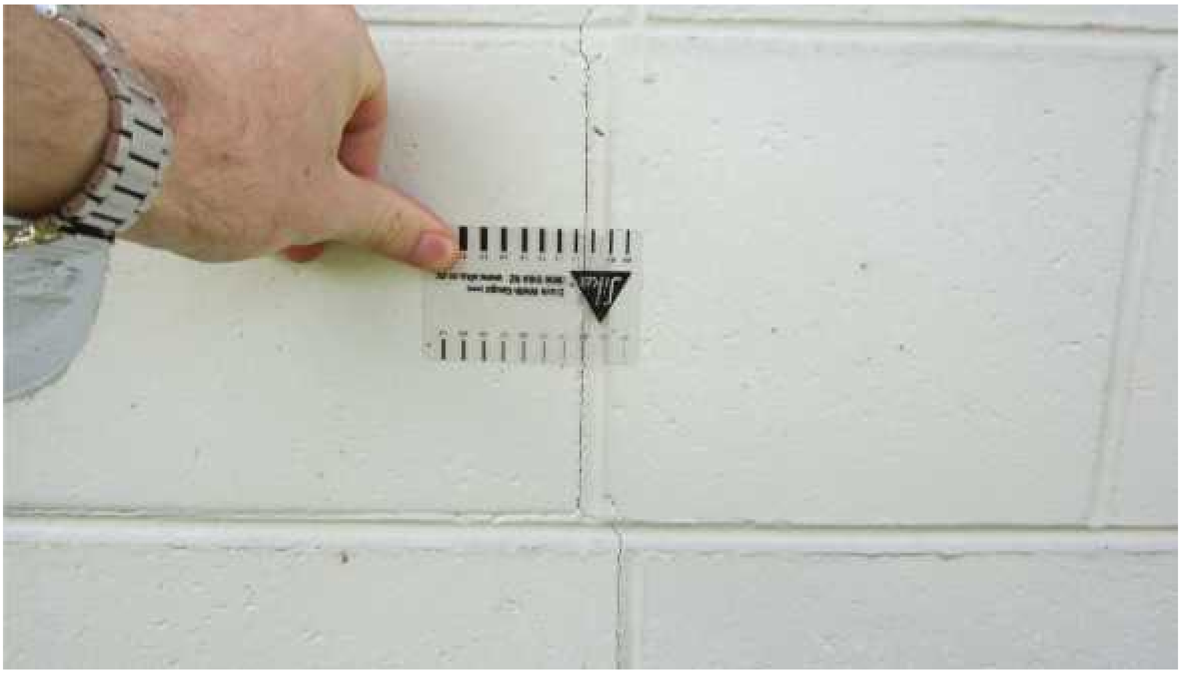


Photo 8: Concrete block masonry veneer – Block A.

Damage Description: Cracking of concrete masonry block veneer mortar.

Photo 9: Internal wall and ceiling.

Damage Description: Separation of wall and ceiling linings.

Photo 10: Door architrave and ceiling.

Damage Description: Separation of wall and ceiling linings.

Photo 11: Window and door architrave and ceiling.

Damage Description: Separation of wall and ceiling linings.

Photo 12: Stair landing in Block C.

Damage Description: Cracking of concrete slab.

Photo 13: Stair landing in Block C.

Damage Description: Cracking of concrete slab.

Photo 14: Stair landing in Block C.

Damage Description: Cracking of stair landing in Block C. (Temporary propping detail provided)

Photo 15: Reinforced concrete masonry block wall – northern end wall of Block B.

Damage Description: Stepped cracking in concrete masonry block work mortar.

Photo 16: Underside of typical first floor balcony.

Damage Description: Cracking of concrete balcony (approximately in the middle).

Photo 17: First floor slab – Block C.

Damage Description: Diagonal cracking to first floor slab,.

Photo 18: First floor slab – Western end wall in Block C.

Damage Description: Diagonal cracking to first floor slab and cracking of concrete masonry block.

Photo 19: Concrete masonry block wall – Block C.

Damage Description: Stepped cracking in concrete masonry block work mortar.

Photo 20: Ceiling lining.

Damage Description: Cracking of ceiling lining.

Photo 21: Concrete patio adjacent to Block C.

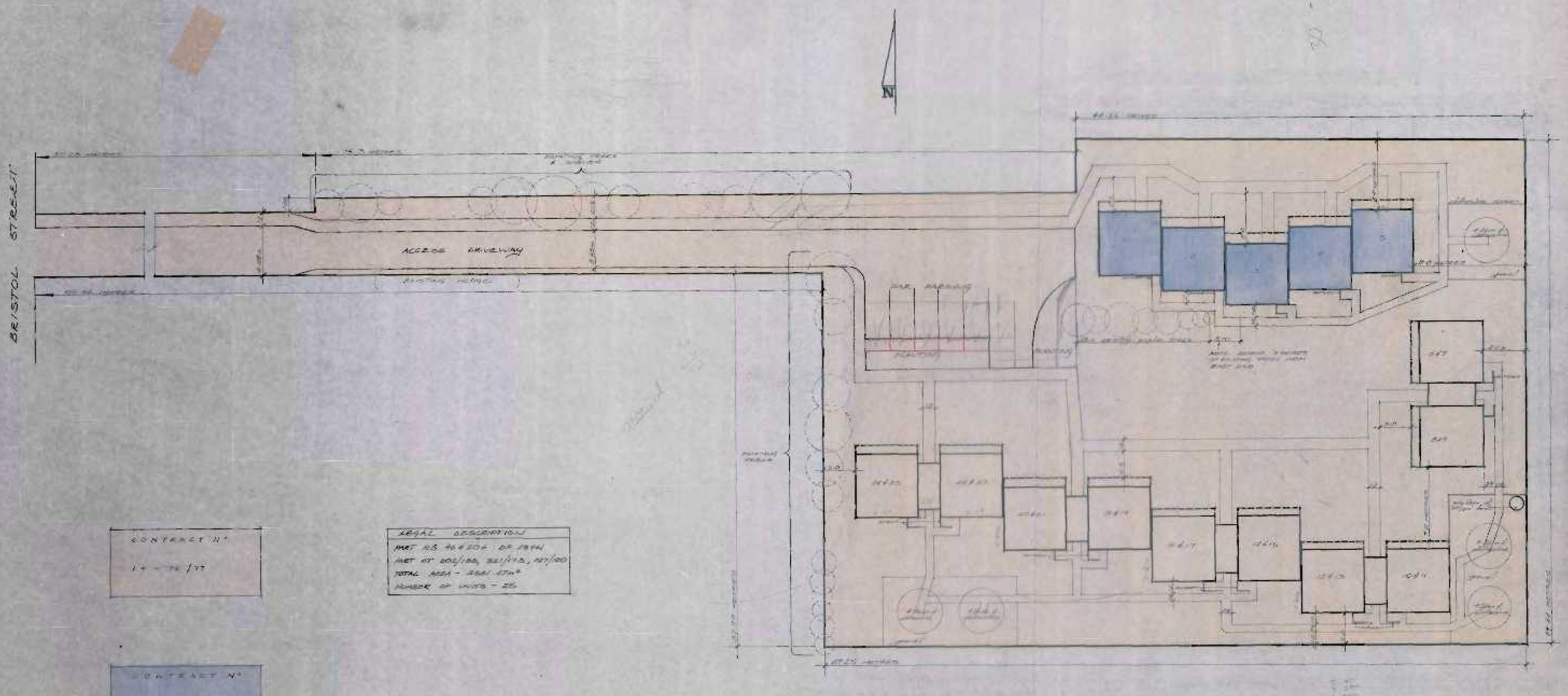
Damage Description: Ground cracks / cracking to concrete pavement.

Photo 22: Inner skin (15series) of concrete masonry block wall – ground floor in Block C.

Damage Description: Cracking of concrete masonry block work mortar.

Appendix B

Existing Drawings



SITE PLAN 1:200

CONTRACT Nº
14 – 76/77

CONTRACT Nº
18 – 76/77

LEGAL DESCRIPTION
PART R.S. 46620A OF 38?H
PART LOT 202/100, 321/173, 127/100
TOTAL AREA – 2661.67m²
NUMBER OF UNITS – 25

CHRISTCHURCH CITY COUNCIL
Approved subject to the Bylaws
3 MAR 1977

547

CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING · BRISTOL STREET · ST ALBANS	1:200	DSN W.R.A.		SITE PLAN	JOB X1621	1
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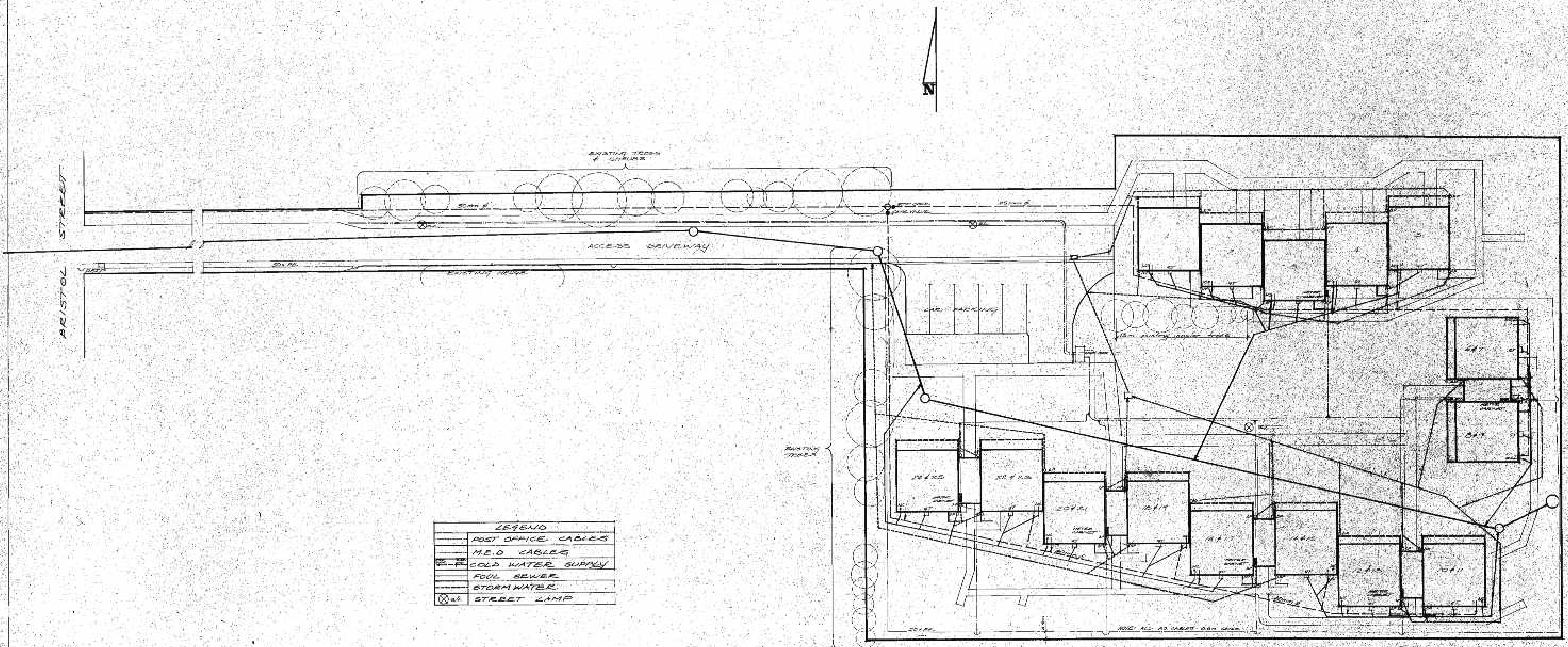

SERVICES PLAN 1:200

CHRISTCHURCH CITY COUNCIL
Approved Subject to the Bylaws
MAR 1977
Per City Engineer

CITY ARCHITECT'S DIVISION
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING - BRISTOL STREET - ST ALBANS

SCALES 1:200
DESIGN
DSN M.F.A.
DRN
TCD
CKD
AMENDMENTS
DATE 15-2-76

SHEET TITLE SERVICES PLAN

REFERENCE JOB A/
FILE
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SHEET 2 OF

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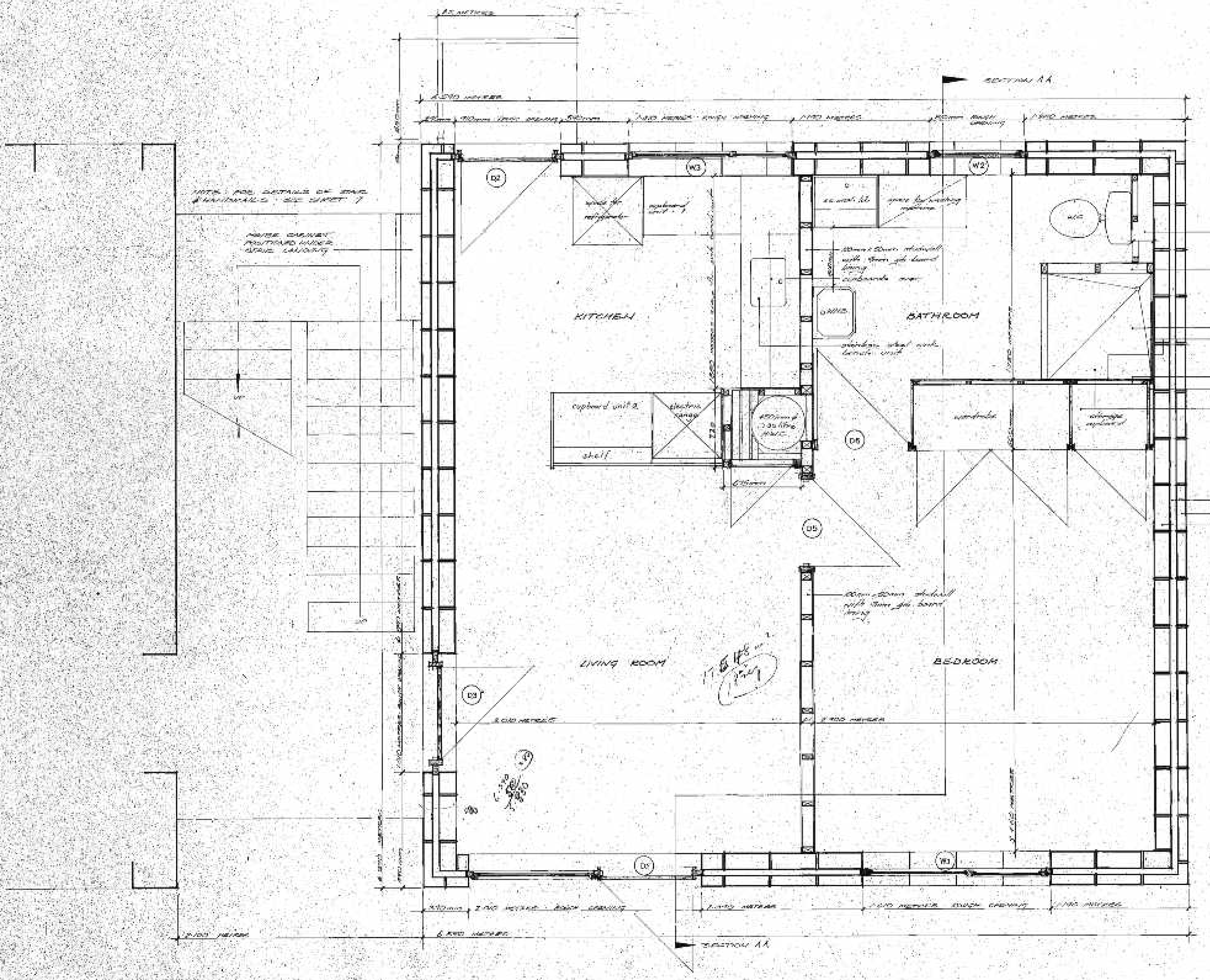
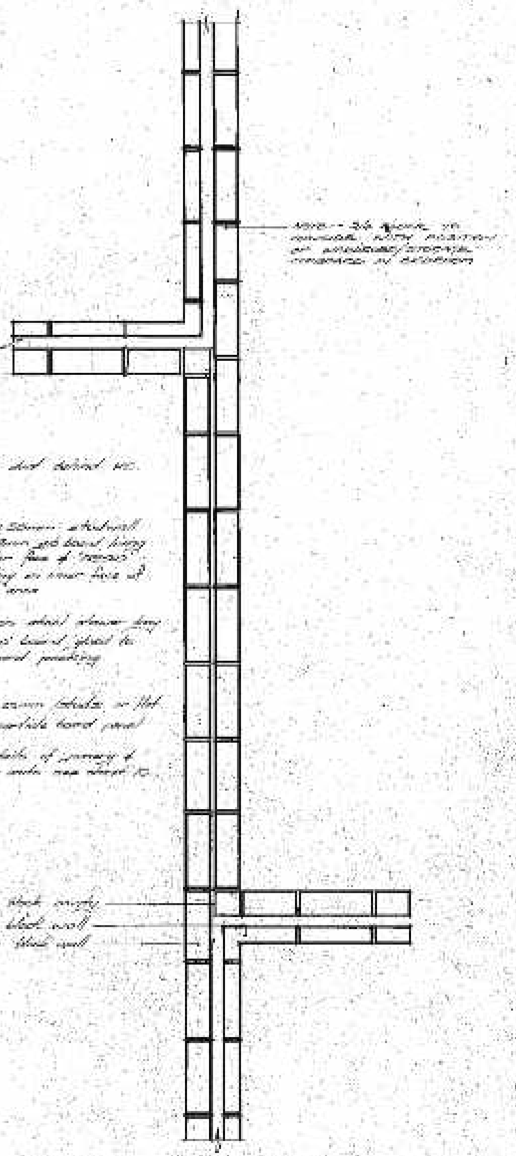


GROUND FLOOR PLAN · TWO STOREY UNIT · SCALE - 1:20



PLAN OF FIREWALL AT GROUND FLOOR · SCALE 1:20

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3 MAR 1977
For City Engineer

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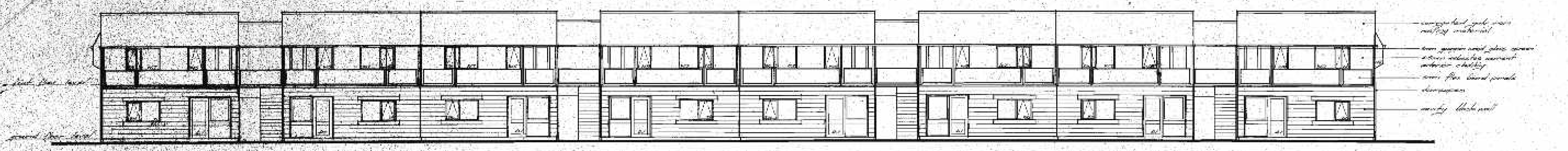
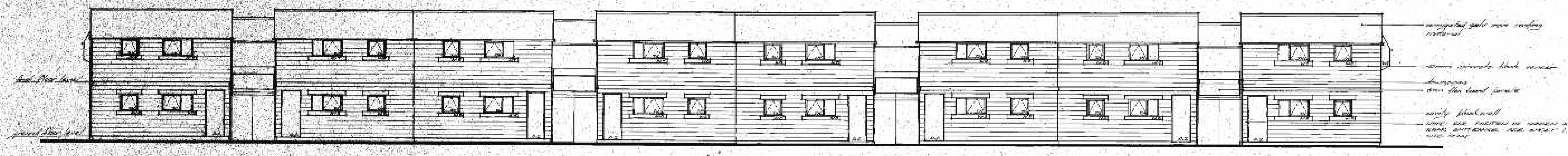
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT
CONSULTANT
ELDERLY PERSONS HOUSING · BRISTOL STREET · ST ALBANS
SCALES 1:20
DESIGN
DSN N.P.A.
DRN
TCD
CKD
AMENDMENTS
SHEET TITLE
GROUND FLOOR PLAN - DOUBLE STOREY UNIT FIREWALL PLAN
REFERENCE JOB A 184 /
FILE
CONT 14-
SHEET 3
OF
DATE 14/3/76
CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



FRONT ELEVATION · TWO STOREYED UNITS · SCALE - 1:100



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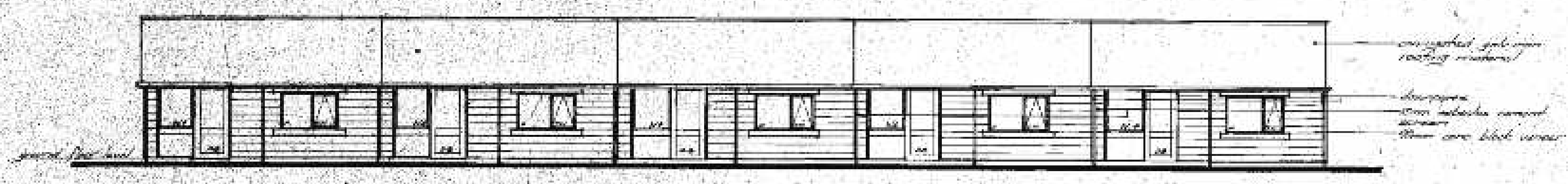
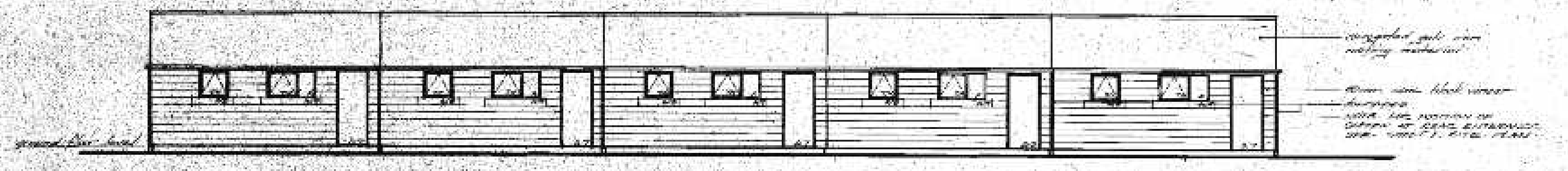
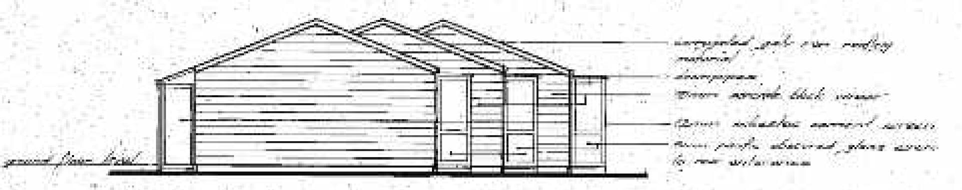


FRONT ELEVATION · SINGLE STOREY UNITS · SCALE - 1:100

END ELEVATION · TWO STOREYED UNITS · SCALE - 1:100



REAR ELEVATION · SINGLE STOREY UNITS · SCALE - 1:100



END ELEVATION · SINGLE STOREY UNITS
SCALE - 1:100

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3 MAR 1977
Per City Engineer

