Detailed Seismic Assessment

Aldan Lodge, 86 Wellington Street, Picton

Freehold Properties (Investment) LLP

Reference: 3587-9593

emajineer
the possibilities are endless

Structural Concepts

This document is prepared for Freehold Properties (Investment) LLP by Structural Concepts Limited.

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Technical Summary

Building Information	
Building Name/ Description	Aldan Lodge Residence
Street Address	86 Wellington Street, Picton
Territorial Authority	Marlborough District Council
No. of Storeys	Two storey building.
Area of Typical Floor (approx.)	The building area is approximately 250 m2
Year of Design (approx.)	1976
NZ Standard Designed to	Ministry of Works Code of Practice: 1968
Structural System including Foundations	Timber purlins are supported by timber jack studs and partially filled concrete block walls. Ceiling, ply diaphragm on the second floor level is supported by partially filled reinforced block walls and timber walls. Unislab diaphragm on the first floor level is supported by partially filled concrete block walls and reinforced concrete frames. Concrete walls and frames on the ground floor level are supported by shallow foundations.
Key features of ground profile and identified geohazards	No geotechnical report is currently available. Unlikely liquefaction potential and settlement potential.
Previous strengthening and/or significant alteration	No.
Heritage Issues/ Status	No.
Other relevant information	None.
Assessment Information	
Consulting Practice	Structural Concepts Ltd
CPEng Responsible, Including: • Name • CPEng number • A statement of suitable skills and experience in the seismic assessment of existing buildings.	Arthur Budvietas CPEng 65305 Current practice field is structural. Undertaking and overseeing seismic assessment using the NZSEE Guidelines since 1992 attending training on sections C1 to C5 of the draft Guidelines in February 2017, attended Seminar by Jason Ingham in August 2016 on C8 Guidelines. Attended MBIE seminar August 2017 on methodology. Attended SLaMA seminar in April 2019.

Documentation reviewed, including: • Date/version of drawings/calculations • Previous seismic assessment	Original drawings are dated 1976
Geotechnical Report(s)	None viewed
Date Building Inspected	June 2020
Description of any structural testing undertaken and result summary	None.
Previous assessment Reports	None
Other relevant information	None.
Summary of engineering assessment Methodology and Key Parameters Used	
Occupancy Type and Importance Level	Building is residential, part of the motel complex
Site subsoil class	Conservatively assumed Class D
Summary of how part C was applied, including: • The analysis methodology used from C2 • Other sections of part C applied	The assessment procedure used is equivalent static. Ductility of concrete walls was considered 1.25. Ductility of timber framed floor was considered 3.5. Section C5 (concrete) has been used in this evaluation.
Other relevant information	None
Assessment outcomes	
Assessment Status	
Assessed %NBS	35 % NBS (IL2)
Seismic grade and Relative Risk (from Table A3.1)	Alpha rating C Approx. risk relative to a new building 5-10 times greater.
Comment on the nature of secondary structural and Non-structural elements/parts identified and assessed	N/A
Describe the governing critical structural weakness (CSW)	Concrete block walls at the second floor level not supported out of plane.
Recommendations (optional for EPB purposes)	Support block walls with gib walls on second floor level.

Executive Summary

The purpose of this Detailed Seismic Assessment (DSA) report is to evaluate the existing building's seismic strength for the Building at 86 Wellington Street, Picton. The assessment method is based on '*The Seismic Assessment of Existing Buildings Technical Guidelines for Engineering Assessments*' published by New Zealand Society for Earthquake Engineering dated 1 July 2017. The existing structure information is obtained from existing structural drawings and site observations.

The original building was designed in 1976 and probably built around the same time. The building is the residential part of the Aldan Lodge Motel. It is a two storey building. The ground floor consists of concrete frames and partially filled reinforced concrete block walls, supporting a unislab floor above. The second floor consists of the partially filled reinforced concrete block walls on the South and East elevations and timber walls on the North and West elevations. A ply diaphragm forms the ceiling at the second floor. The roof is corrugated longrun, supported by purlins which are supported on the jack stud walls and external walls.

The foundations are shallow beam and pad foundations.

Building is approximately 250m2.

The assessment evaluates the building as 35% NBS.