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CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING - BRISTOL STREET · ST ALBANS

SCALES 1:100
DESIGN
DSN
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DATE 18/3/76
AMENDMENTS
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SHEET 5
OF

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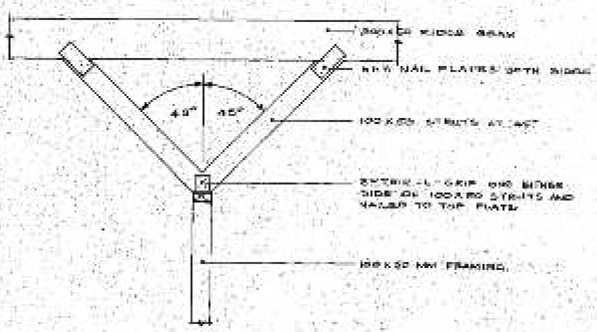
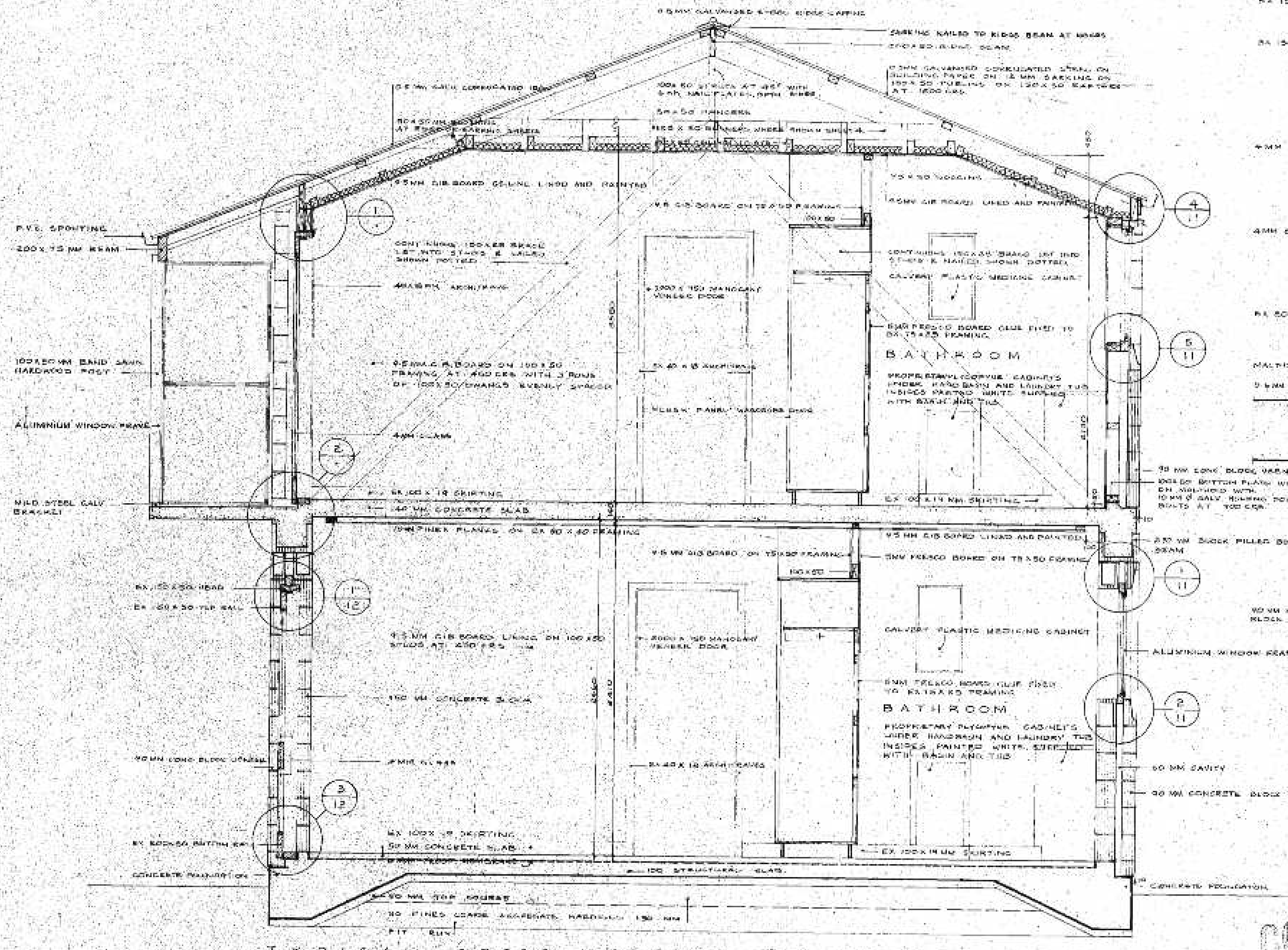
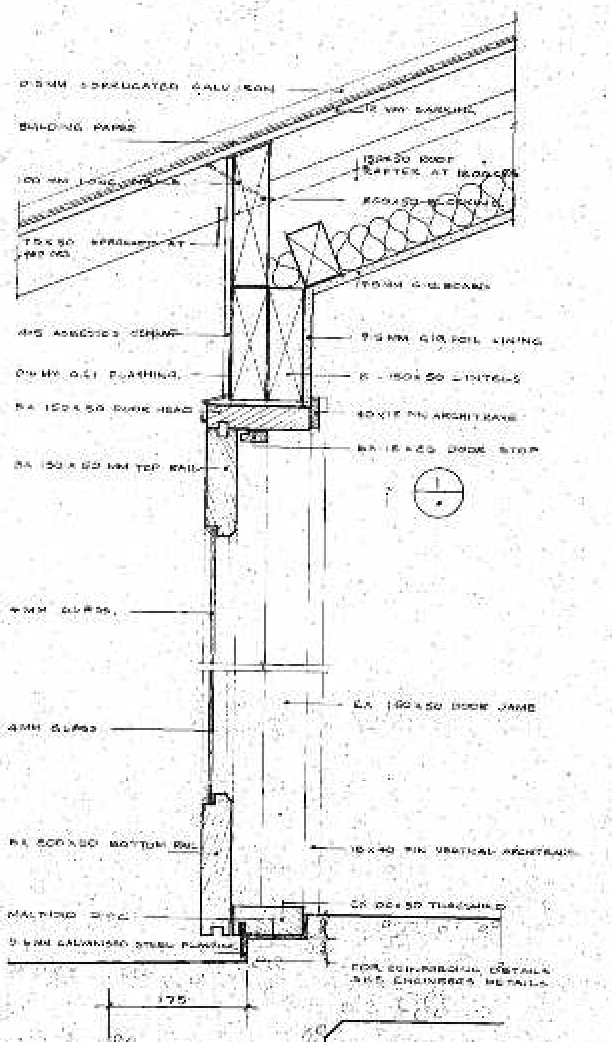


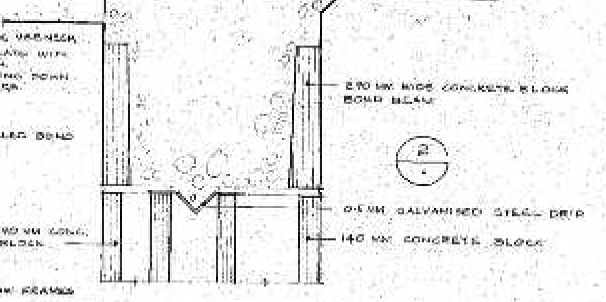
90° VIEW OF RIDGE FRAME, AS SHOWN BELOW

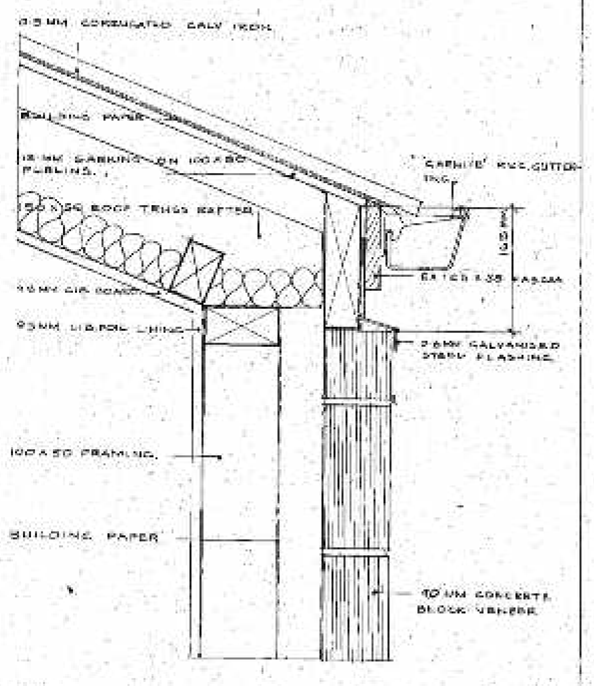


TYPICAL CROSS-SECTION A-A SCALE 1:20

(NOT TRUE CROSS SECTION)







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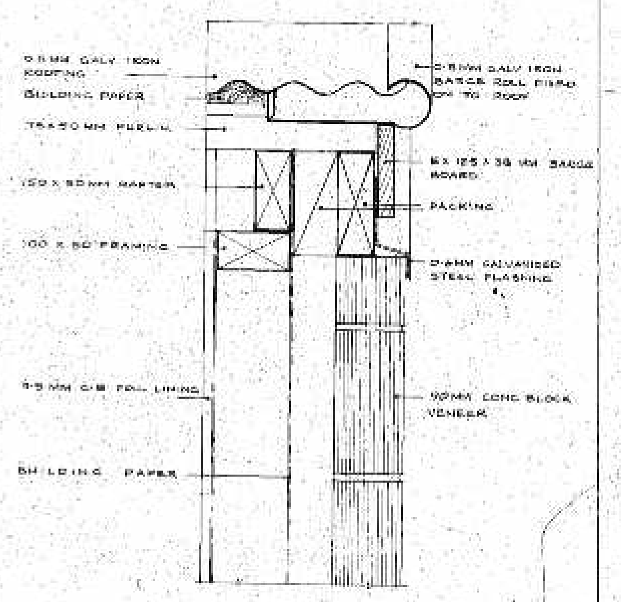
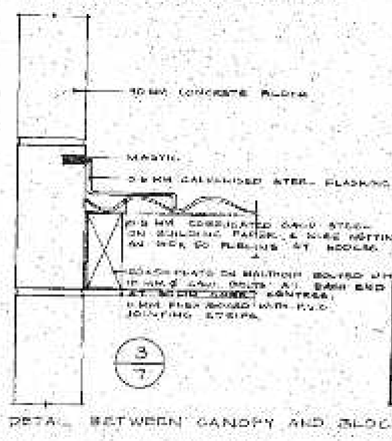


TYPICAL BARGE DETAIL



DETAIL BETWEEN CANOPY AND BLOCK. SEE SHEET 7

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CHRISTCHURCH CITY COUNCIL
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25 MAR 1977
Per City Engineer

CITY ARCHITECT'S DIVISION

CHRISTCHURCH CITY COUNCIL

CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING - BRISTOL STREET ST ALBANS

SCALES 1:20 1:5

DESIGN DSN W.F.A. DRN R.J.B. TCD R.J.B. CKD

AMENDMENTS

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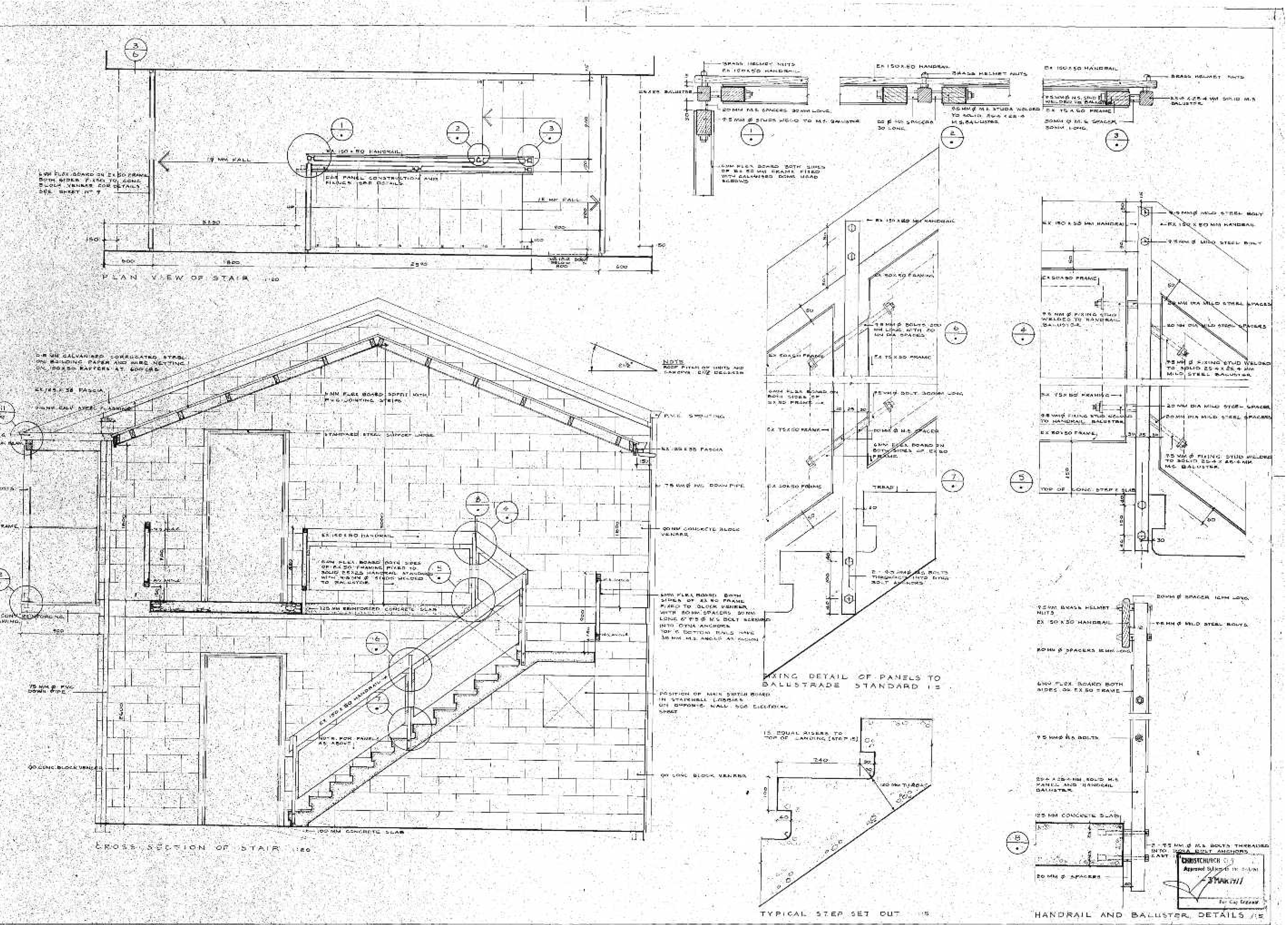
REFERENCE JOB A 254 FILE CONT

SHEET 6 OF

DATE MARCH 1976

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



CHRISTCHURCH CITY
Approved Subject to conditions
3 MAR 1977
For City Engineer

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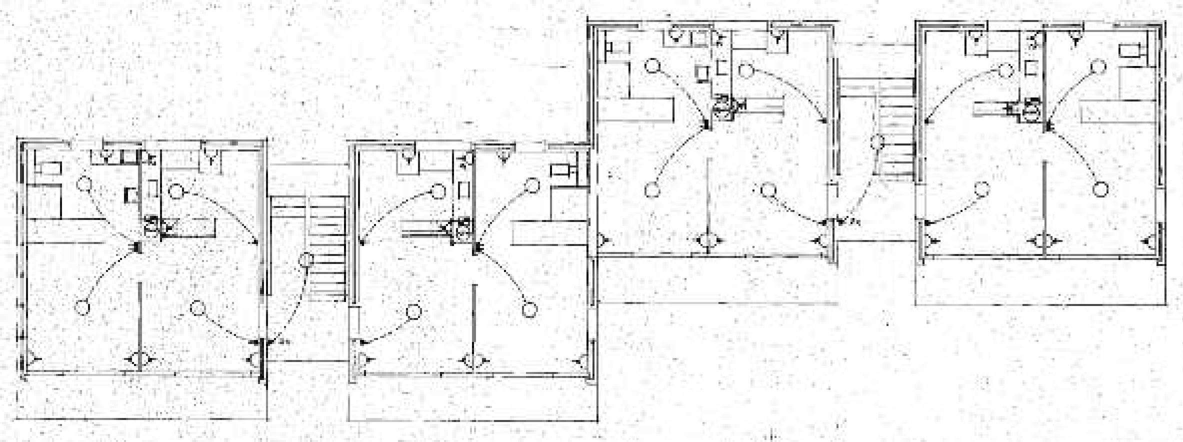
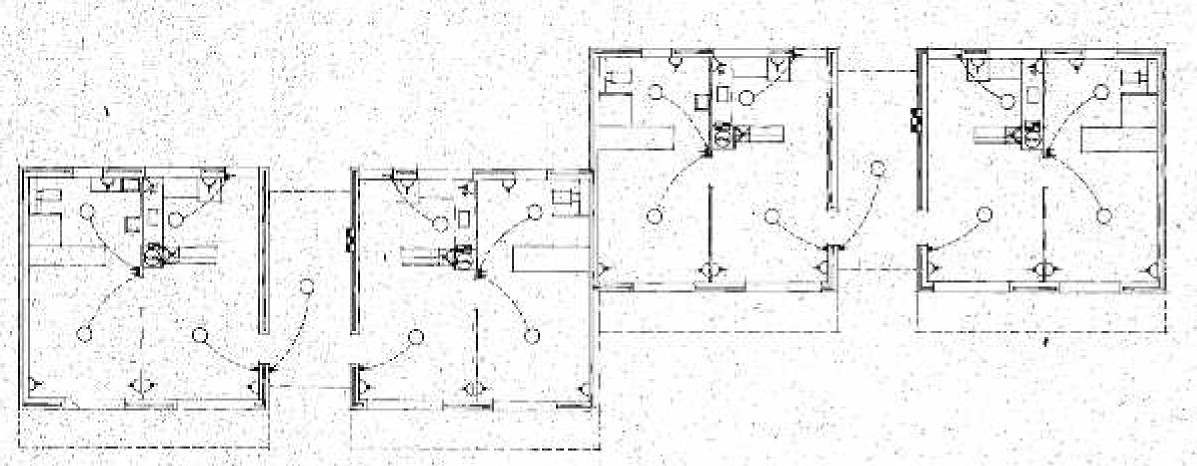
CITY ENGINEER'S DEPARTMENT			DATE MARCH 1976	CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK				OF

CONTRACT No 14 ONLY



FIRST FLOOR ELECTRICAL LAYOUT



GROUND FLOOR ELECTRICAL LAYOUT

CONTRACT Nº 14 ONLY

LEGEND

▷	PERMANENT CONNECTION	▷	DOUBLE SWITCH SOCKET OUTLET
▷	SWITCH SOCKET OUTLET	⊖	HOT WATER CYLINDER
•	LIGHT SWITCH		
•	TWO WAY SWITCH		
▬	DISTRIBUTION BOARD		
▬	MAIN SWITCH BOARD		
○	INCANDESCENT LIGHT FITTING		

CHRISTCHURCH CITY C I
Approved Subject to the By-Laws
- 3 MAR 1977
For City Engineer

CITY ARCHITECT'S DIVISION
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING BRISTOL STREET ST ALBANS

SCALES 1:100

DESIGN
DSN W.F.A
DRN F.J.B
TCD F.J.B
CKD

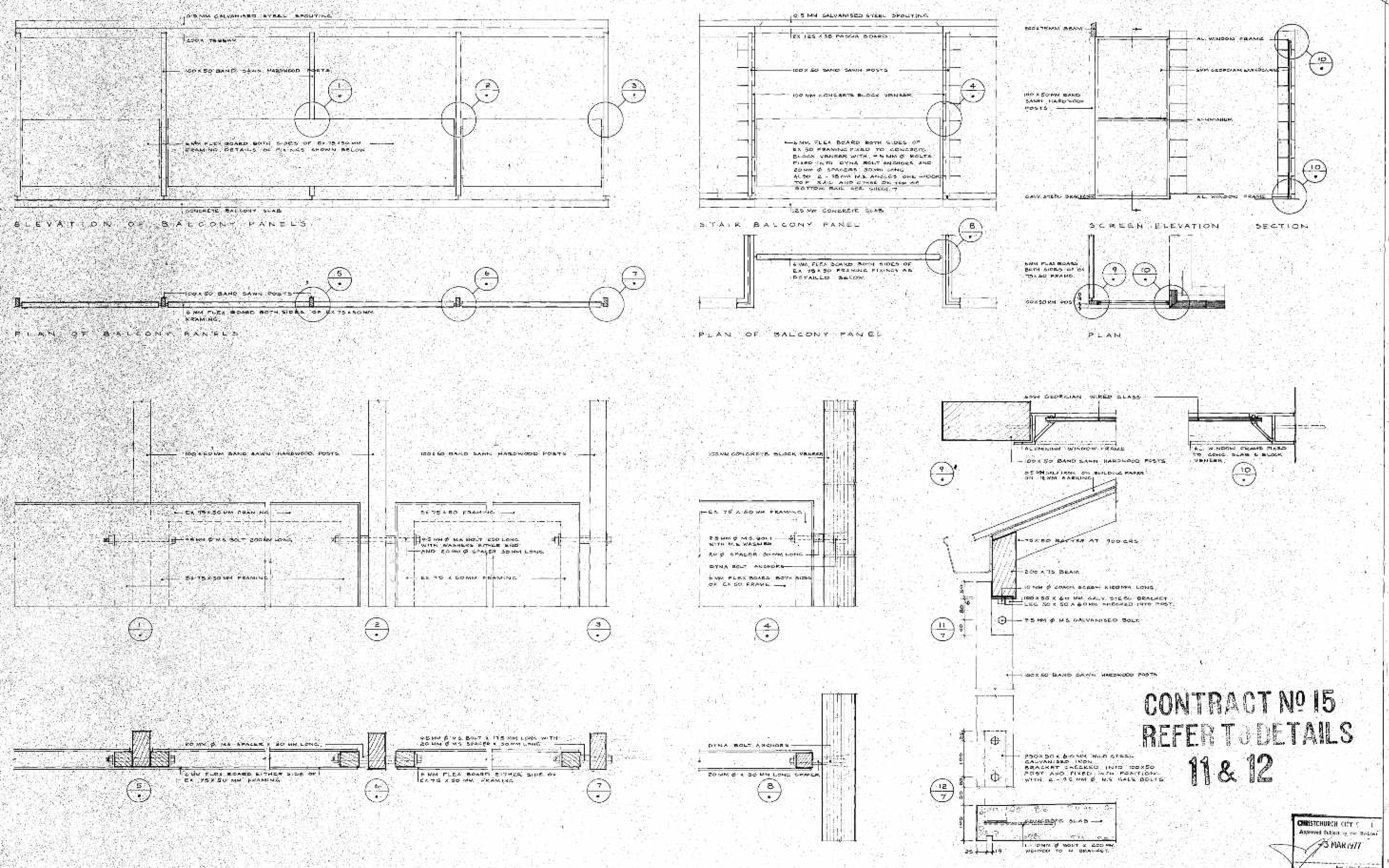
AMENDMENTS

SHEET TITLE ELECTRICAL PLAN

REFERENCE JOB FILE CONT

SHEET 8 OF

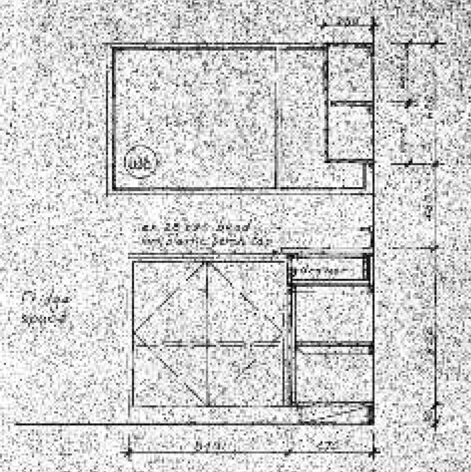
DATE FEBRUARY 76 CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



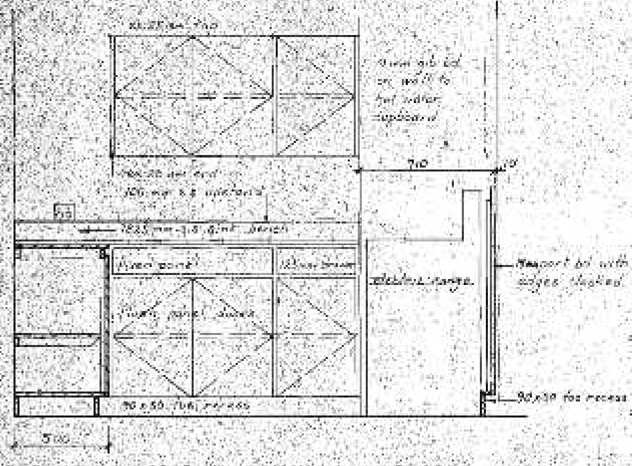
CONTRACT Nº 15
REFER TO DETAILS
11 & 12

CHRISTCHURCH CITY C[illegible]
Approved Subject to the By-Laws
3 MAR 1977
For City Engineer

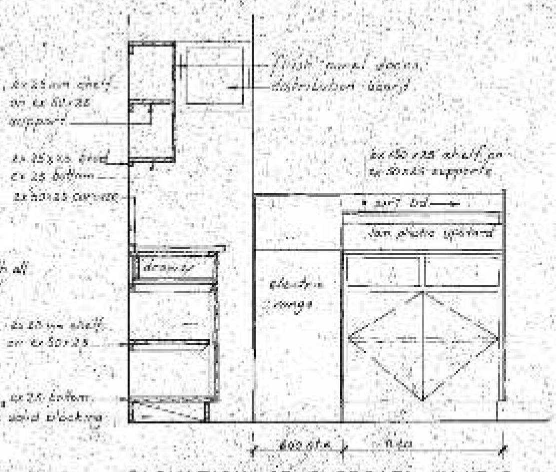
CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING BRISTOL STREET ST ALBANS	1:20 1:5	DSN W.F.A. DRN R.J.B. TCD R.J.B. CKD		BALUSTRADE AND SCREEN DETAILS	JOB FILE CONT	9
CITY ENGINEER'S DEPARTMENT			DATE MARCH 1975	CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK				OF



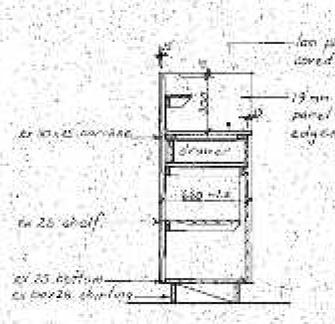
ELEVATION OF CUPBOARD UNIT 1



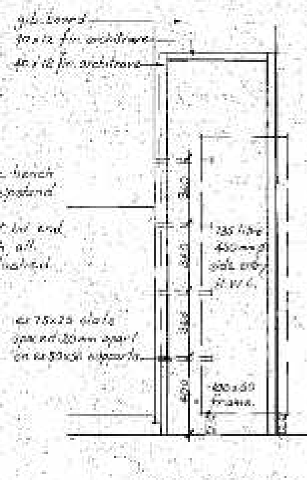
ELEVATION OF SINK BENCH & CUPBOARDS



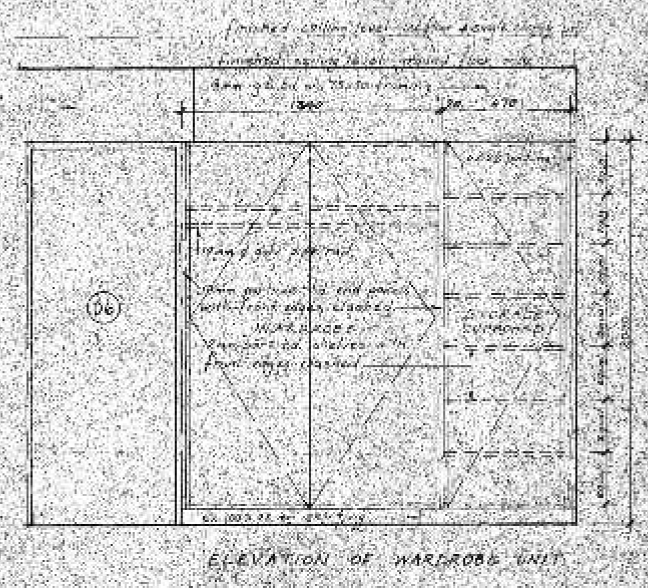
ELEVATION OF CUPBOARD UNIT 2.



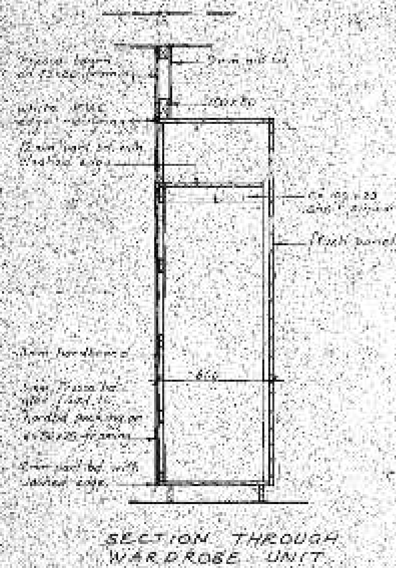
SECTION THROUGH CUPBOARD UNIT 2



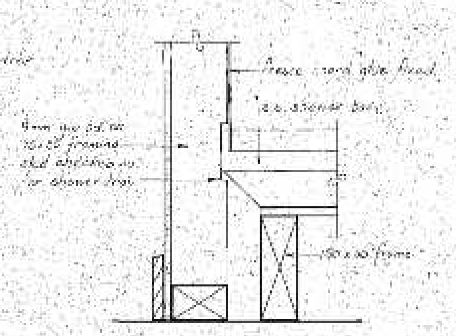
ELEVATION OF H.W.C. CUPBOARD



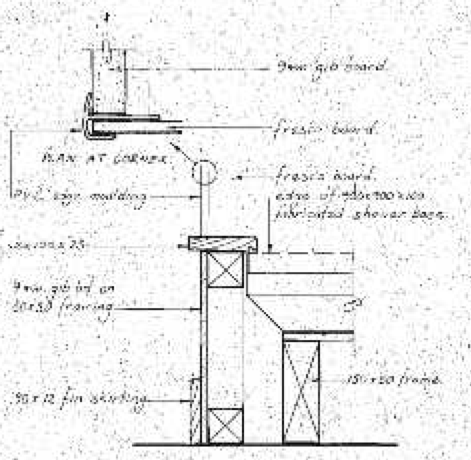
ELEVATION OF WARDROBE UNIT



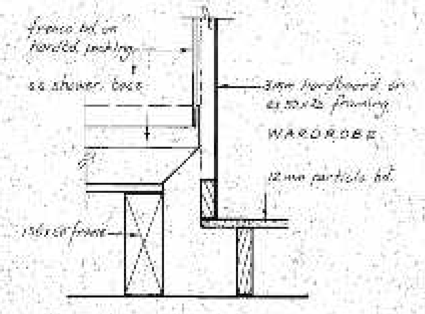
SECTION THROUGH WARDROBE UNIT



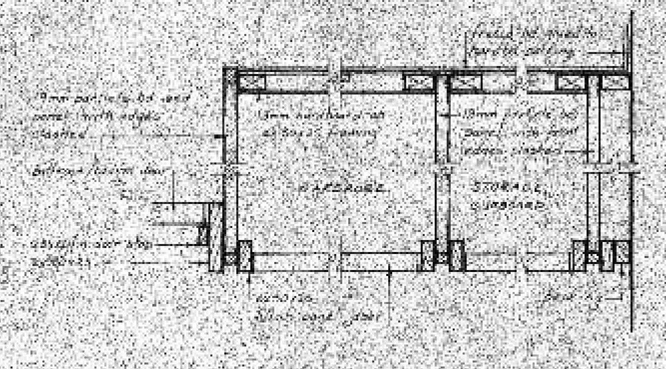
DETAIL AT EDGE OF SHOWER
scale 1:5



DETAIL AT FRONT OF SHOWER
scale 1:5



DETAIL AT EDGE OF SHOWER & WARDROBE
scale 1:5



PLAN OF WARDROBE UNIT

CHRISTCHURCH CITY
Approved Subject to the Bylaws
3 MAR 1977
For City Engineer

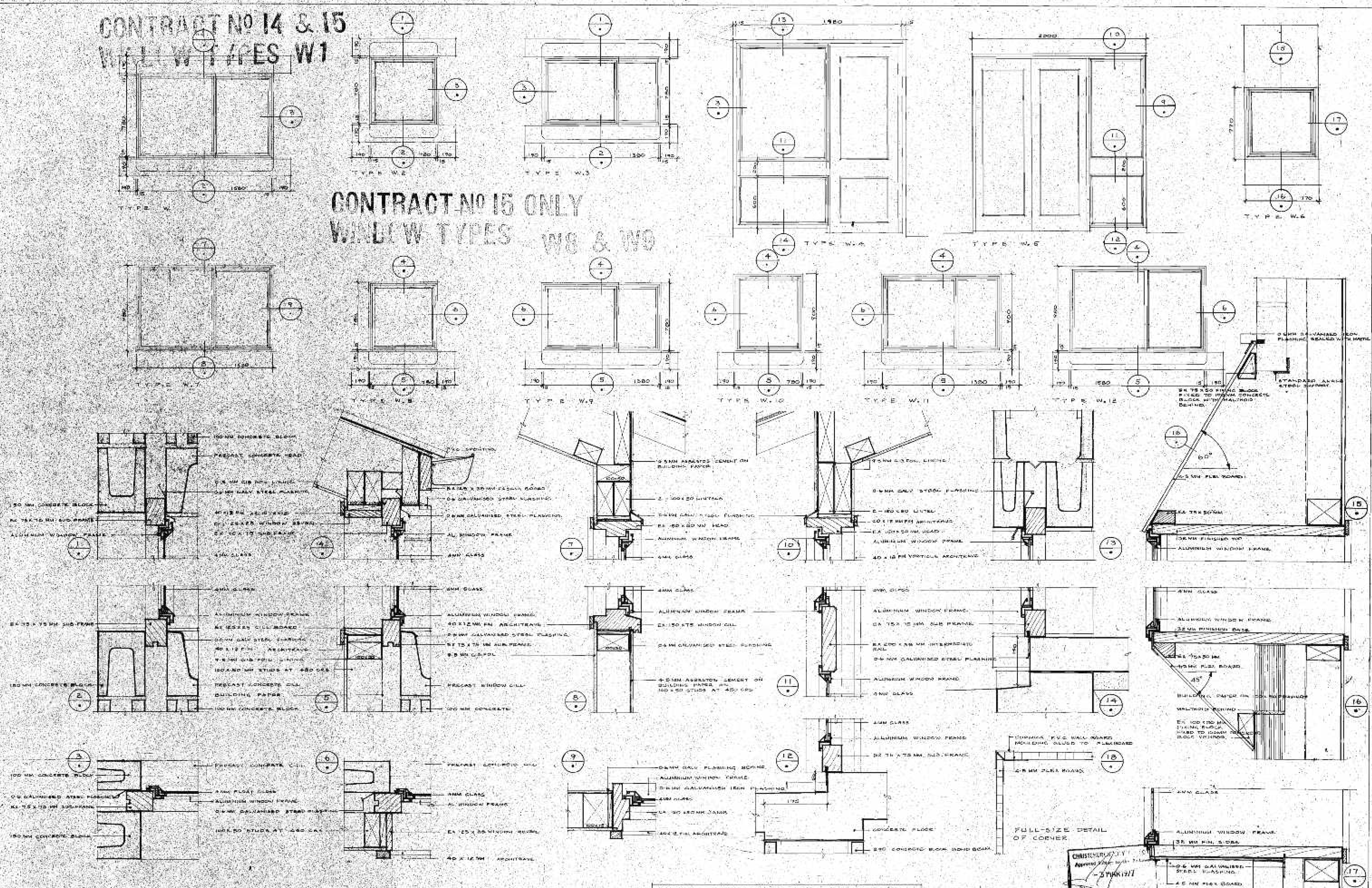
CITY ARCHITECT'S DIVISION
CONSULTANT
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING BRISTOL STREET · ST ALBANS

SCALES 1:5 1:20
DESIGN
DSN W.F.A.
DRN G.E.
TCD G.E.
CKD
AMENDMENTS
SHEET TITLE JOINERY & SHOWER DETAILS.
REFERENCE JOB 1184
FILE
CONT
SHEET 10
DATE MAY 1976
CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK
OF

CONTRACT No 14 & 15
WINDOW TYPES W1

CONTRACT No 15 ONLY
WINDOW TYPES W8 & W9



NOTE: ALL WINDOW SIZES TO BE CHECKED ON SITE

CHRISTCHURCH CITY
Approved subject to the ...
- 3 MAR 1977
for City Engineer

CITY ARCHITECT'S DIVISION
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

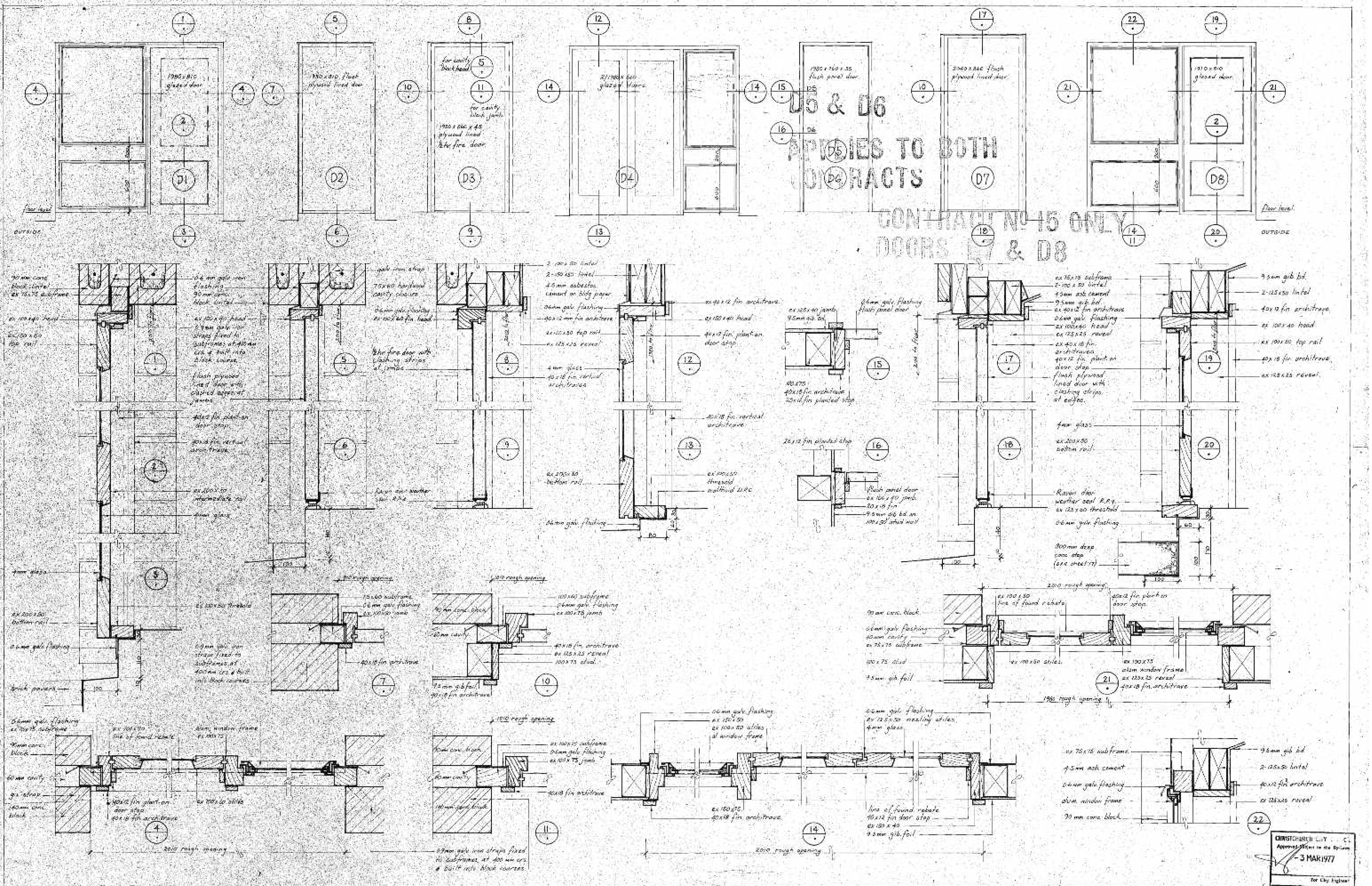
ELDERLY PERSONS HOUSING · BRISTOL STREET · ST ALBANS

SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
1:20 1:5 F.S/1:1	DSN W.F.A. DRN P.A. 7/6 TCD P.A. 7/6 CKD		WINDOW SCHEDULE	JOB FILE CONT	11

DATE MARCH 1976 CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK

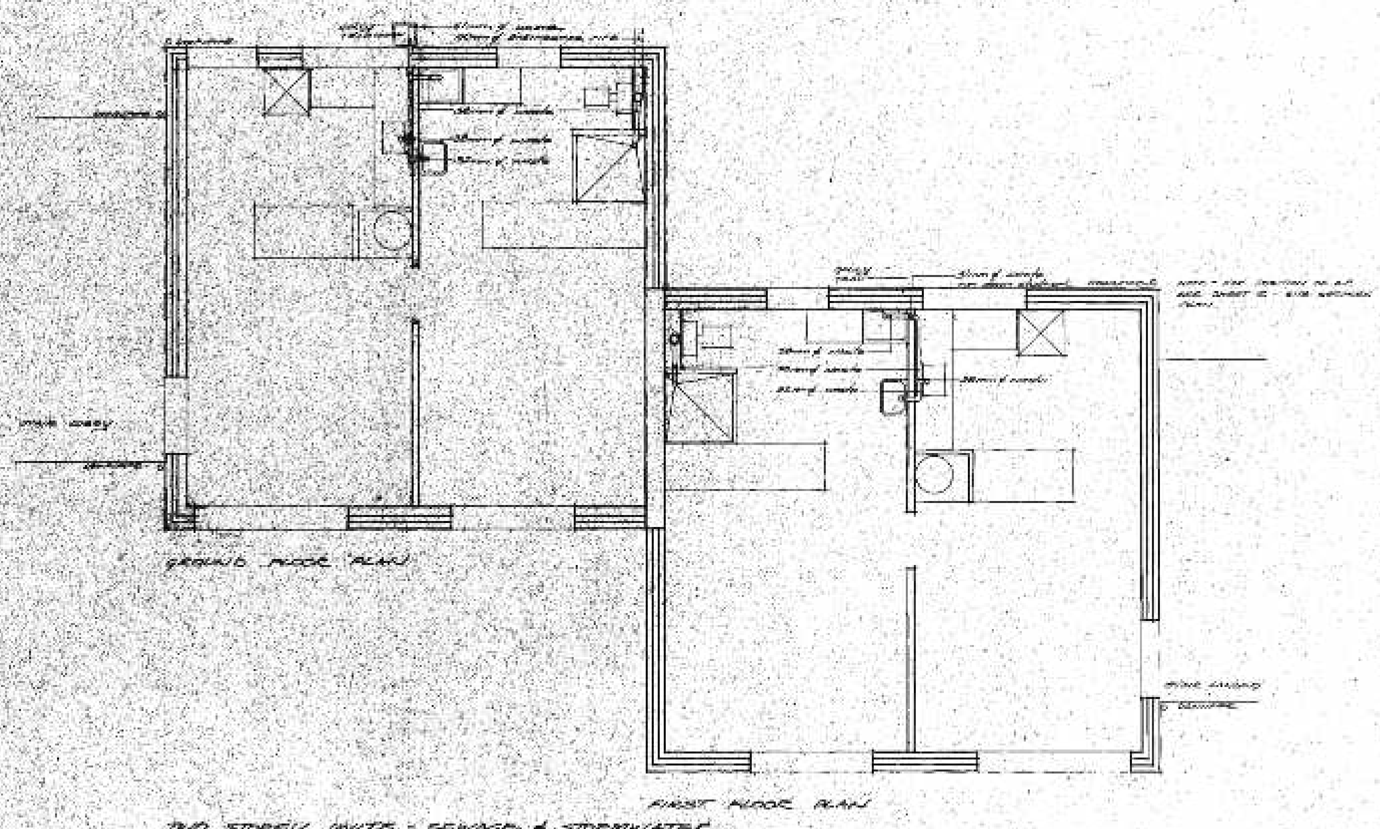
D5 & D6 APPLIES TO BOTH CONTRACTS

CONTRACT No 15 ONLY DOORS D7 & D8

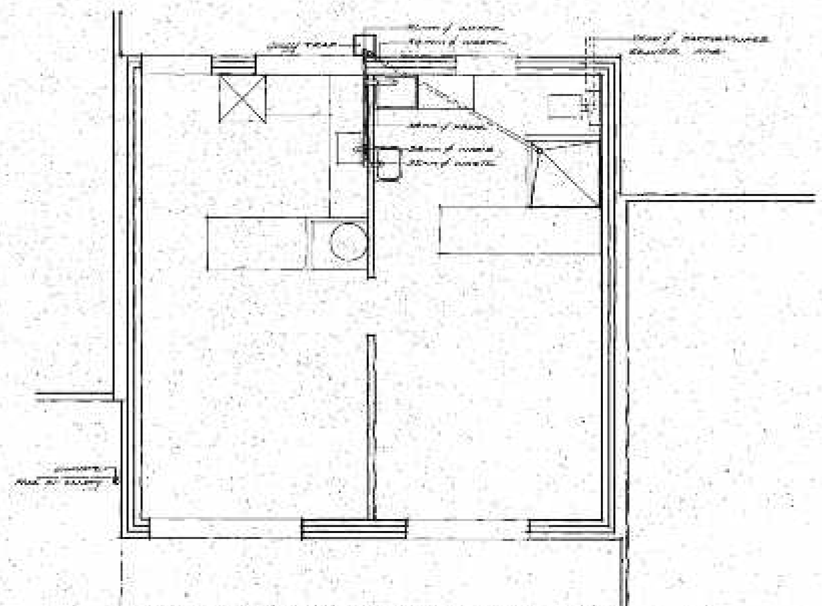


CHRISTCHURCH CITY C...
Approved subject to the By-Laws
-3 MAR 1977
for City Engineer