Contents

1. Preamble 8
2. Investigations 8
3. Geotechnical Considerations 9
4. Observations 9
5. Building Description 9
6. Structural System 10
7. Governing Structural Elements 11
8. Assessment 11
9. Assumptions 11
10. Conclusions 11
11. Elements Not Inspected 11
12. Applicability 12

Appendices

Appendix A Photographs
Appendix B Existing drawings

Figure 1: Site Locality (linz)

1. Preamble

We were requested by Freehold properties to investigate and report on the existing building's strength at Aldan Lodge, 86 Wellington Street, Picton. Comment is required as to its structural adequacy with regard to current seismic standards (NBS). In particular, we have been asked to assess the building strength in terms of the Building Act and current %NBS. The assessment has been carried out in accordance with '*The Seismic Assessment of Existing Buildings Technical Guidelines for Engineering Assessments*' published by New Zealand Society for Earthquake Engineering dated 1 July 2017.

This report is not intended to give specific strengthening design but will define strengthening options to be developed by further work.

The building has been assessed assuming an importance level 2 (IL2) for less than 300 people occupancy.
The current loading standard (NZS1170.5) requires new buildings to be designed for two levels of performance or "Limit States":

Ultimate limit state (ULS): Damage may be extensive but will permit safe exiting of the building. Occupancy may be restricted until repairs are made or the building may need to be demolished.
Serviceability limit state (SLS): The degree of damage to the structure is minor and does not affect the use of the building and is readily repairable and does not prevent occupancy of the building.

Any seismic event above the SLS earthquake may cause damage that might require the building to be closed for at least a limited time for repairs, or even demolition if stresses or movements warrant it. This can occur even if the building is rated at 100%NBS. Typically, in an assessment process we are evaluating the maximum load which will not cause collapse and comparing it with the ULS state. It is not normal practice to assess the SLS state unless specifically requested.

The purpose of the Detailed Seismic Assessment is solely for the stability of the structural system under a code specified seismic event. Damages to the linings and services are outside of this report scope.

2. Investigations

2.1 The building was visually inspected on 24th June 2020.

2.2 Plans were obtained from the local council for evaluation of the structural design and the detailing assessment. The building was designed and built in 1976.

3. Geotechnical Considerations

A site-specific geotechnical report was not available at the time of our investigation, nor did we find any geotechnical reports in the Marlborough District Council records.

The analysis has conservatively used Class D soils to NZS1170.5.

Liquefaction potential at this site is less likely and based on our experience, if this were to occur and cause some differential and/or global settlement, a building of this configuration will not likely collapse due to this ground movement. Local loss of bearing may cause large settlements of some components of the building, but this will not likely affect the overall life safety of the building as the building has redundancies (long stiff walls and large strip footings) allowing for redistribution of support.

4. Observations

The following observations were made of the documents:

- The visual inspection showed the building to be in moderate to good condition
- The drawings obtained don't generally represent the main building structural elements.
- The building, in general terms has been designed in a robust manner for the vertical load cases.

5. Building Description

5.1 General Description

The purpose of this Detailed Engineering Assessment (DSA) report is to evaluate the existing building's seismic strength for the building at 86 Wellington Street, Picton. The assessment method is based on 'The Seismic Assessment of Existing Buildings Technical Guidelines for Engineering Assessments' published by New Zealand Society for Earthquake Engineering dated 3 July 2017. The existing structure information is obtained from existing structural drawings and site investigation.

The building's location in Picton is shown in Figure 1. The original building was designed in 1976 and probably built around the same time.

Total length of the building is approximately 14.5m. Width of the building is 10.6m.

The building is a two storeys.

The ground floor consists of concrete frames and partially filled reinforced concrete block walls, supporting a unislab floor slab. The second floor consists of partially filled reinforced concrete block walls on the East and South elevations and timber walls on the North and West elevations. A ply diaphragm forms the ceiling at the second floor. The roof is corrugated longrun, supported by the purlins which are supported by the jack stud walls and external walls.

The foundations are shallow beam and pad foundations.

Building is approximately 250m2.

5.2 Roof Construction

The roof cladding is corrugated steel longrun. The roof structure are purlins supported by the jack studs.