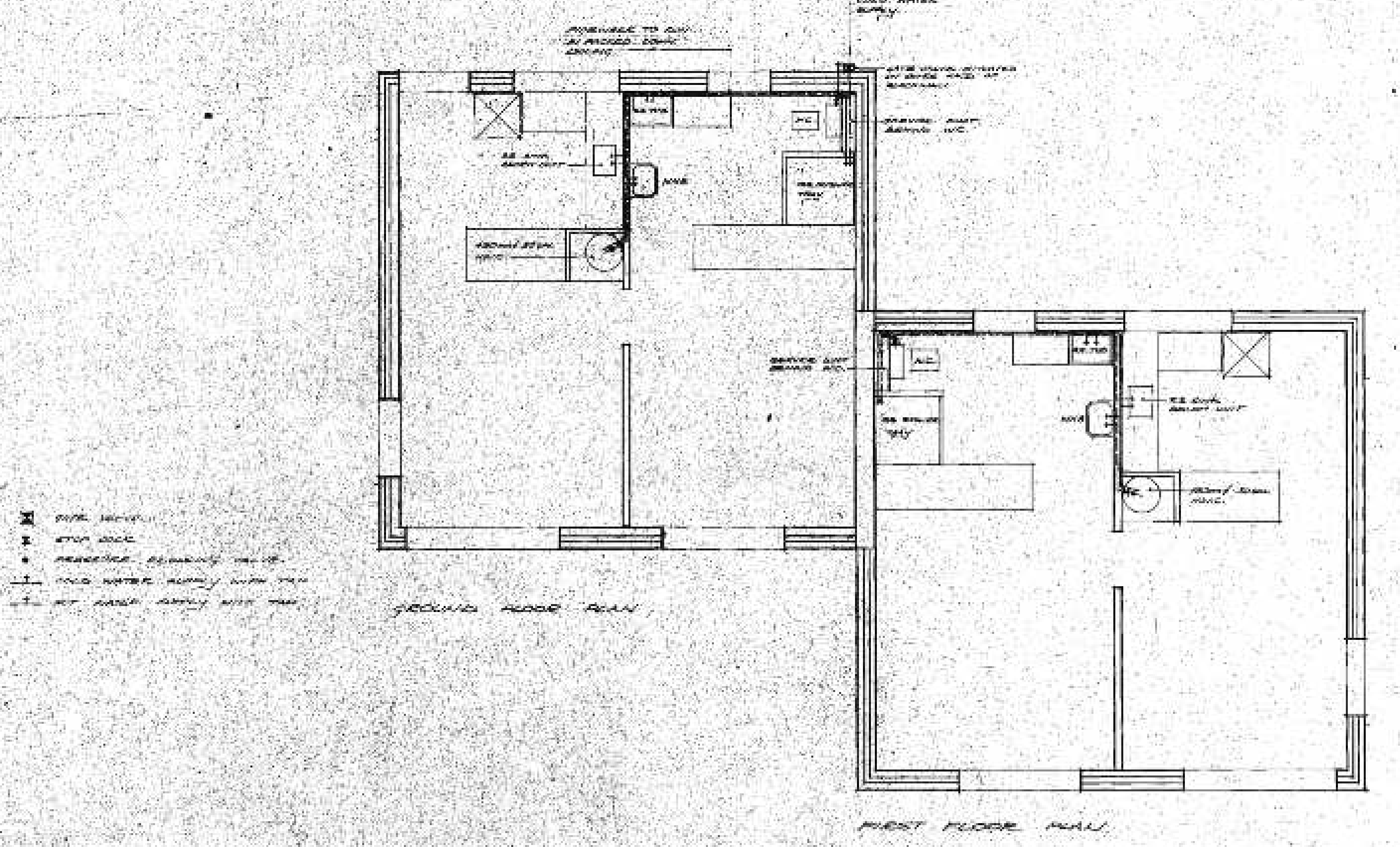
CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING BRISTOL STREET ST ALBANS	1:5 1:20	DSN W.F.A. DRN G.C. TRD G.C. CKD		DOOR SCHEDULE.	JOB FILE CONT	12
CITY ENGINEER'S DEPARTMENT			DATE MAY 1976		CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK			OF



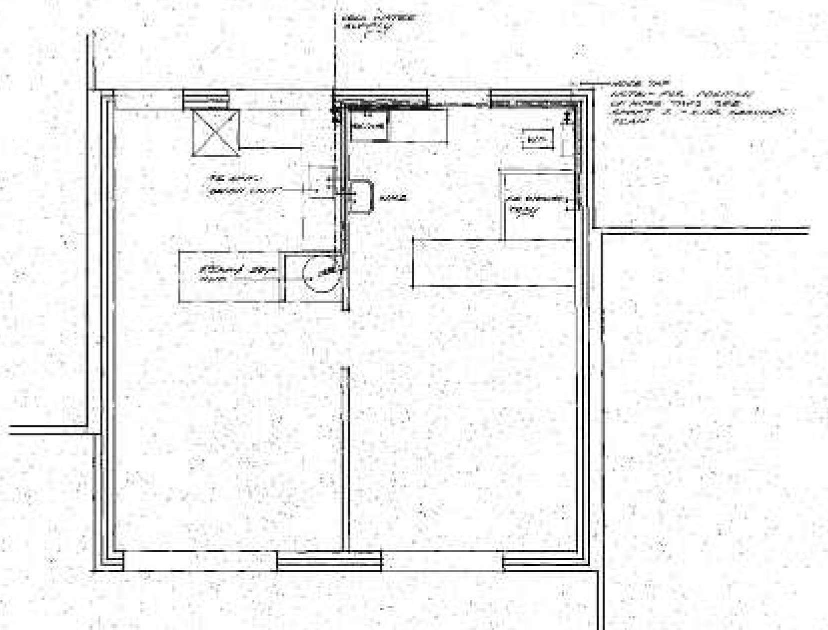
TWO STOREY UNITS - SEWAGE & STORMWATER
SCALE - 1:50



FLOOR PLAN - SINGLE STOREY UNIT
SEWAGE & STORMWATER - SCALE - 1:50



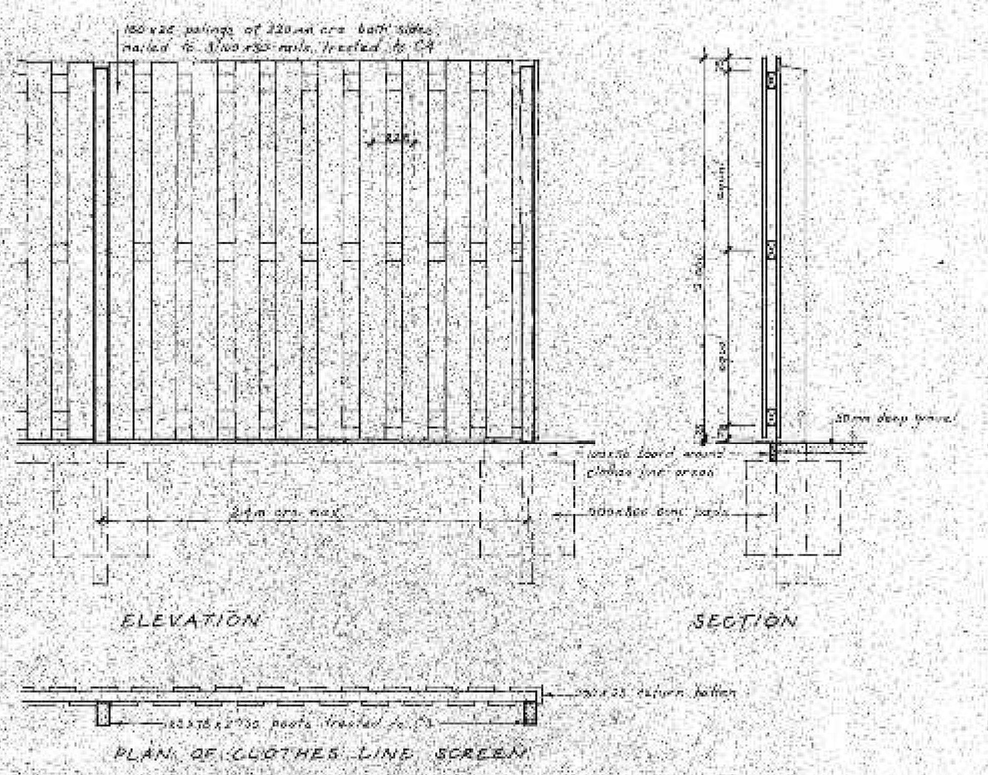
TWO STOREY UNITS - WATER RETICULATION
SCALE - 1:50

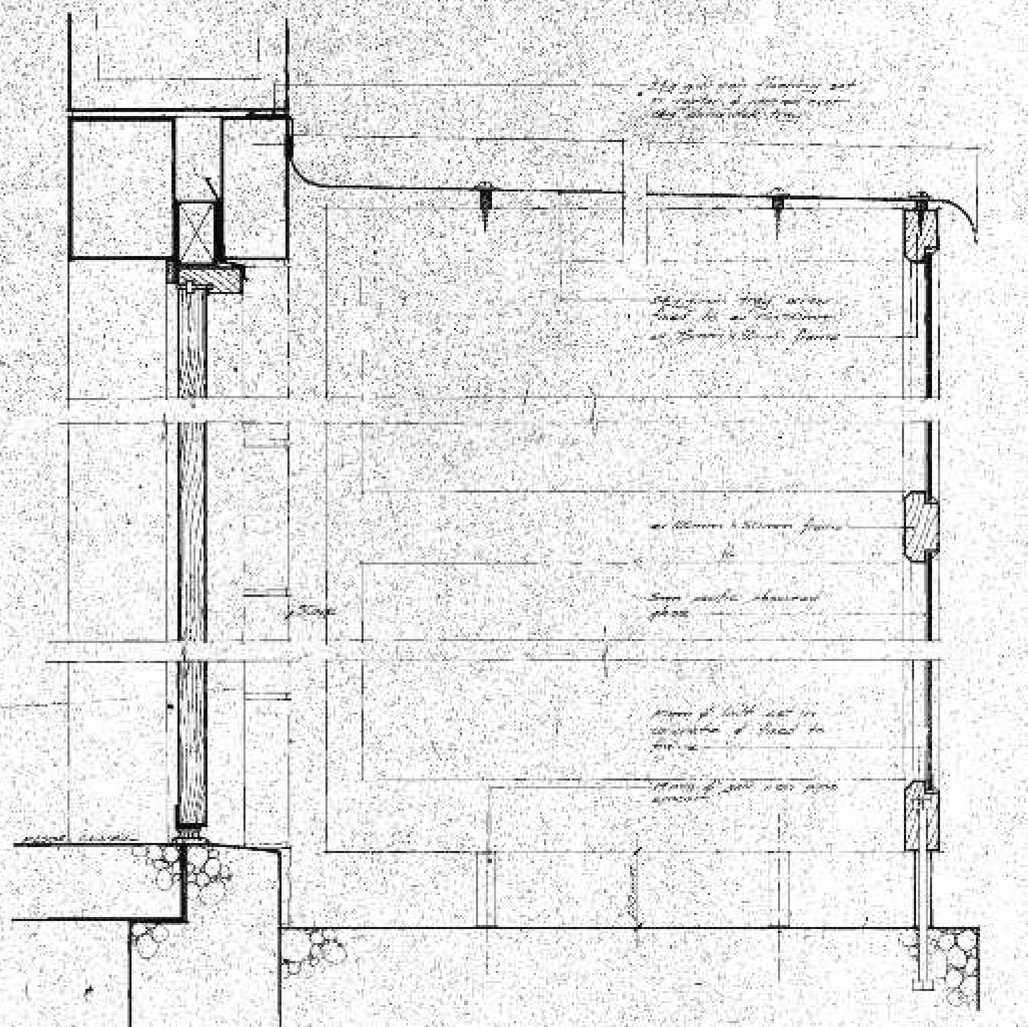


FLOOR PLAN - SINGLE STOREY UNIT
WATER RETICULATION SCALE - 1:50

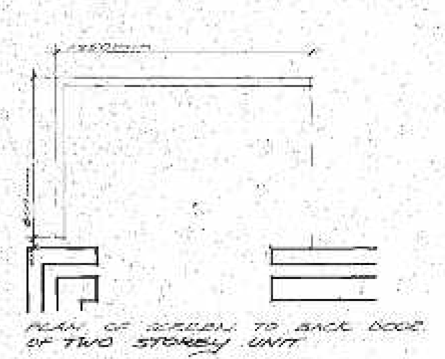
CHRISTCHURCH C.C.
Approved Subject to the Bylaws
3 MAR 1977
For City Engineer

CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	SHEET TITLE	REFERENCE / SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING - BRISTOL ST. - ST ALBANS	1:50	DSN DRN TCD CKD	SEWAGE & STORMWATER WATER RETICULATION	JCB FILE CONT **13**
CITY ENGINEER'S DEPARTMENT			DATE		CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK	OF

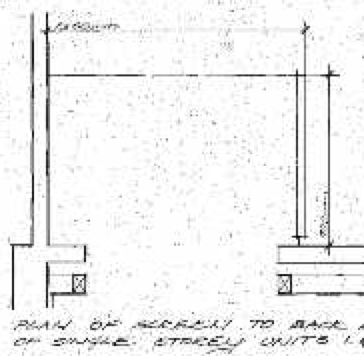




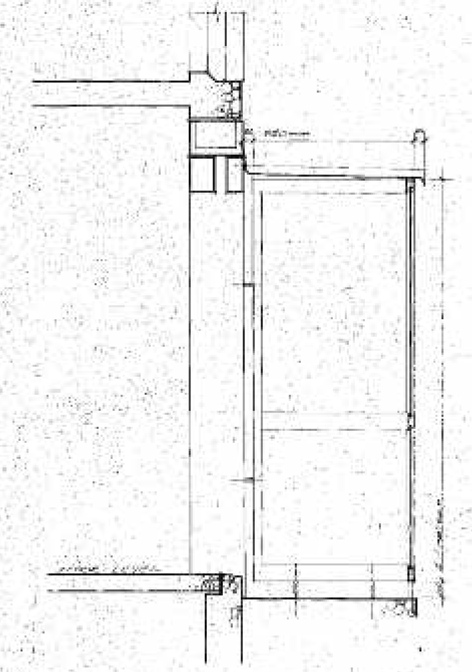
TYPICAL VERTICAL SECTION THROUGH SCREEN · SCALE - 1:5



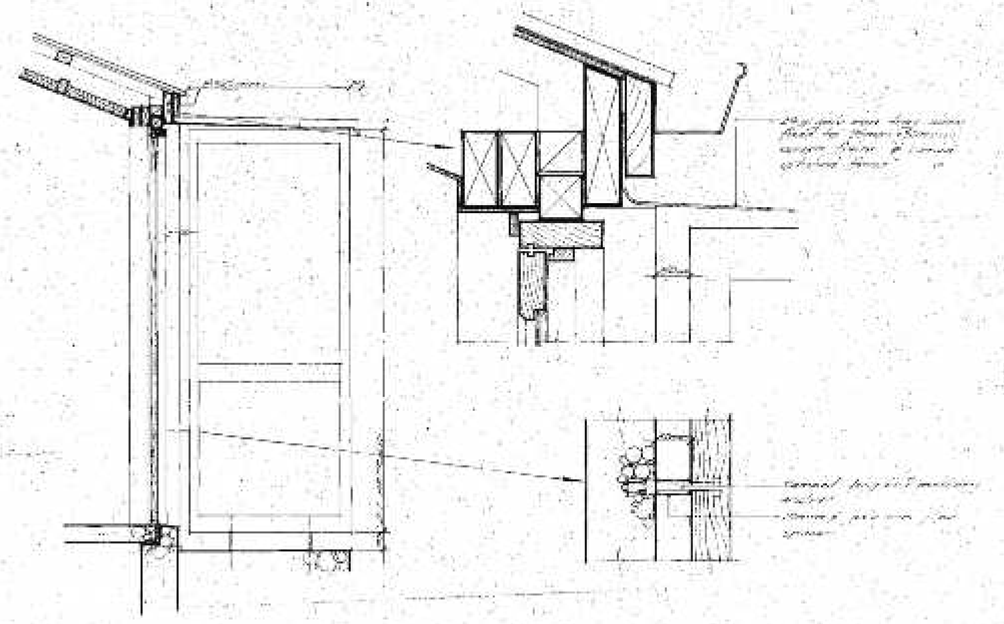
PLAN OF SCREEN TO BACK DOOR OF TWO STOREY UNIT
·SCALE - 1:20



PLAN OF SCREEN TO BACK DOOR OF SINGLE STOREY UNITS 1 & 2.
·SCALE - 1:20



VERTICAL SECTION THROUGH SCREEN DOUBLE STOREY UNIT

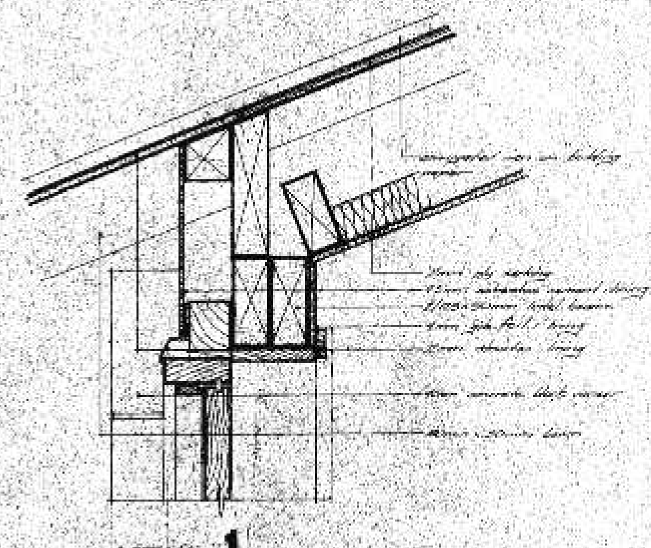


VERTICAL SECTION THROUGH SCREEN SINGLE STOREY UNIT

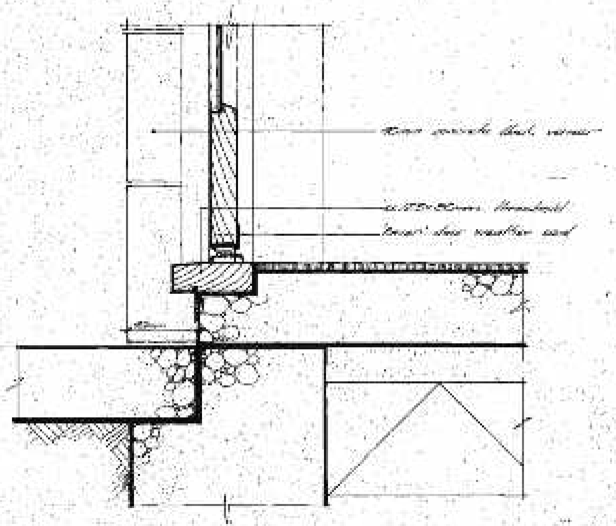
CONTRACT Nº 14 ONLY CONTRACT Nº 15 ONLY

CHRISTCHURCH C.C.
Approved Subject to the By-Laws
3 MAR 1977
for City Engineer

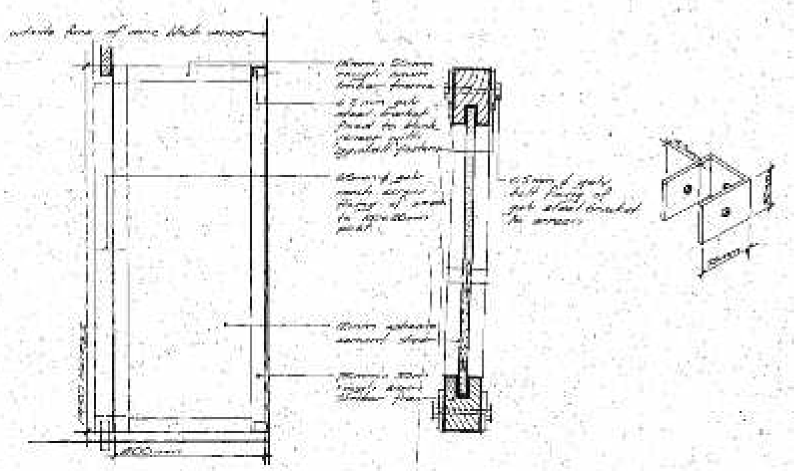
CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING · BRISTOL STREET · ST ALBANS	1:5 1:20	DSN DRN TCD CKD		SCREEN DETAILS	JOB FILE CONT	14
CITY ENGINEER'S DEPARTMENT			DATE		CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK			OF