5.3 Internal Wall Construction

The partition walls are timber stud walls on first floor and timber and block walls on ground floor level.

5.4 External Wall Construction

The cladding is split block on the North and West side. The East and South walls are block walls.

5.5 Foundation Construction

Shallow reinforced beams and pads.

6. Structural System

6.1 Lateral System

Lateral loads are resisted by the concrete block walls.
Walls are connected with the concrete diaphragm. At the first floor the system is a combination of block walls and timber shear walls.

6.2 Gravity System

The timber purlins are supported by timber jack studs, timber walls and partially reinforced concrete block walls.
The unislab floor on the first floor level is supported by concrete block walls and reinforced concrete beams.
Concrete walls and frames on the ground floor level are supported by shallow foundations.

6.3 Foundation System

Shallow pad and beam foundations

7. Governing Structural Elements

The governing structural elements are:

- Concrete block walls/Timber Shear walls
- Plywood Diaphragm

8. Assessment

The strength of the building has been determined at a %NBS using methodologies provided by NZSEE. A Detailed Seismic Assessment has been used with a preliminary desk top study, including calculations to assess actual likely strength.
Our findings are as follows:

Element	%NBS	Comment
Concrete block walls – ground floor	100% (IL2)	
First floor block walls out of plane / Timber bracing	35% (IL2)	

9. Assumptions

The following assumptions have been made for the assessment of this building:

- Soils are categorised Class D in terms of NZS1170.5
- Importance Level 2 has been adopted as described in NZS1170.5.
- The probable strength of reinforcement steel has been considered as 324MPa.
- The probable compressive strength for masonry has been considered as 12 MPa.
- The ductility for concrete shear block walls is assumed to be 1.25.
- The ductility for timber walls is assumed to be 3.5.

10. Conclusions/Recomendations

10.1 The building is in average physical condition.
10.2 The building has a rating of 35% NBS.
10.3 Strengthening can be achieved by upgrading the internal bracing elements of the upper floor/roof space.

11. Elements Not Inspected

The following is a list of elements not specifically inspected:

- Foundations
- Soil
- Partition walls

12. Applicability

13.1 Recommendations and opinions in this report are based on existing drawings, plus the non-destructive visual inspection.

13.2 Although there is nothing to suggest otherwise, the nature and continuity of the structure hidden from sight (e.g. reinforcing steel, bolt depths, etc.) is inferred, but it must be appreciated that actual conditions could vary.

13.3 Findings presented in this report are for the sole use of the client. The findings may not contain sufficient information for use by other parties, and as such should not be relied upon unless discussed with Structural Concepts Ltd.

13.4 We have exercised our services in a professional manner using a degree of care and skill normally, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

Appendix A

Photographs

West and North side

North and East side

East wall

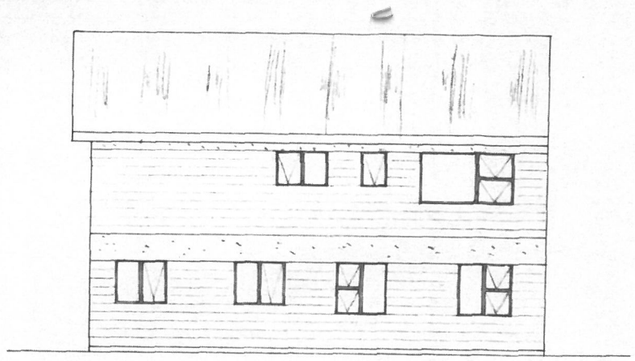
South wall

Roof structure

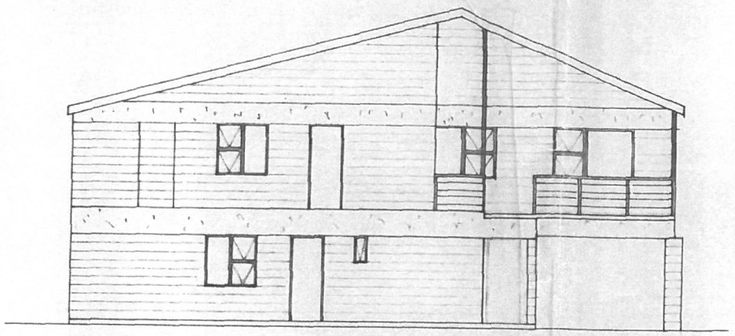
Appendix B

Existing drawings

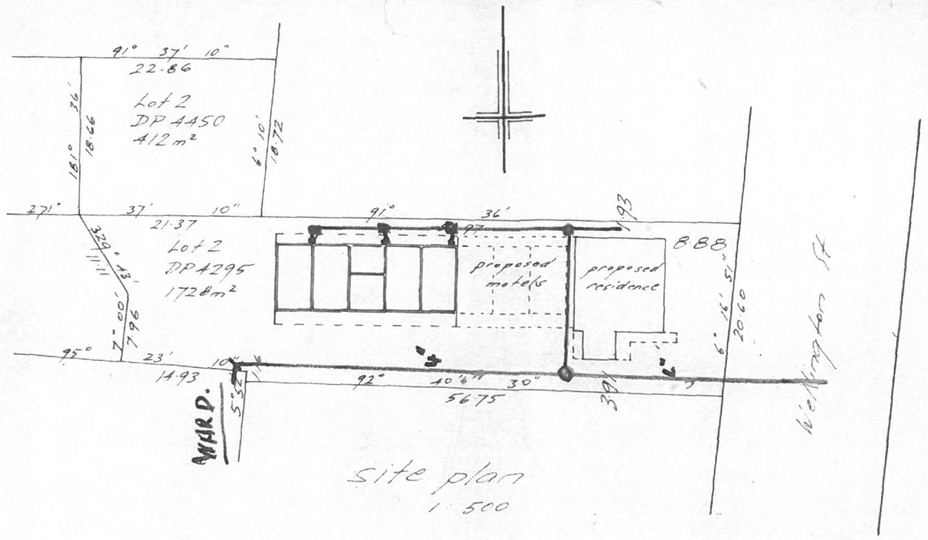
26117



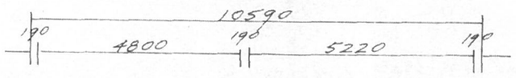