DETAIL 1 SCALE 1:15

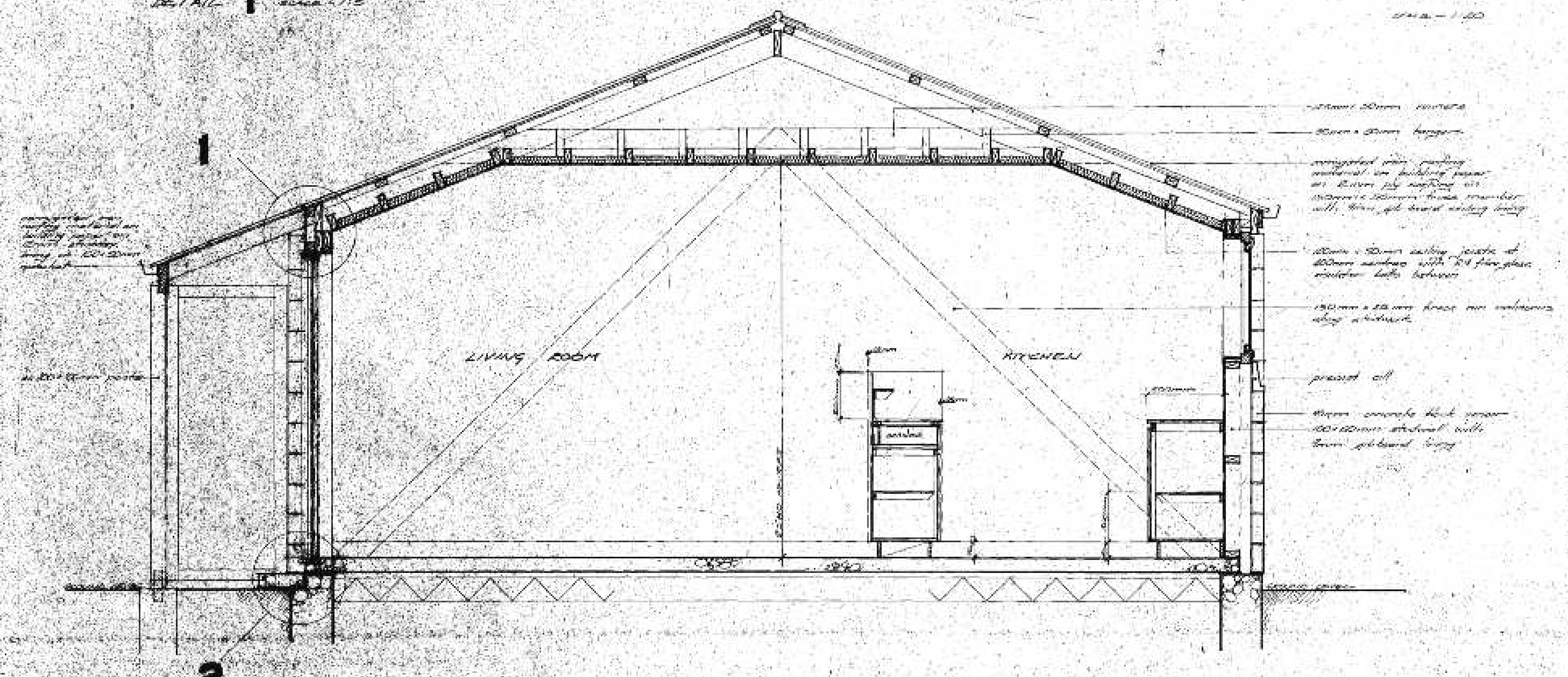


DETAIL 2 SCALE 1:15



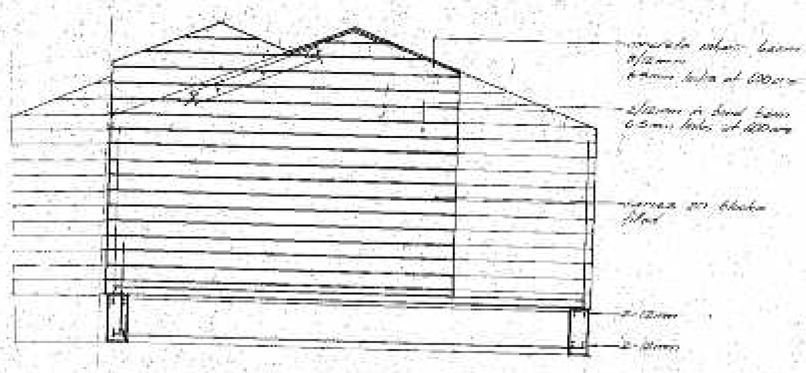
ELEVATION OF SCREEN SCALE — 1:20

VERTICAL SECTION THROUGH SCREEN SCALE 1:15



TYPICAL CROSS SECTION THROUGH SINGLE STOREY UNIT

SCALE — 1:20



ELEVATION OF FIREWALL BETWEEN SINGLE STOREY UNITS SCALE 1:50

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
3 MAR 1977
For City Engineer

CONTRACT Nº15 ONLY

CITY ARCHITECT'S DIVISION
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING : BRISTOL STREET ST. ALBS

SCALES 1:20 1:15 1:50
DESIGN
DRN
CKD
DATE

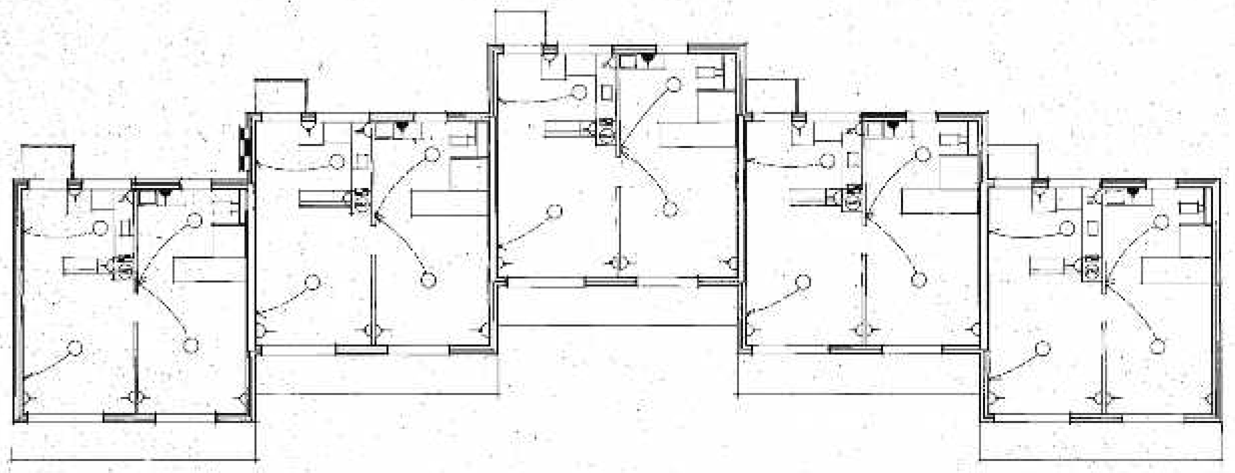
AMENDMENTS

SHEET TITLE
CROSS SECTION - SINGLE STOREY UNITS: SCREEN DETAILS FIREWALL DETAILS

REFERENCE JOB FILE CONT

SHEET 15 OF

CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



SINGLE STOREY ELECTRICAL LAYOUT · SCALE – 1:100

LEGEND

▲	PERMANENT CONNECTION
⏊	SWITCH SOCKET OUTLET
⏊	DOUBLE SWITCH SOCKET OUTLET
╲	LIGHT SWITCH
▬	DISTRIBUTION BOARD
▬	MAIN SWITCH BOARD
○	INCANDESCENT LIGHT FITTING
⊗	HOT WATER CYLINDER

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-Laws
3 MAR 1977
For City Engineer

CONTRACT Nº15 ONLY

CITY ARCHITECT'S DIVISION
CHRISTCHURCH CITY COUNCIL
CITY ENGINEER'S DEPARTMENT

CONSULTANT

ELDERLY PERSONS HOUSING · BRISTOL STREET · ST ALBANS

SCALES 1:100
DATE

DESIGN
DSN K/FA
DRN
TCD
CKD

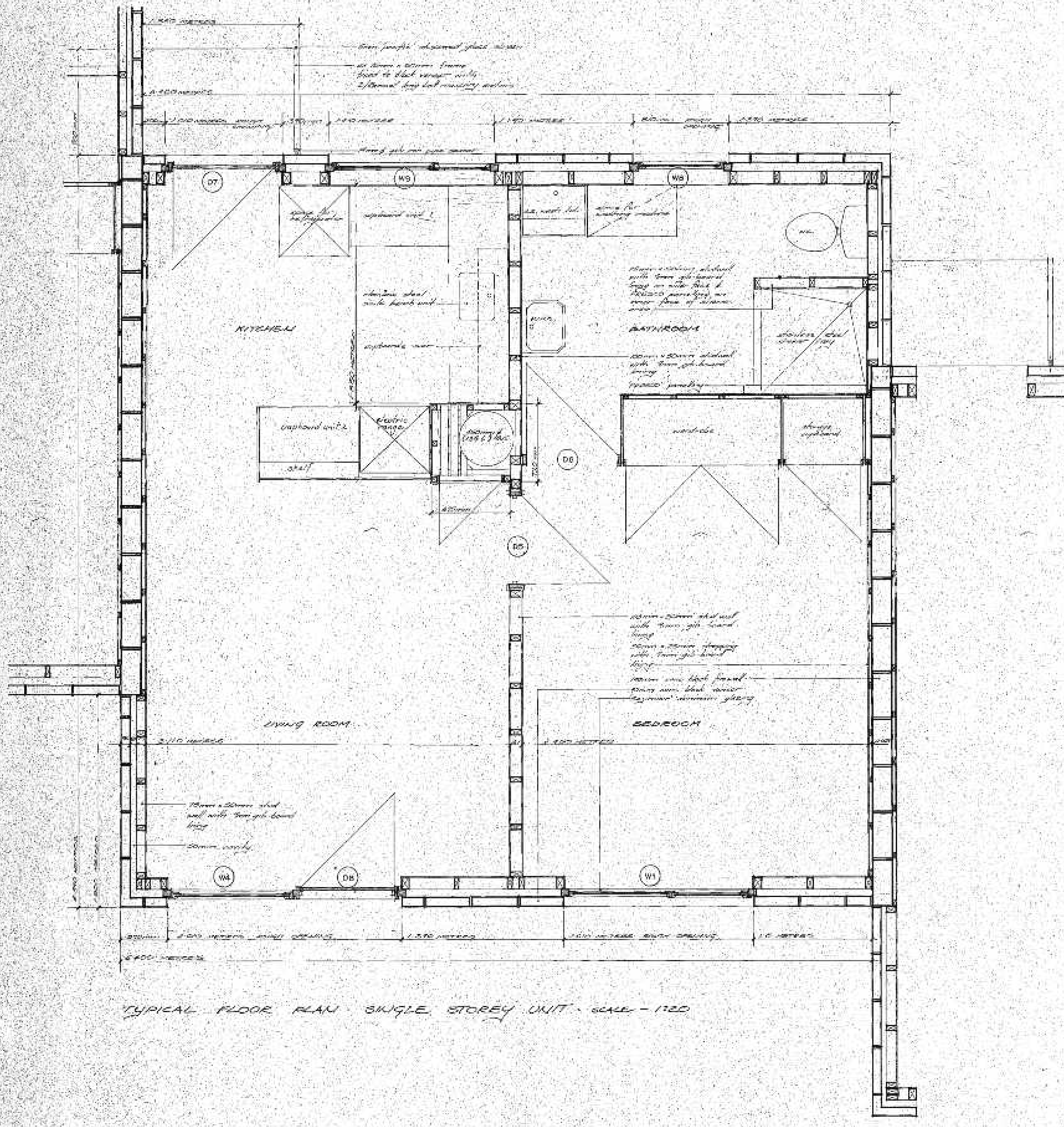
AMENDMENTS

SHEET TITLE
SINGLE STOREY ELECTRICAL LAYOUT

REFERENCE
JOB
FILE
CONT

SHEET
16
OF

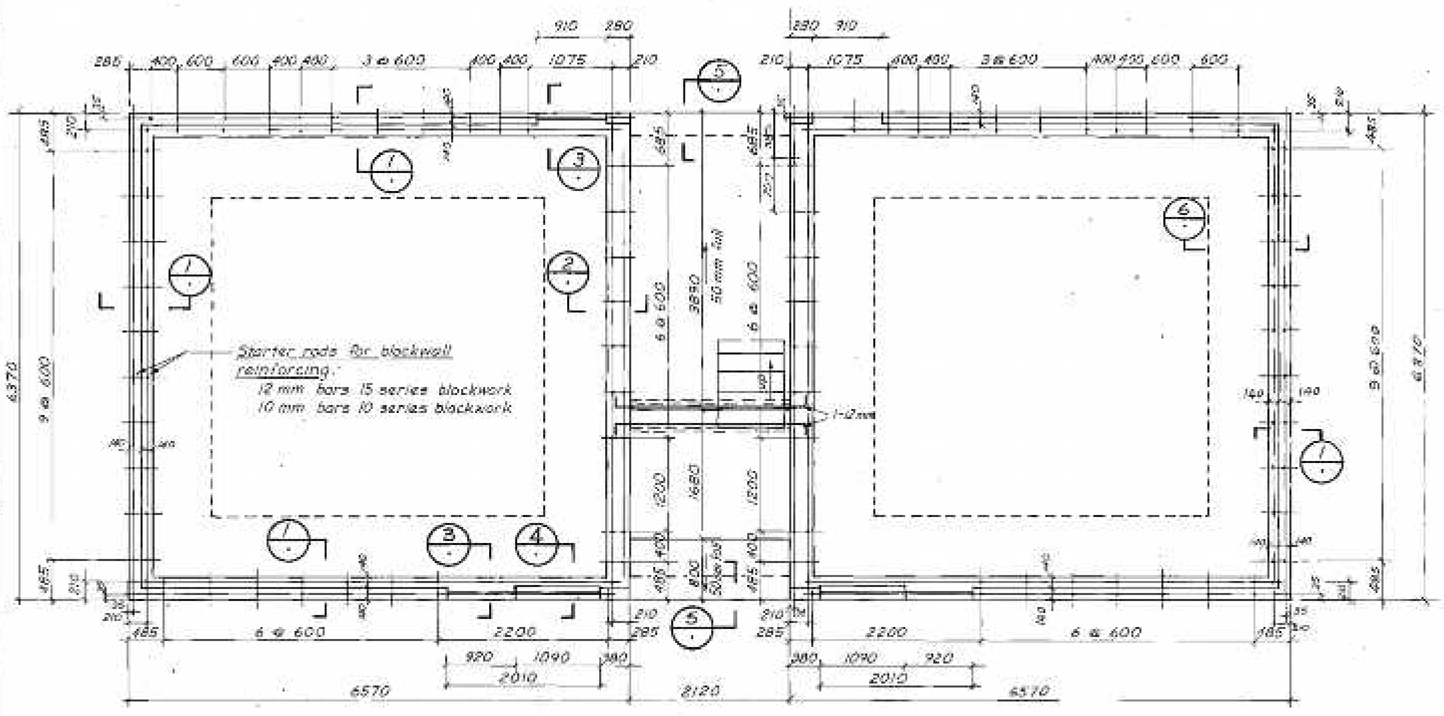
CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK



TYPICAL FLOOR PLAN SINGLE STOREY UNIT · SCALE – 1:20

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-laws
3 MAR 1977
For City Engineer

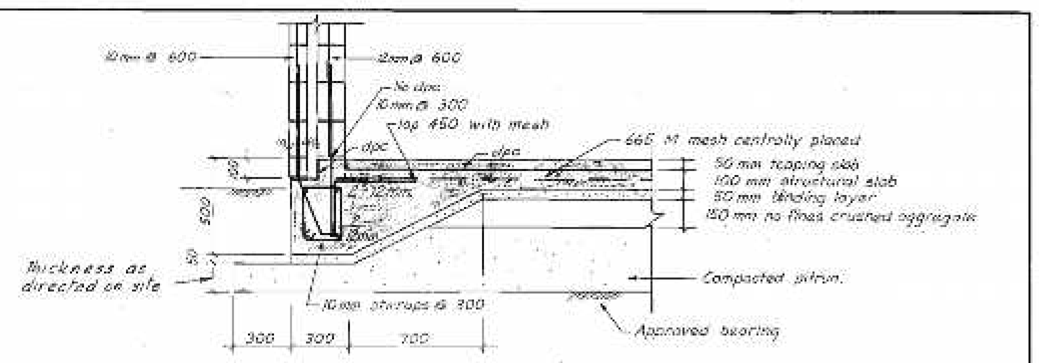
CITY ARCHITECT'S DIVISION	CONSULTANT		SCALES	DESIGN	AMENDMENTS	SHEET TITLE	REFERENCE	SHEET
CHRISTCHURCH CITY COUNCIL		ELDERLY PERSONS HOUSING BRISTOL STREET ST ALBANS	1:20	DSN DRN TCD CKD		FLOOR PLAN SINGLE STOREY UNIT	JOB FILE CONT	17
CITY ENGINEER'S DEPARTMENT			DATE		CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK			OF



FOUNDATION PLAN – UNITS 6 & 8

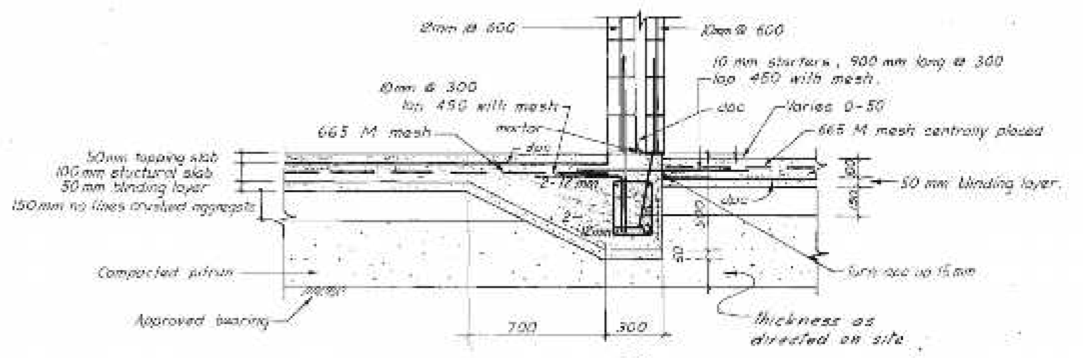
Scale 1:50

Note: Starter bar location for blockwork reinforcing shown as dots on above plan



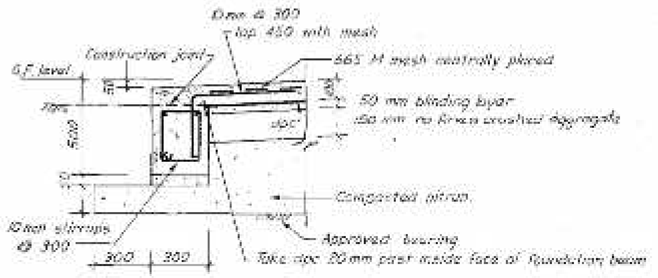
SECTION ①

Scale 1:20



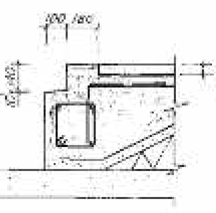
SECTION ②

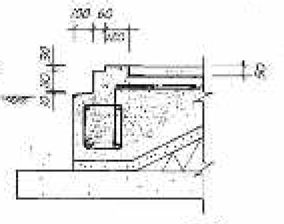
Scale 1:20



SECTION ⑤

Scale 1:20

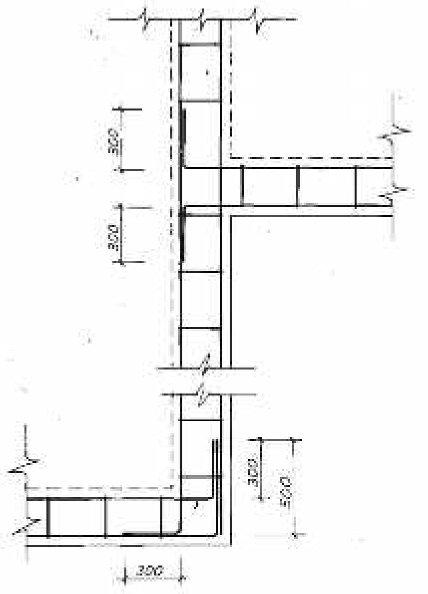




SECTION ③ SECTION ④

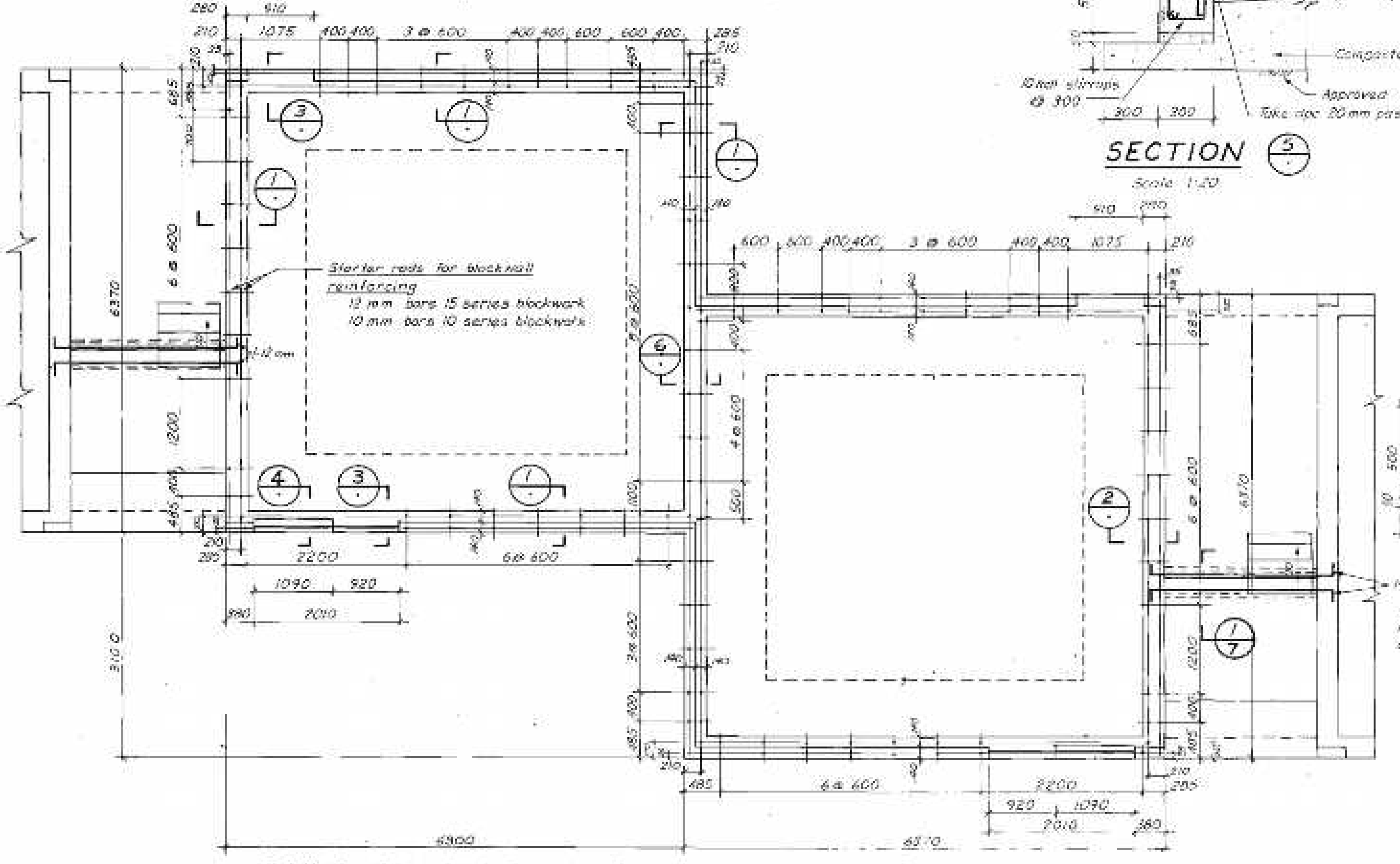
For all other details & dimensions refer to section ②

Scale 1:20



TYPICAL FOUNDATION WALL INTERSECTIONS

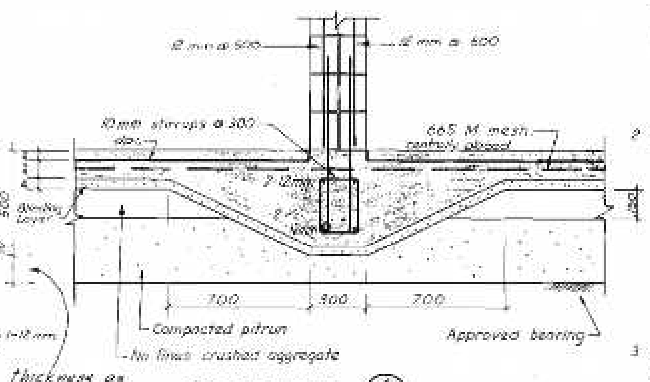
Scale 1:20



PART FOUNDATION PLAN – UNITS 10 – 24

Scale 1:50

Note – Starter bar locations for blockwork reinforcing shown as dots on above plan



SECTION ⑥

Scale 1:20

Notes:

1. Concrete
   - (a) All concrete f'c = 20 MPa at 28 days
   - (b) Cover to foundation beam stirrups – 50 mm top and side, 75 mm bottom
2. Reinforcing
   - (a) All bars except stirrups & ties to be deformed Grade 275.
   - (b) Stirrups & ties to be plain Grade 275.
   - (c) Reinforcing to be continuous throughout. Laps in reinforced concrete shall be:
     10 mm = 350 mm
     12 mm = 400 mm
     mesh = 300 mm
     unless specifically shown otherwise
     – see sheet 5 for laps in blockwork
3. Refer to Architects drawings for details of bolts, inserts, chases etc to be cast into or formed in concrete.
4. All dimensions are in mm unless specifically shown otherwise.
5. All starter bars to have 75 mm bobs at the lower ends.