south

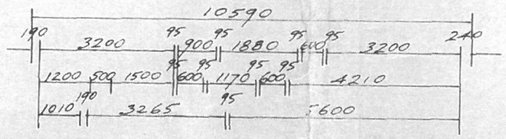


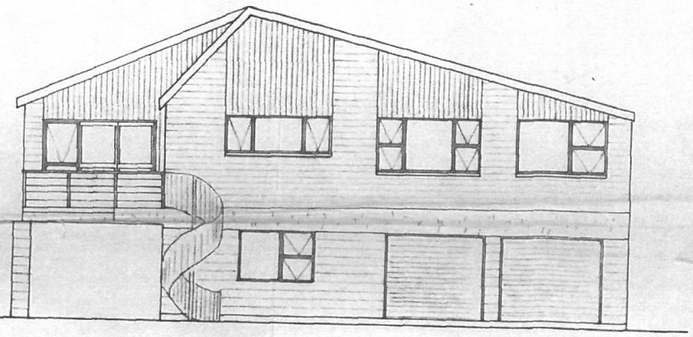
east



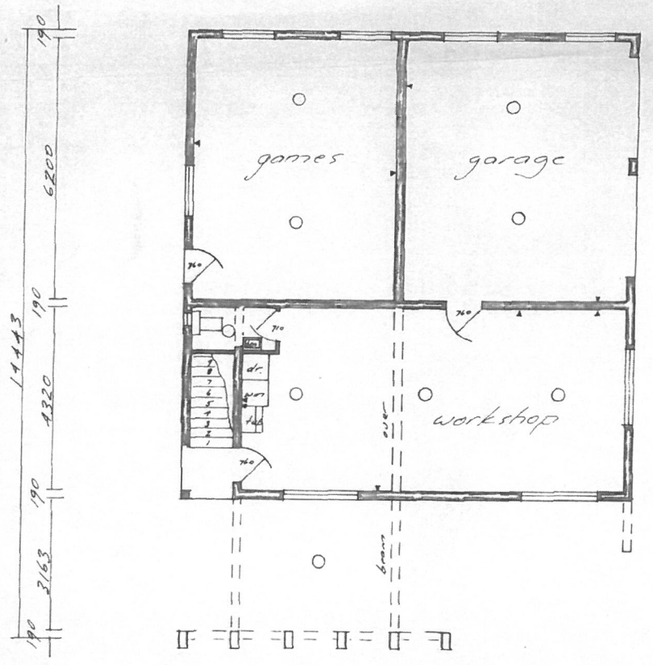
site plan
1:500

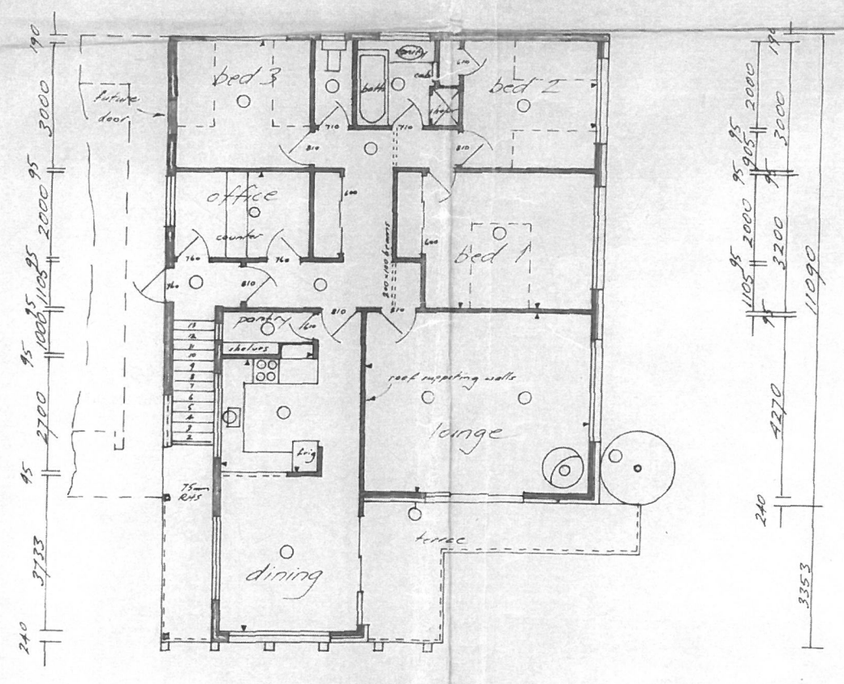


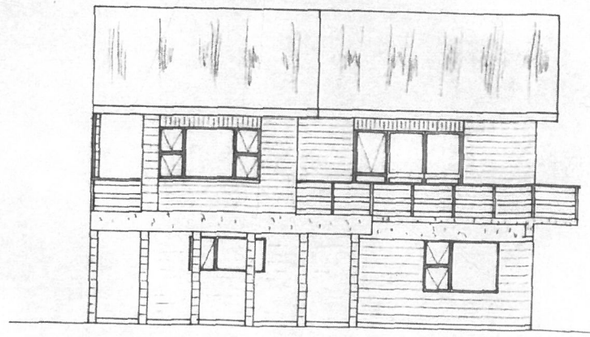




west







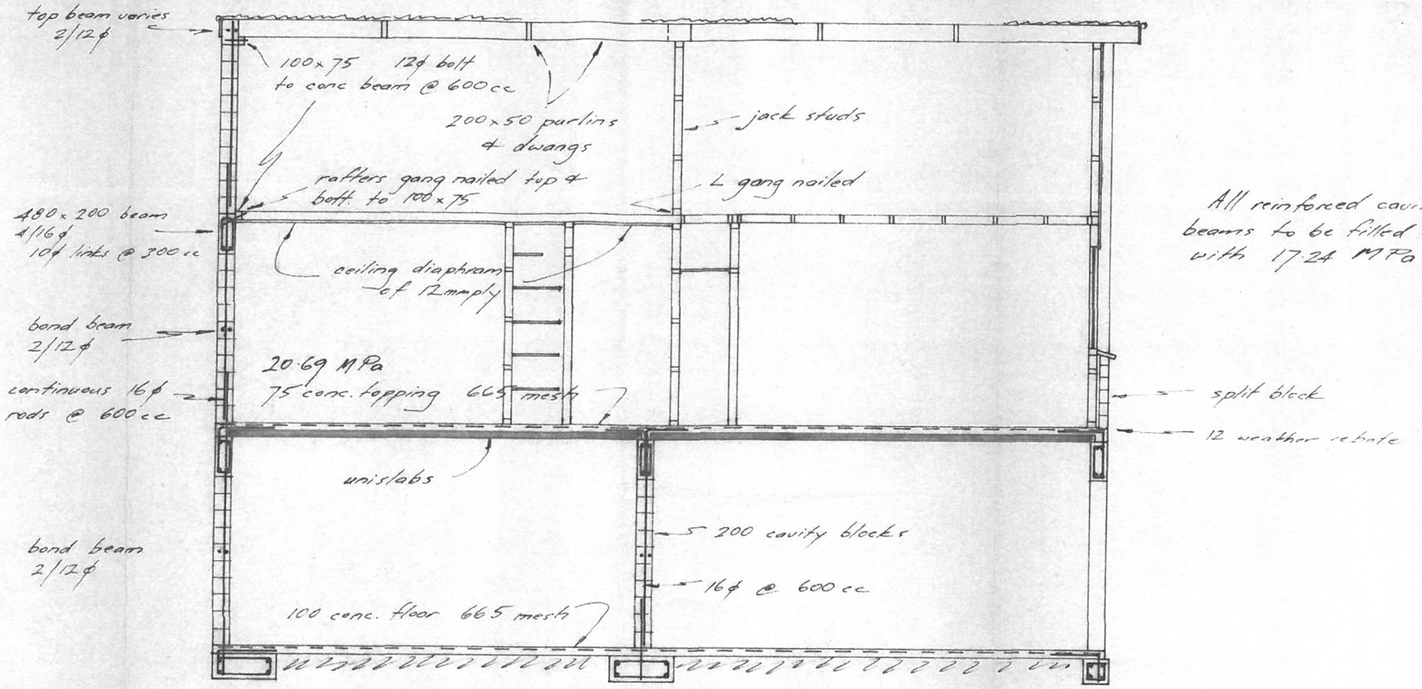