CONTRACT Nº 14 ONLY

CHRISTCHURCH CITY COUNCIL
Approved subject to the By-laws
– 3 MAR 1977
Per City Engineer

METRIC

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

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

		Date
Designed	S.R. Smith	4/76
Drawn	A.E. Bainbridge	4/76
Traced	B. J. Hargreaves	6/76
Dwg. Chk.	B. Jennings	5/76
Des. Chk.		
Released		

Approved
Design Engineer. 23.6.76
B.D. Forbes
for City Engineer

CHRISTCHURCH CITY COUNCIL – CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING – BRISTOL STREET – FOUNDATION PLAN & DETAILS

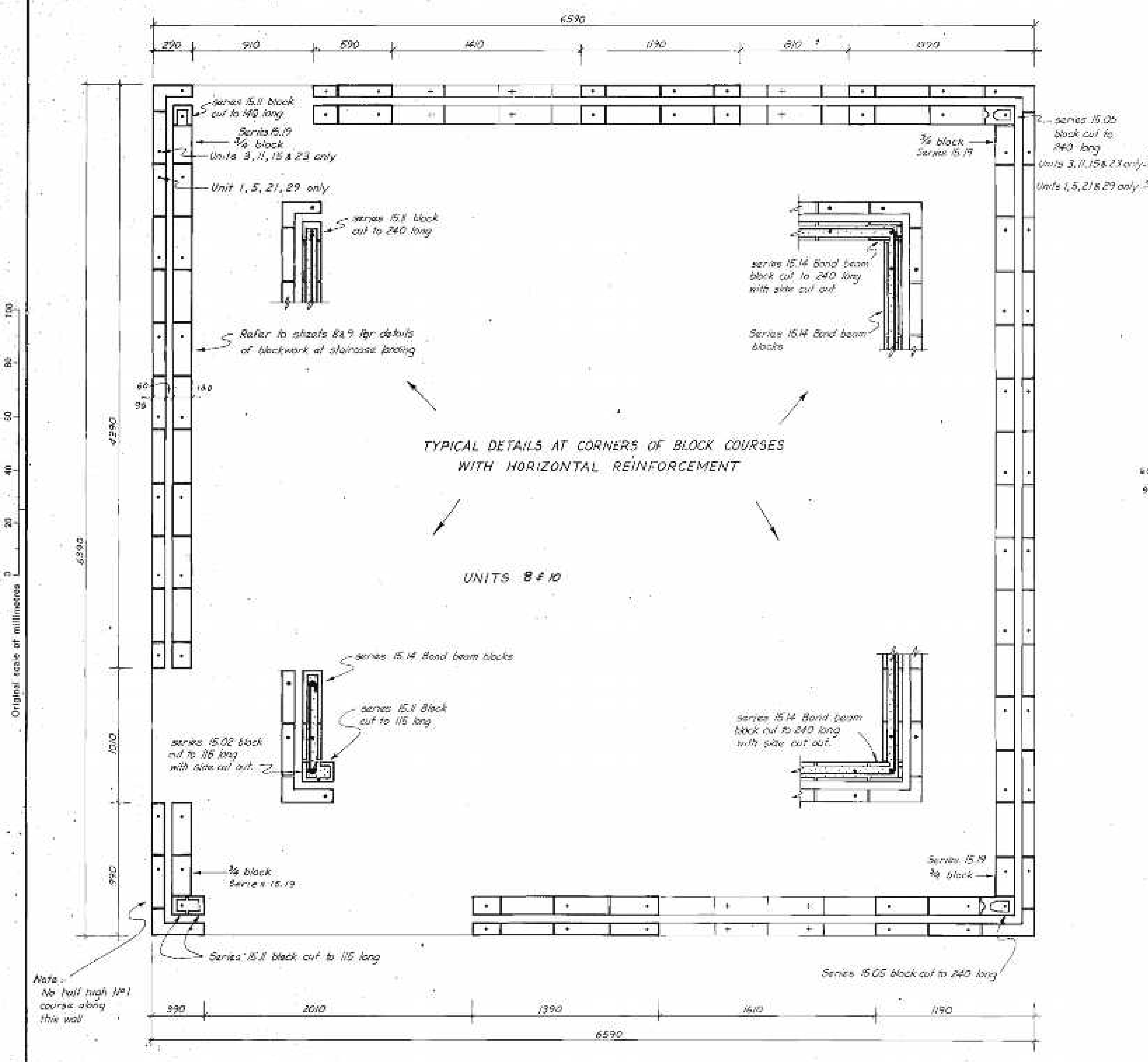
Scales 1:50 1:20

File No. 50/18/1/23

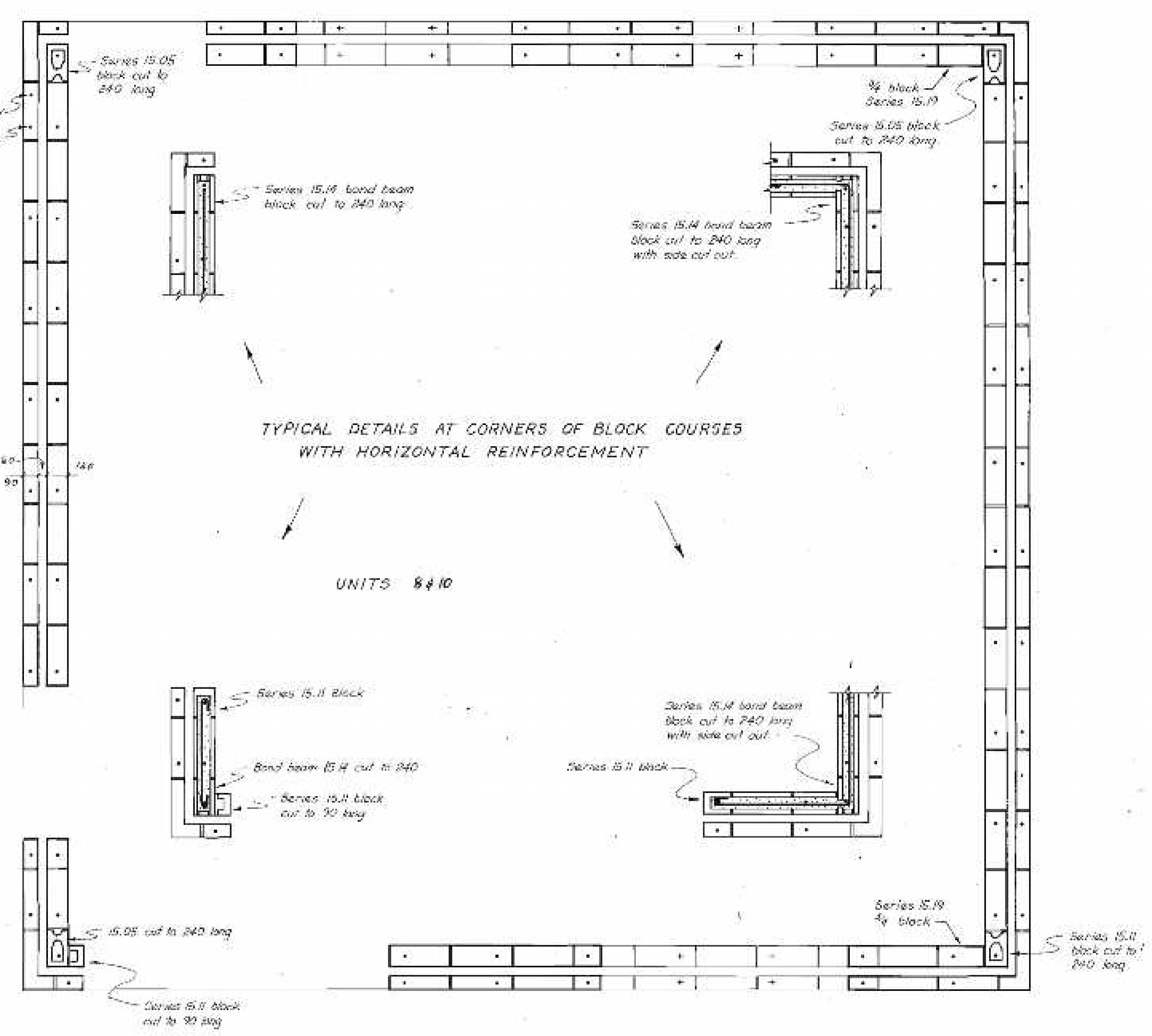
Issue

D.2022

Sheet 1 of 7



Block Courses Nº 1 (half high) 3.5.7.9 & 11



Notes:- Refer to notes on sheets 1, 5 & 6

Block Courses Nº 2.4.6.8.10 & 12

Units 8 & 10 as drawn
Units 6 & 24 opposite hand

CONTRACT Nº 14 ONLY

CHRISTCHURCH CITY [illegible]
Approved subject to the By-Law
3 MAR 1977
for City Engineer

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

	Book	Page	Initials	Date
Surveyed				
Levelled				

B.M.
Corrected from

		Date
Designed	S.D. Booth	4/76
Drawn	B.J. Jorgensen	4/76
Traced	B.J. Jorgensen	4/76
Dsg. Chk.	S.D. Booth	6/76
Qus. Chk.		
Issued		

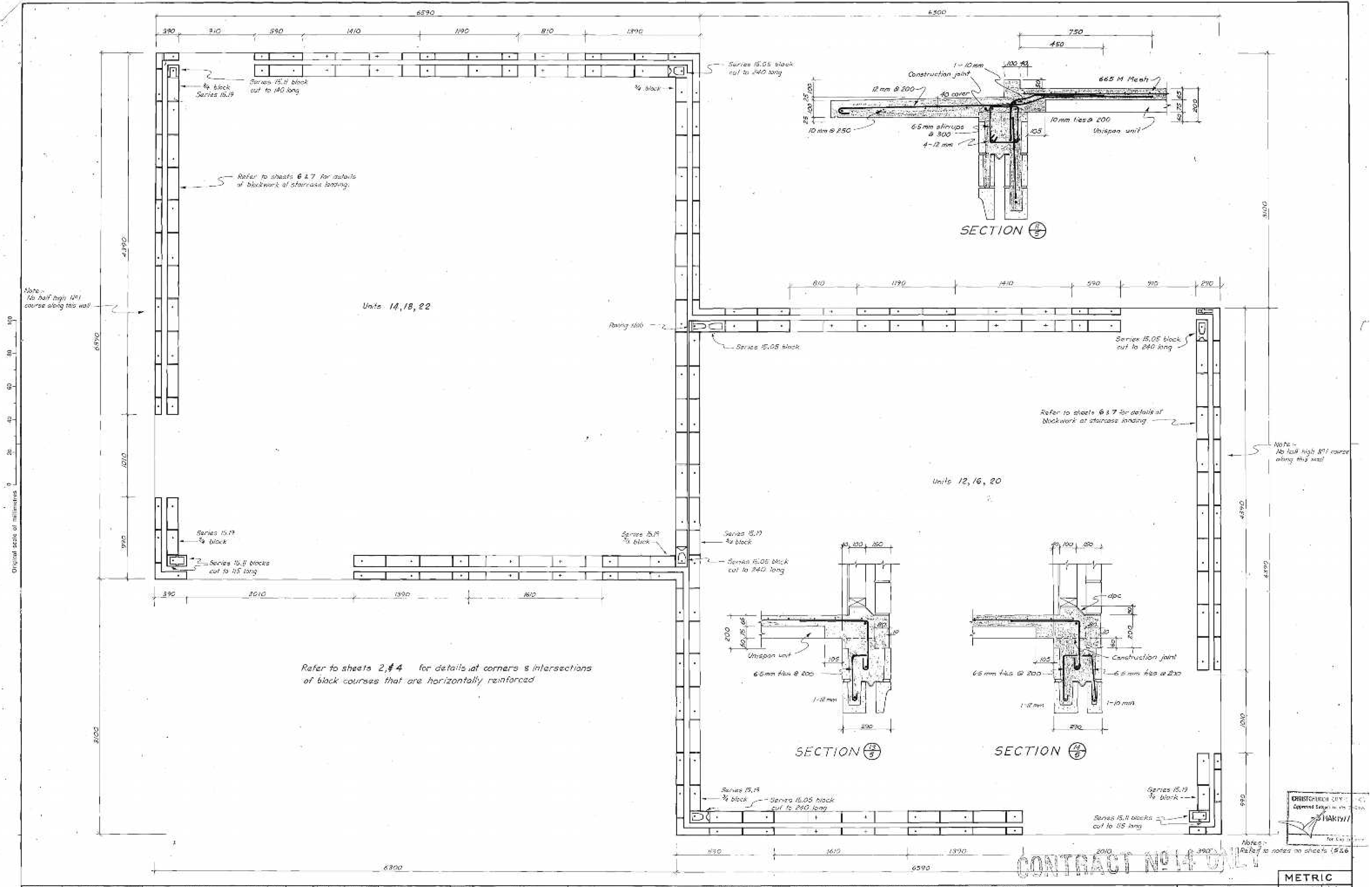
Approved
23.6.76
Design Engineer Date
B.W. Forbes
for City Engineer

CHRISTCHURCH CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING — BRISTOL STREET —
Block Course Details — Units 6, 8, 10, 24

Scales 1:20

METRIC
File No. 80/18/1/28
Issue
D.2022
Sheet 2 of 7



CONTRACT Nº 14 ONLY

CHRISTCHURCH CITY COUNCIL
Approved Subject to the ... Conditions
3 MAR 1977
for City Engineer

Services	Initials	Service	Initials	Amendments	Initials	Date		Book	Page	Initials	Date			Date	Approved
H.P. Water		Lands & Survey					Surveyed					Designed	S.G. Smith	4/76	23.6.74 Design Engineer Date
Sewer		Planning					Levelled					Drawn	B.J. Jagersma	4/76	
S.W. Drainage							B.M.					Traced	B.J. Jagersma	4/76	
Gas												Dsg. Chk.	S.G. Smith	5/76	for City Engineer
Cables (M.E.D.)							Checked from					Dwr. Chk.			
P.O.												Altered			

CHRISTCHURCH CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING — BRISTOL STREET —
Block Courses Nº 1 (half high) 3, 5, 7, 9 & 11 — Units 12,14,16,18,20,22

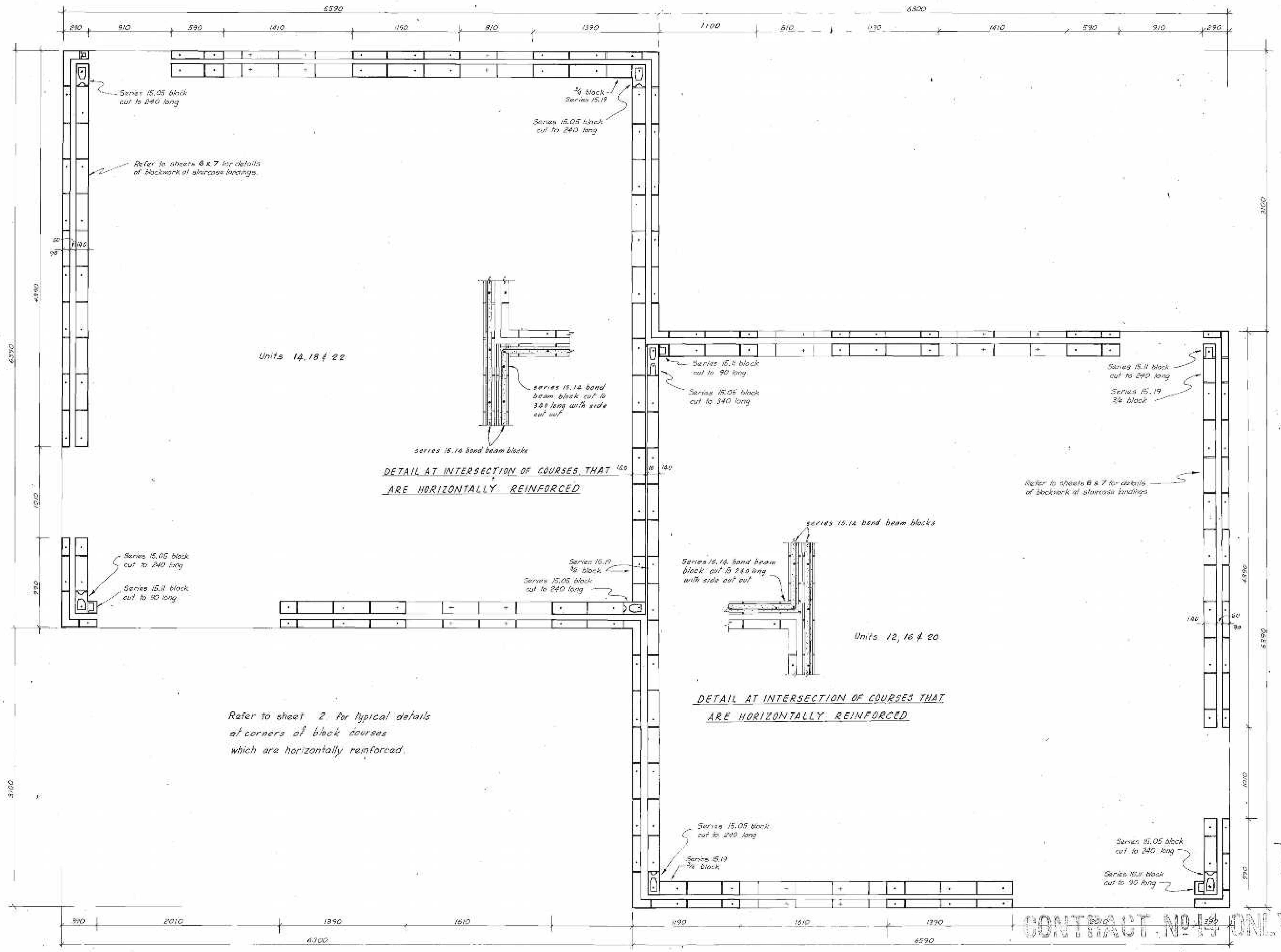
Scale 1:20

METRIC

File No. 611/18/1/23

D.2022

Sheet 5 of 7



CONTRACT No 14 ONLY

CHRISTCHURCH CITY COUNCIL
Approved Subject to the By-laws
3 MAR 1977
for City Engineer

Notes –
Refer to notes on Sheets 1, 5 & 6

METRIC

CHRISTCHURCH CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING – BRISTOL STREET –
Block Courses Nº 2, 4, 6, 8, 10 & 12 – Units 12, 14, 16, 18, 20, 22.

Scale 1:20

File No. 80/18/1/23

D.2022

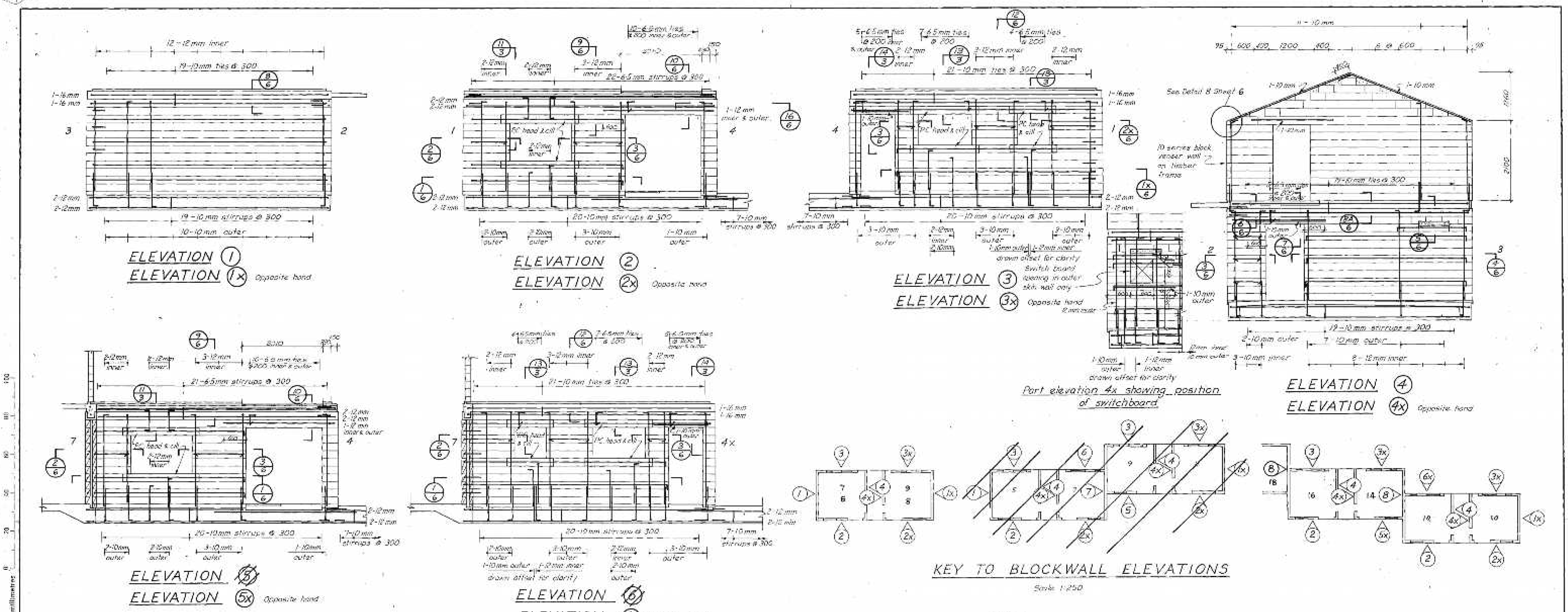
Sheet 4 of 7

Service	Initials	Service	Initials
H.P. Water		Land & Survey	
Sewer		Planning	
S.W. Drainage			
Gas			
Cables (N.Z.P.O.)			
7.01			

Designed	S.G. Smith	4/76
Drawn	B.J. Jogerson	4/76
Traced	B.J. Jogerson	4/76
Plan Chk.	S.G. Smith	5/76

Approved 23.6.76 Design Engineer

B.E. Forbes for City Engineer



ELEVATION ①
ELEVATION ①x Opposite hand

ELEVATION ②
ELEVATION ②x Opposite hand

ELEVATION ③
ELEVATION ③x Opposite hand

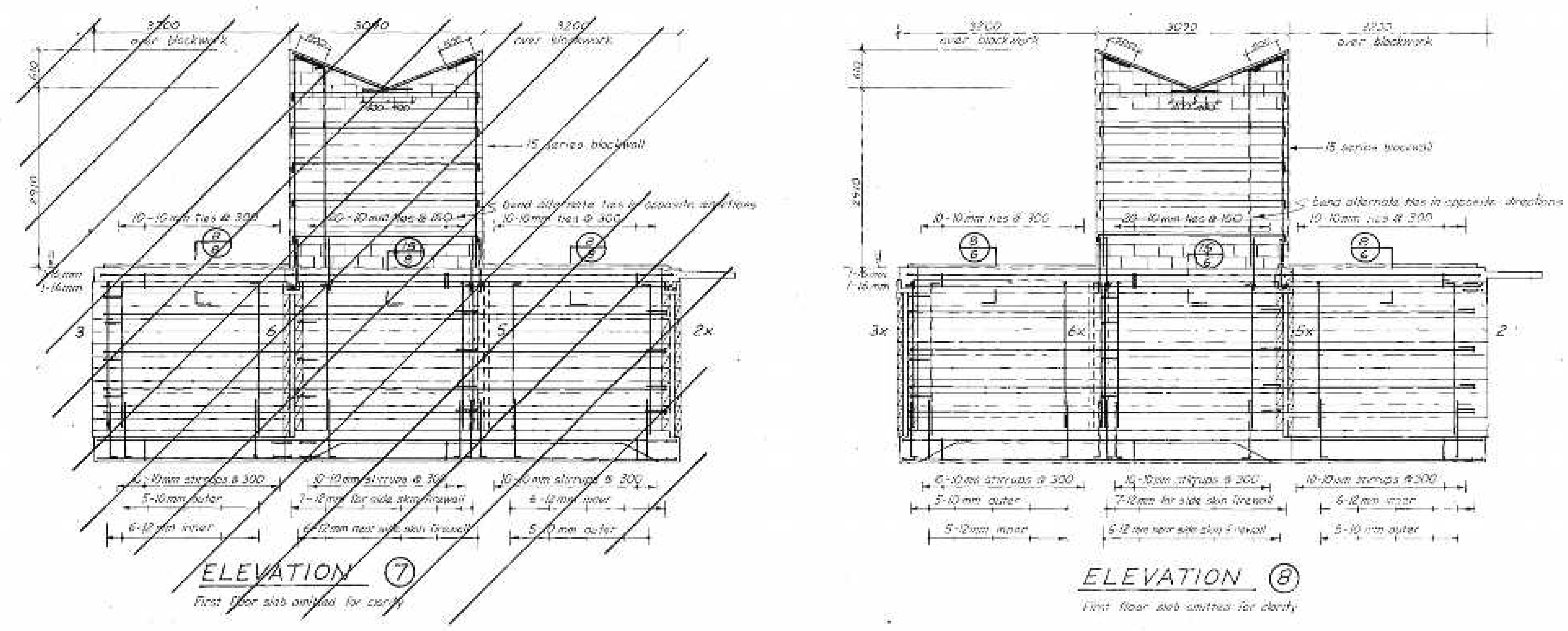
ELEVATION ④
ELEVATION ④x Opposite hand

ELEVATION ⑤
ELEVATION ⑤x Opposite hand

ELEVATION ⑥
ELEVATION ⑥x Opposite hand

KEY TO BLOCKWALL ELEVATIONS

Scale 1:250



ELEVATION ⑦

First floor slab omitted for clarity

ELEVATION ⑧

First floor slab omitted for clarity

Notes:-

1. Blockwork
- (a) Ground floor walls. Outer skin 10 series blocks
  - Inner skin 15 series blocks
  - Firewall 2 skins 15 series blocks
- (b) First floor walls Block veneer 10 series blocks
  - Firewall 15 series blocks
- (c) Provide clean out openings in blockwalls as specified.
- (d) All block cores, except cores in 10 series blockwork not containing reinforcing, to be filled with grout.

2. Reinforcing
- (a) All bars in 10 series blockwork to be 10 mm diameter unless stated otherwise.
- (b) All bars in 15 series blockwork to be 12 mm diameter unless stated otherwise.
- (c) All horizontal rods shown are in the outer skin ONLY except where specifically noted as in inner & outer skin.
  Horizontal rods occur in both skins of the firewall.
  Horizontal rods in bond beam are 16mm & 7mm as noted.
- (d) All laps shall be 10mm = 400 mm
  - 12mm = 500 mm
  - 16mm = 650 mm
- (e) Vertical rods in the corners are shown once in one elevation only and are not repeated in adjoining elevations.
- (f) Reinforcing details
  - (i) 90° bends in vertical bars
    bends to be located mid height of block course unless indicated otherwise in the sections on sheet 6 & 7
    75
    30 mm internal radius
  - (ii) 90° Downward bends in horizontal bars
    10 mm internal radius
    200
    Hooks must be tight against vertical bars
  - (iii) 90° Horizontal bends in horizontal bars.
    Bend horizontal bars around vertical bars.
    30 mm internal radius for 12mm bars 40 mm for 16mm bars
    300
    or continuation
  - (iv) 180° hooks in horizontal bars.
    horizontal bar bent around vertical
    vertical bar
    100
    12mm internal radius
    hooks must be tight against vertical rods
- (g) Reinforcing notation
  - (i) ⟷ represents 180° hook as in f(iv) above
  - (ii) ——→ represents 90° bend in reinforcing
- (h) 6.5 mm ties to be hooked around lower longitudinal bars and to have 90° hook x 125 mm long at the upper end
- (i) Refer to sheet 1 for starter bar layout

3. Refer to notes on sheet 1

CHRISTCHURCH CITY COUNCIL
Approved subject to the Act
7 MAR 1977
for City Engineer

CONTRACT Nº14 ONLY

METRIC

Survey	Initials	Studies	Initials	Amendments	Initials	Date
P.F. Ward		Level & Survey				
Sewer		Planning				
S.W. Drainage						
Drs						
Office (M.E.D)						
(T.O.)						

Designed	D. M. Smith	4/76
Drawn	A.E.Bainbridge	4/76
Traced	B.J.Jorgensen	4/76
Desg. Chk.		
Dwg. Chk.		
Artwork		

Design Engineer 23.6.76

B.G. Forbes
for City Engineer

CHRISTCHURCH CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

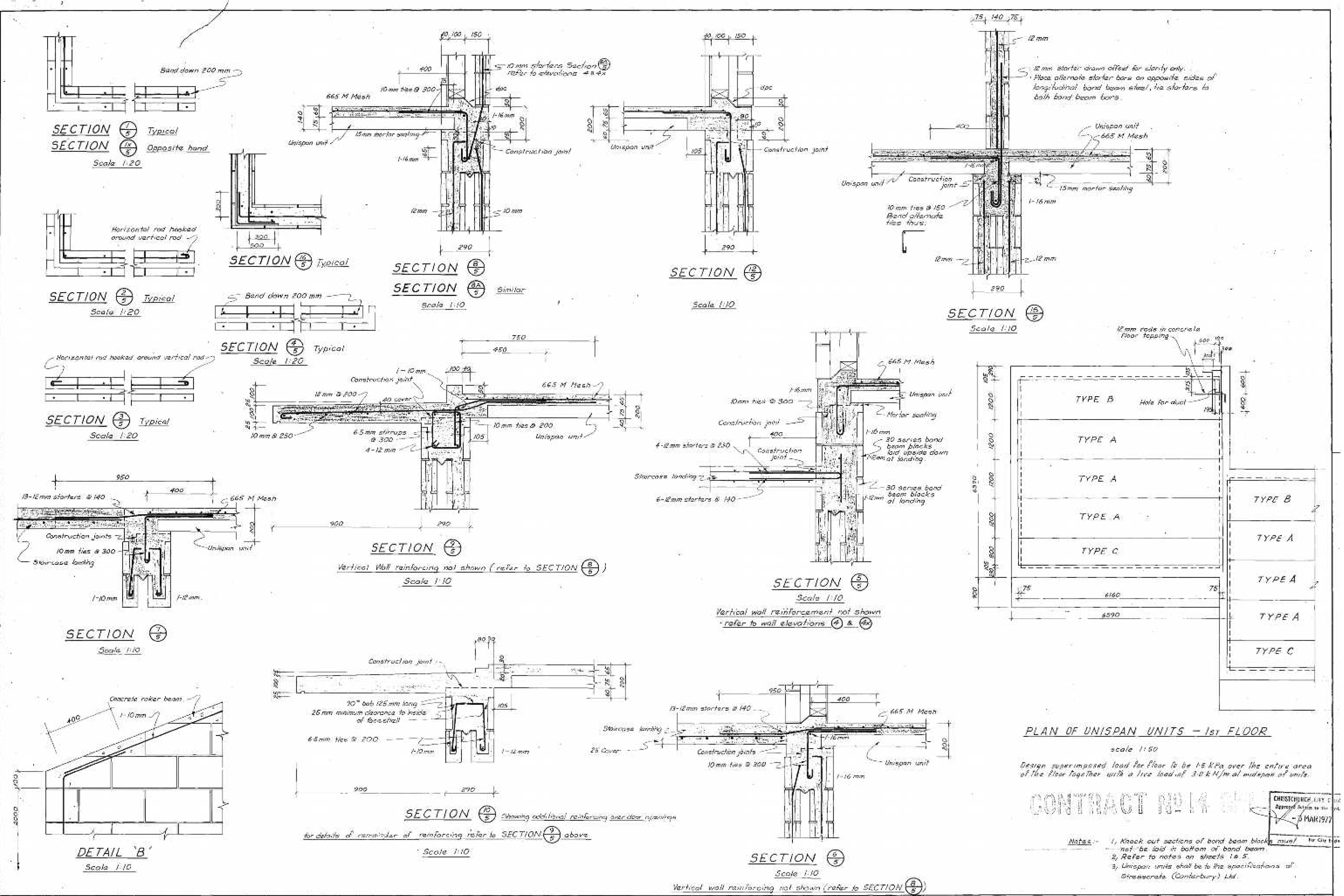
ELDERLY PERSONS HOUSING — BRISTOL STREET — ELEVATIONS OF BLOCKWALLS

Scales 1:50 1:250

File No. 80/18/1/23

D.2022

Sheet 5 of 7



PLAN OF UNISPAN UNITS - 1st FLOOR

scale 1:50

Design superimposed load for floor to be 1.5 KPa over the entire area of the floor together with a live load of 3.0 kN/m at midspan of units.

CONTRACT No 14

CHRISTCHURCH CITY COUNCIL
Approved subject to the ...
- 3 MAR 1977
for City Engr

Notes:-
1, Knock out sections of bond beam blocks must not be laid in bottom of bond beam.
2, Refer to notes on sheets 1 & 5.
3, Unispan units shall be to the specifications of Stresscrete (Canterbury) Ltd.

CHRISTCHURCH CITY COUNCIL - CITY ENGINEER'S DEPARTMENT

ELDERLY PERSONS HOUSING - BRISTOL STREET - BLOCKWORK DETAILS - 1ST FLOOR PLAN

Scale 1:10 1:20 1:50

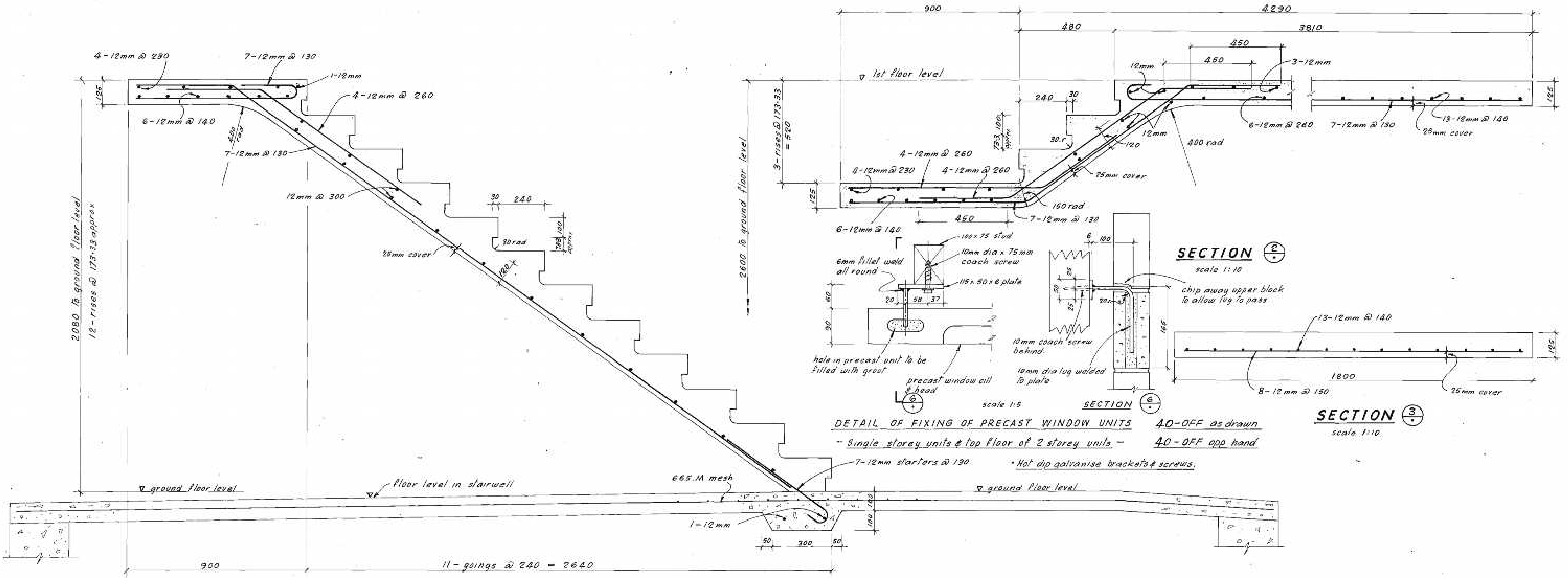
File No 80/18/1/29

D.2022

Sheet 6 of 7

Designed S.D.Smith 4/76
Drawn A.E.Bainbridge 4/76
Traced
Data Chk S.D.Smith 5/76

Design Engineer 11.6.76
for City Engineer



SECTION ①

scale 1:10

SECTION ②

scale 1:10

scale 1:5

SECTION ⑥

DETAIL OF FIXING OF PRECAST WINDOW UNITS

– Single storey units & top floor of 2 storey units –

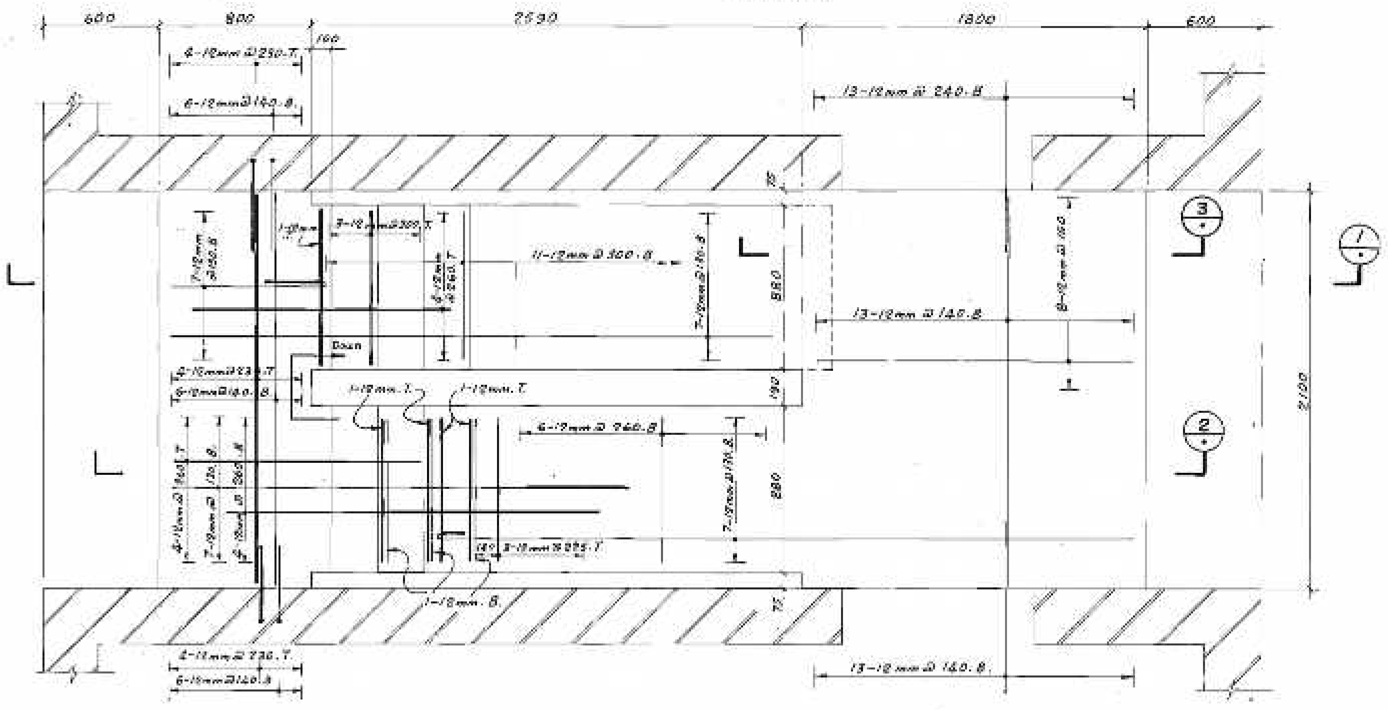
40-OFF as drawn

40-OFF opp hand

• Hot dip galvanise brackets & screws.

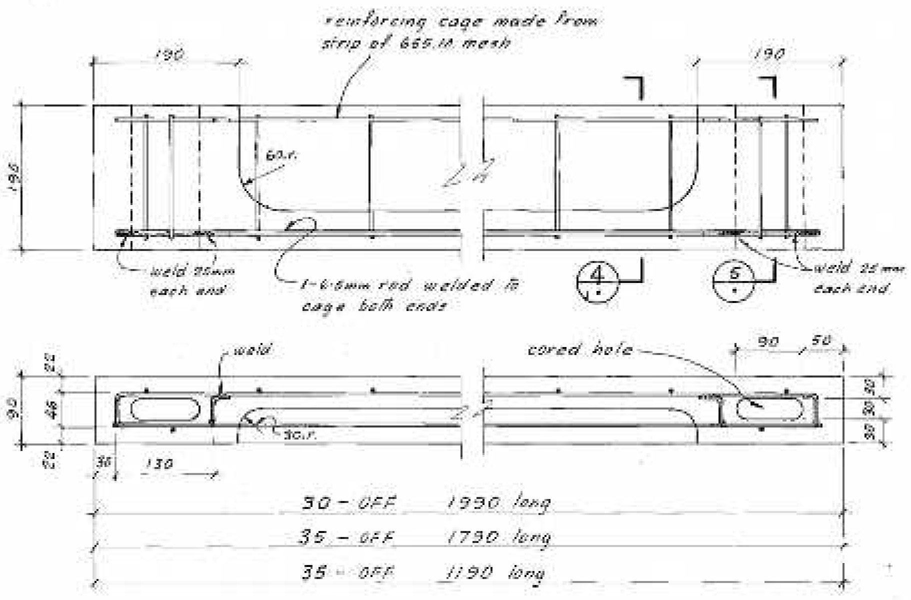
SECTION ③

scale 1:10



PLAN OF 1st FLOOR LANDING

scale 1:20



DETAIL OF PRE-CAST CONCRETE HEAD & CILL

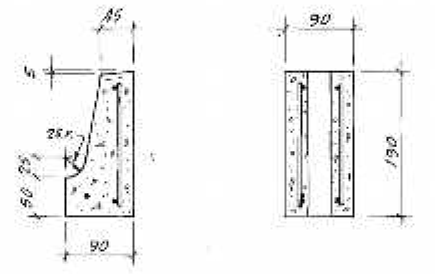
scale 1:5

Dimension Tolerances.

length ± 3mm

all other dimensions ± 1·5mm

Note: All reinforcing in precast heads & cills to be hot dipped galvanised.



SECTION ④ SECTION ⑤

Notes:

1. Reinforcing notation

T	Denotes top bar
B	Denotes bottom bar
━━━	Denotes top bar
───	Denotes bottom bar
━━─	Denotes bar changing from top to bottom

2. Refer to sheets 5 & 6
3. Refer to notes on sheet .1.
4. Refer to Architects drawings for details of handrail etc.

CHRISTCHURCH CITY COUNCIL
Approved subject to the Bylaws
3 MAR 1977
for City Engineer

CHRISTCHURCH CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

Designed	S.D. Smith	5/76	Design Engineer
Drawn	A.E. Bainbridge	5/76	
Traced			
Des. Chk.	S.D. Smith	6/76	for City Engineer
Drg. Chk.			

ELDERLY PERSONS HOUSING – BRISTOL STREET –
DETAILS OF CONCRETE STAIRCASE

Scales 1:10 1:20

File No. 8U/18/1/23

D.2022

Sheet 7 of 7

Appendix C

CERA DEE Summary Data

Detailed Engineering Evaluation Summary Data

V1.11

Location

Building Name: Block A
Unit No: Street
Building Address: 40 Bristol St, St Albans
Legal Description: Pickering Courts
Degrees Min Sec
GPS south:
GPS east:
Building Unique Identifier (CCC): PRO 0611-001

Reviewer: David Whittaker
CPEng No: 123089
Company: Beca
Company project number: 5323355
Company phone number: 643663521
Date of submission:
Inspection Date: 13/12/2012
Revision:
Is there a full report with this summary? yes

Site

Site slope: flat
Soil type:
Site Class (to NZS1170.5): D
Proximity to waterway (m, if <100m):
Proximity to clifftop (m, if < 100m):
Proximity to cliff base (m,if <100m):

Max retaining height (m):
Soil Profile (if available): Unknown.
If Ground improvement on site, describe:
Approx site elevation (m):

Building

No. of storeys above ground: 1 single storey = 1
Ground floor split? no
Storeys below ground 0
Foundation type: raft slab
Building height (m): 3.40
Floor footprint area (approx): 210
Age of Building (years): 34

Ground floor elevation (Absolute) (m):
Ground floor elevation above ground (m):
if Foundation type is other, describe:
height from ground to level of uppermost seismic mass (for IEP only) (m): 2.5
Date of design: 1965-1976

Strengthening present? no
Use (ground floor): multi-unit residential
Use (upper floors):
Use notes (if required):
Importance level (to NZS1170.5): IL2

If so, when (year)?
And what load level (%g)?
Brief strengthening description:

Gravity Structure

Gravity System: load bearing walls
Roof: timber framed
Floors: concrete flat slab
Beams:
Columns:
Walls: fully filled concrete masonry

rafter type, purlin type and cladding timber rafters, timber battens, ply sarking, corrugated iron cladding.
slab thickness (mm) 150
#N/A

Lateral load resisting structure

Lateral system along: lightweight timber framed walls
Ductility assumed, μ: 2.00
Period along: 0.40 0.00
Total deflection (ULS) (mm):
maximum interstorey deflection (ULS) (mm):

Note: Define along and across in detailed report!

note typical wall length (m) 32
estimate or calculation? estimated
estimate or calculation?
estimate or calculation?

Lateral system across: fully filled CMU
Ductility assumed, μ: 1.25
Period across: 0.40 ##### enter height above at H31
Total deflection (ULS) (mm):
maximum interstorey deflection (ULS) (mm):

note total length of wall at ground (m): 6.6
estimate or calculation? estimated
estimate or calculation?
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 Exposed masonry across and block veneer along.
Roof Cladding: Metal describe Corrugated iron.
Glazing: aluminium frames
Ceilings: fibrous plaster, fixed 9mm gib board.
Services(list):

Available documentation

Architectural partial original designer name/date Christchurch City Council, 1976.
Structural partial original designer name/date Christchurch City Council, 1976.
Mechanical none original designer name/date
Electrical none original designer name/date
Geotech report none original designer name/date

Damage

Site:
(refer DEE Table 4-2)

Site performance: Good
Describe damage: Minor cracking of linings and mortar.

Settlement: none observed notes (if applicable):
Differential settlement: 0-1:350 notes (if applicable): Possibly, not visible to naked eye.
Liquefaction: none apparent notes (if applicable):
Lateral Spread: none apparent notes (if applicable):
Differential lateral spread: none apparent notes (if applicable):
Ground cracks: none apparent notes (if applicable):
Damage to area: slight notes (if applicable):

Building:

Current Placard Status: green

Along Damage ratio: 0%
Describe (summary): Minor structural damage.
Describe how damage ratio arrived at: Minor structural damage.

Across Damage ratio: 0%
Describe (summary): Minor structural damage.

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

Diaphragms Damage?: no Describe:
CSWs: Damage?: no Describe:
Pounding: Damage?: no Describe:
Non-structural: Damage?: no Describe:

Recommendations

Level of repair/strengthening required: minor structural Describe: Repair cracks in linings and mortar.
Building Consent required: no Describe:
Interim occupancy recommendations: full occupancy Describe:

Along Assessed %NBS before e'quakes: 50% 50% %NBS from IEP below
Assessed %NBS after e'quakes: 50%

If IEP not used, please detail assessment methodology:

Across Assessed %NBS before e'quakes: 50% 50% %NBS from IEP below
Assessed %NBS after e'quakes: 50%

IEP

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

Period of design of building (from above): 1965-1976
h_n from above: 2.5m

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):	0.4	0.4

(%NBS)nom from Fig 3.3:	5.0%	5.0%
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
	along	across
Final $(\%NBS)_{nom}$:	**5%**	**5%**

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	0.8
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 =k_μ, if pre-1976, fromTable 3.3:	1.57	1.57
Ductiity Scaling Factor, **Factor D**:	1.57	1.57

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

$\%NBS_b$:	**37%**	**37%**

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

3.1. Plan Irregularity, factor A:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1

3.4. Pounding potential

Pounding effect D1, from Table to right 1.0

Height Difference effect D2, from Table to right 1.0

Therefore, Factor D: 1

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

3.5. Site Characteristics 1

3.6. Other factors, Factor F

	Along	Across
For ≤ 3 storeys, max value =2.5, otherwise max valule =1.5, no minimum	1.4	1.4
Rationale for choice of F factor, if not 1	Minor liquefaction potential based on previous Earthquakes (F = 0.9), F = 1.5 for residential building.	

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)	**1.35**	**1.35**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**50%**	**50%**
4.4 Percentage New Building Standard (%NBS), (before)		**50%**

Detailed Engineering Evaluation Summary Data

V1.11

Location

Building Name: Block B
Building Address: Unit: No: 40 Street: Bristol St, St Albans
Legal Description: Pickering Courts
GPS south: Degrees: Min: Sec:
GPS east: Degrees: Min: Sec:
Building Unique Identifier (CCC): PRO 0611-002

Reviewer: David Whittaker
CPEng No: 123089
Company: Beca
Company project number: 5323355
Company phone number: 643663521
Date of submission:
Inspection Date: 13/12/2012
Revision:
Is there a full report with this summary? yes

Site

Site slope: flat
Soil type:
Site Class (to NZS1170.5): D
Proximity to waterway (m, if <100m):
Proximity to clifftop (m, if < 100m):
Proximity to cliff base (m,if <100m):

Max retaining height (m):
Soil Profile (if available): Unknown.
If Ground improvement on site, describe:
Approx site elevation (m):

Building

No. of storeys above ground: 2 single storey = 1
Ground floor split? no
Storeys below ground: 0
Foundation type: raft slab
Building height (m): 6.00
Floor footprint area (approx): 100
Age of Building (years): 34

Ground floor elevation (Absolute) (m):
Ground floor elevation above ground (m):
if Foundation type is other, describe:
height from ground to level of uppermost seismic mass (for IEP only) (m): 5.2
Date of design: 1965-1976

Strengthening present? no

If so, when (year)?
And what load level (%g)?
Brief strengthening description:

Use (ground floor): multi-unit residential
Use (upper floors): multi-unit residential
Use notes (if required):
Importance level (to NZS1170.5): IL2

Gravity Structure

Gravity System: load bearing walls
Roof: timber framed
Floors: precast concrete with topping
Beams:
Columns:
Walls: fully filled concrete masonry

rafter type, purlin type and cladding: timber rafters, timber purlins, ply sarking, corrugated iron cladding.
unit type and depth (mm), topping: 75mm Unispan, 65mm in situ topping.
#N/A

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along: other (note)
Ductility assumed, μ: 1.25
Period along: 0.40 0.00
Total deflection (ULS) (mm):
maximum interstorey deflection (ULS) (mm):

Timber frame first floor, CMU ground floor.
describe system: 15.3
estimate or calculation? estimated
estimate or calculation?
estimate or calculation?

Lateral system across: other (note)
Ductility assumed, μ: 1.25
Period across: 0.40 0.00
Total deflection (ULS) (mm):
maximum interstorey deflection (ULS) (mm):

Timber frame first floor, CMU ground floor.
describe system: 6.4
estimate or calculation? estimated
estimate or calculation?
estimate or calculation?

Separations:

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

Non-structural elements

Stairs: other (specify) — describe: Timber stairs with concrete landings.
Wall cladding: other heavy — describe: Block veneer first floor, exposed masonry block ground flo
Roof Cladding: Metal — describe: Corrogated iron.
Glazing: aluminium frames
Ceilings: fibrous plaster, fixed — 9.5mm gib board.
Services(list):

Available documentation

Architectural: partial — original designer name/date: Christchurch City Council, 1976.
Structural: partial — original designer name/date: Christchurch City Council, 1976.
Mechanical: none — original designer name/date:
Electrical: none — original designer name/date:
Geotech report: none — original designer name/date:

Damage

Site:
(refer DEE Table 4-2)

Site performance: Good
Describe damage: Minor cracking of linings and mortar.

Settlement: none observed — notes (if applicable):
Differential settlement: 0-1:350 — notes (if applicable): Possibly, not visible to naked eye.
Liquefaction: none apparent — notes (if applicable):
Lateral Spread: none apparent — notes (if applicable):
Differential lateral spread: none apparent — notes (if applicable):
Ground cracks: none apparent — notes (if applicable):
Damage to area: slight — notes (if applicable):

Building:

Current Placard Status: green

Along
Damage ratio: 0%
Describe (summary): Minor structural damage.
Describe how damage ratio arrived at: Minor structural damage.

Across
Damage ratio: 0%
Describe (summary): Minor structural damage.

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

Diaphragms Damage?: no Describe:
CSWs: Damage?: no Describe:
Pounding: Damage?: no Describe:
Non-structural: Damage?: no Describe:

Recommendations

Level of repair/strengthening required: minor structural — Describe: Repair cracks in linings and mortar.
Building Consent required: no — Describe:
Interim occupancy recommendations: full occupancy — Describe:

Along
Assessed %NBS before e'quakes: 37% ##### %NBS from IEP below
Assessed %NBS after e'quakes: 37%

If IEP not used, please detail assessment methodology: Quantitative Calculation - Force based

Across
Assessed %NBS before e'quakes: 53% ##### %NBS from IEP below
Assessed %NBS after e'quakes: 53%

IEP

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

Period of design of building (from above): 1965-1976
h_n from above: 5.2m

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):	0.4	0.4

(%NBS)nom from Fig 3.3:		

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

	along	across
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:
Z_{1992}, from NZS4203:1992
Hazard scaling factor, **Factor B:** #DIV/0!

2.4 Return Period Scaling Factor

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

2.5 Ductility Scaling Factor

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

2.6 Structural Performance Scaling Factor:

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

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

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

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

3.1. Plan Irregularity, factor A: insignificant 1

3.2. Vertical irregularity, Factor B: insignificant 1

3.3. Short columns, Factor C: insignificant 1

3.4. Pounding potential
Pounding effect D1, from Table to right 1.0
Height Difference effect D2, from Table to right 1.0

Therefore, Factor D: 1

3.5. Site Characteristics insignificant 1

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

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

3.6. Other factors, Factor F

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

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)
List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

3.7. Overall Performance Achievement ratio (PAR)	**0.00**	**0.00**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**#DIV/0!**	**#DIV/0!**
4.4 Percentage New Building Standard (%NBS), (before)		**#DIV/0!**

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Block C	Reviewer:	David Whittaker
	Unit / No: 40 / Street: Bristol St, St Albans	CPEng No:	123089
Building Address:		Company:	Beca
Legal Description:	Pickering Courts	Company project number:	5323355
		Company phone number:	643663521
	Degrees / Min / Sec		
GPS south:		Date of submission:	
GPS east:		Inspection Date:	13/12/2012
		Revision:	
Building Unique Identifier (CCC):	PRO 0611-003	Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	
Soil type:		Soil Profile (if available):	Unknown.
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:	2	single storey = 1	Ground floor elevation (Absolute) (m):	
Ground floor split?	no		Ground floor elevation above ground (m):	
Storeys below ground	0			
Foundation type:	raft slab		if Foundation type is other, describe:	
Building height (m):	6.00		height from ground to level of uppermost seismic mass (for IEP only) (m):	5.2
Floor footprint area (approx):	390			
Age of Building (years):	34		Date of design:	1965-1976
Strengthening present?	no		If so, when (year)?	
			And what load level (%g)?	
Use (ground floor):	multi-unit residential		Brief strengthening description:	
Use (upper floors):	multi-unit residential			
Use notes (if required):				
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber framed	rafter type, purlin type and cladding	timber rafters, timber purlins, ply sarking, corrogated iron cladding.
Floors:	precast concrete with topping	unit type and depth (mm), topping	75mm Unispan, 65mm in situ topping.
Beams:			
Columns:			
Walls:	fully filled concrete masonry	#N/A	

Lateral load resisting structure

Lateral system along:	other (note)	**Note: Define along and across in detailed report!**		Timber frame first floor, CMU ground floor.
Ductility assumed, μ:	1.25		describe system	61
Period along:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):			estimate or calculation?	
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	
Lateral system across:	other (note)			Timber frame first floor, CMU ground floor.
Ductility assumed, μ:	1.25		describe system	6.4
Period across:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):			estimate or calculation?	
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	

Separations:

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

Non-structural elements

Stairs:	other (specify)	describe	Timber stairs with concrete landings.
Wall cladding:	other heavy	describe	Block veneer first floor, exposed masonry block ground flo
Roof Cladding:	Metal	describe	Corrogated iron.
Glazing:	aluminium frames		
Ceilings:	fibrous plaster, fixed		9.5mm gib board.
Services(list):			

Available documentation

Architectural	partial	original designer name/date	Christchurch City Council, 1976.
Structural	partial	original designer name/date	Christchurch City Council, 1976.
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site:
(refer DEE Table 4-2)

Site performance:	Good	Describe damage:	Minor cracking of linings and mortar.
Settlement:	none observed	notes (if applicable):	
Differential settlement:	0-1:350	notes (if applicable):	Possible, not visible by naked eye.
Liquefaction:	none apparent	notes (if applicable):	
Lateral Spread:	none apparent	notes (if applicable):	
Differential lateral spread:	none apparent	notes (if applicable):	
Ground cracks:	0-20mm/20m	notes (if applicable):	
Damage to area:	slight	notes (if applicable):	

Building:

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

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

Recommendations

	Level of repair/strengthening required:	minor structural		Describe:	Repair cracks in linings and mortar.
	Building Consent required:	no		Describe:	
	Interim occupancy recommendations:	full occupancy		Describe:	
Along	Assessed %NBS before e'quakes:	35%	##### %NBS from IEP below	If IEP not used, please detail assessment methodology:	Quantitative calculations - force based
	Assessed %NBS after e'quakes:	35%			
Across	Assessed %NBS before e'quakes:	53%	##### %NBS from IEP below		
	Assessed %NBS after e'quakes:	53%			

IEP

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

Period of design of building (from above):	1965-1976	h_n from above:	5.2m
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):	0.4	0.4

$(\%NBS)_{nom}$ from Fig 3.3:

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

	along	across
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:
Z_{1992}, from NZS4203:1992
Hazard scaling factor, **Factor B:** #DIV/0!

2.4 Return Period Scaling Factor

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

2.5 Ductility Scaling Factor

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

2.6 Structural Performance Scaling Factor:

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

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

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

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

3.1. Plan Irregularity, factor A: insignificant 1

3.2. Vertical irregularity, Factor B: insignificant 1

3.3. Short columns, Factor C: insignificant 1

3.4. Pounding potential
Pounding effect D1, from Table to right 1.0
Height Difference effect D2, from Table to right 1.0

Therefore, Factor D: 1

3.5. Site Characteristics 1

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

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

3.6. Other factors, Factor F

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

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)
List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

3.7. Overall Performance Achievement ratio (PAR)	**0.00**	**0.00**
4.3 PAR x $(\%NBS)_b$: PAR x Baselline %NBS:	**#DIV/0!**	**#DIV/0!**
4.4 Percentage New Building Standard (%NBS), (before)		**#DIV/0!**

Appendix D

Previous Reports and Assessments

BE 0611 EQ2

Christchurch Eq. RAPID Assessment Form - LEVEL 1

Inspector Initials: Puvi. M
Territorial Authority: Christchurch City
Date of Inspection: 09.03.11
Time: 2pm
Exterior Only ☐
Exterior and Interior ☑

[No internal access for units 3,4,8,12 & 16]

Building Name: Pickering Courts
Short Name: (City Housing)
Address: 40 Bristol St
Christchurch
GPS Co-ordinates: S° E°
Contact Name:
Contact Phone:
Storeys at and above ground level: 1 & 2
Below ground level:
Total gross floor area (m²):
Year built:
No of residential Units: 25
Photo Taken: [✓ Yes] No

Type of Construction

☑ Timber frame – Internal walls
☐ Steel frame
☐ Tilt-up concrete
☐ Concrete frame
☐ RC frame with masonry infill
☐ Concrete shear wall
☐ Unreinforced masonry
☑ Reinforced masonry – External & Fire walls
☐ Confined masonry
☐ Other:

Primary Occupancy

☐ Dwelling
☐ Other residential
☐ Public assembly
☐ School
☐ Religious
☐ Commercial/ Offices
☐ Industrial
☐ Government
☐ Heritage Listed
☐ Other

Investigate the building for the conditions listed below:

Overall Hazards / Damage	Minor/None	Moderate	Severe	Comments
Collapse, partial collapse, off foundation	N	☐	☐	
Building or storey leaning	N	☐	☐	
Wall or other structural damage	N	☐	☐	
Overhead falling hazard	N	☐	☐	
Ground movement, settlement, slips	N	☐	☐	
Neighbouring building hazard	N	☐	☐	
Other	☐	☐	☐	

Choose a posting based on the evaluation and team judgement. Severe conditions affecting the whole building are grounds for an UNSAFE posting. Localised Severe and overall Moderate conditions may require a RESTRICTED USE. Place INSPECTED placard at main entrance. Post all other placards at every significant entrance.

INSPECTED GREEN ☑
RESTRICTED USE YELLOW ☐
UNSAFE RED ☐

Record any restriction on use or entry:

Further Action Recommended:

Tick the boxes below only if further actions are recommended

☐ Barricades are needed (state location):
☐ Level 2 or detailed engineering evaluation recommended
☐ Structural ☐ Geotechnical ☐ Other:
☐ Other recommendations:

Estimated Overall Building Damage (Exclude Contents)

None	☐		
0-1 %	☑	31-60 %	☐
2-10 %	☐	61-99 %	☐
11-30 %	☐	100 %.	☐

Sign here on completion

Date & Time: 09.03.11 / 4pm
ID: opus

Inspection ID ________ *(Office Use Only)*

Christchurch Eq RAPID Assessment Form - LEVEL 2

Inspector Initials: Puvi. M
Territorial Authority: Christchurch City
Date: 09.03.11
Time: 2pm
Final Posting (e.g. UNSAFE): INSPECTED

Building Name: PICKERING COURTS
Short Name: (CITY HOUSING)
Address: 40 Bristol St
Christchurch.
GPS Co-ordinates: S° E°
Contact Name:
Contact Phone:
Storeys at and above ground level: 1 & 2.
Below ground level:
Total gross floor area (m²):
Year built:
No of residential Units: 25
Photo Taken: [✓ Yes] No

Type of Construction

- ☑ Timber frame – Internal
- ☐ Steel frame
- ☐ Tilt-up concrete
- ☐ Concrete frame
- ☐ RC frame with masonry infill
- ☐ Concrete shear wall
- ☐ Unreinforced masonry
- ☑ Reinforced masonry – External & Fire walls.
- ☐ Confined masonry
- ☐ Other:

Primary Occupancy

- ☐ Dwelling
- ☐ Other residential
- ☐ Public assembly
- ☐ School
- ☐ Religious
- ☐ Commercial/ Offices
- ☐ Industrial
- ☐ Government
- ☐ Heritage Listed
- ☐ Other

Investigate the building for the conditions listed on page 1 and 2, and check the appropriate column. A sketch may be added on page 3

Overall Hazards / Damage	Minor/None	Moderate	Severe	Comments
Collapse, partial collapse, off foundation	☒	☐	☐	
Building or storey leaning	☒	☐	☐	
Wall or other structural damage	☒	☐	☐	
Overhead falling hazard	☒	☐	☐	
Ground movement, settlement, slips	☒	☐	☐	
Neighbouring building hazard	☒	☐	☐	
Electrical, gas, sewerage, water, hazmats	☒	☐	☐	

Record any existing placard on this building:

Existing Placard Type (e.g. UNSAFE):

Choose a new posting based on the new evaluation and team judgement. Severe conditions affecting the whole building are grounds for an UNSAFE posting. Localised Severe and overall Moderate conditions may require a RESTRICTED USE. Place INSPECTED placard at main entrance. Post all other placards at every significant entrance. Transfer the chosen posting to the top of this page.

INSPECTED GREEN: [✓ G1] G2
RESTRICTED USE YELLOW: Y1 Y2
UNSAFE RED: R1 R2 R3

Record any restriction on use or entry:

Further Action Recommended:

Tick the boxes below only if further actions are recommended

- ☐ Barricades are needed (state location):
- ☐ Detailed engineering evaluation recommended
  - ☐ Structural
  - ☐ Geotechnical
  - ☐ Other:
- ☐ Other recommendations:

Estimated Overall Building Damage (Exclude Contents)

- None ☐
- 0-1 % ☑
- 2-10 % ☐
- 11-30 % ☐
- 31-60 % ☐
- 61-99 % ☐
- 100 % ☐

Sign here on completion

Date & Time: 09.03.11 / 4pm.
ID: Opus.

Inspection ID: ________ *(Office Use Only)*

PRUP 1:

Structural Hazards/ Damage	Minor/None	Moderate	Severe	Comments
Foundations	N	☐	☐	
Roofs, floors (vertical load)	☑	☐	☐	Minor old cracks in balcony slabs & in stair landings.
Columns, pilasters, corbels	N	☐	☐	
Diaphragms, horizontal bracing	N	☐	☐	
Pre-cast connections	N	☐	☐	
Beam	N	☐	☐	
Non-structural Hazards / Damage				
Parapets, ornamentation	N	☐	☐	
Cladding, glazing	N	☐	☐	
Ceilings, light fixtures	☑	☐	☐	Minor ceiling cracks.
Interior walls, partitions	N	☐	☐	
Elevators	N	☐	☐	
Stairs/ Exits	N	☐	☐	
Utilities (eg. gas, electricity, water)	N	☐	☐	
Other	☐	☐	☐	
Geotechnical Hazards / Damage				
Slope failure, debris	N	☐	☐	
Ground movement, fissures	N	☐	☐	
Soil bulging, liquefaction	N	☐	☐	

General Comment Single & 2 storey Units - For its age generally in good condition apart from the existing cracks in balcony & landing slabs and some ceiling cracks.

Usability Category

Damage Intensity	Posting	Usability Category	Remarks
Light damage *Low risk*	Inspected (Green)	G1. Occupiable, no immediate further investigation required	
		G2. Occupiable, repairs required	
Medium damage *Medium risk*	Restricted Use (Yellow)	Y1. Short term entry	
		Y2. No entry to parts until repaired or demolished	
Heavy damage *High risk*	Unsafe (Red)	R1. Significant damage: repairs, strengthening possible	
		R2. Severe damage: demolition likely	
		R3. At risk from adjacent premises or from ground failure	

Sketch (optional)
Provide a sketch of the entire building or damage points. Indicate damage points.

Recommendations for Repair and Reconstruction or Demolition (Optional)

① Repair the existing cracks in the Landing slabs

② Repair the ceiling cracks. - Units 7, 20 & 22.