north

Developement for
Glenair Properties Ltd
in Wellington St

m. E. Kelly
18.7.76

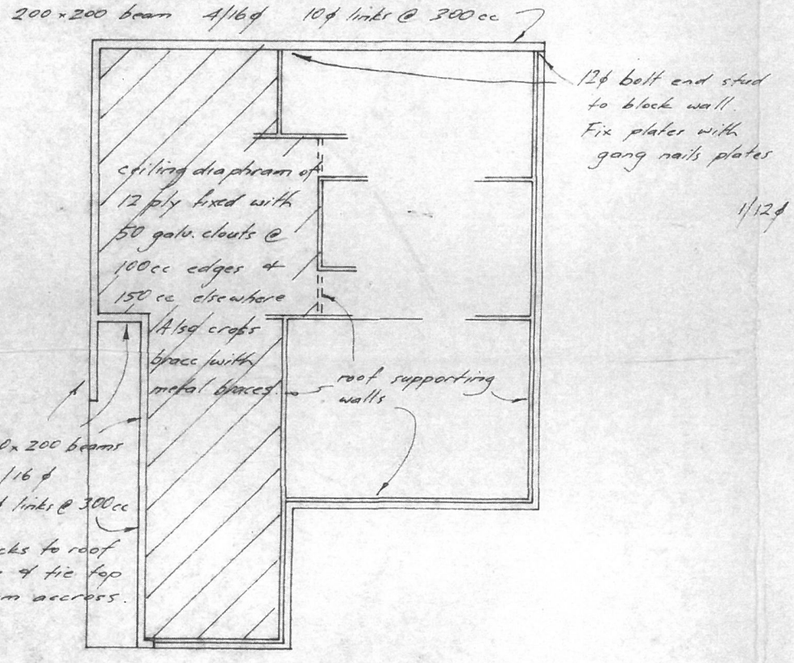
4910 × 1220	5320 × 1220
"	"
"	"
"	"
"	"

3710 × 1070	5320 × 1070
3710 × 1220	5320 × 1220
3710 × 860	5320 × 860
5020 × 1220	5320 × 1220
"	8460 × 1220
6670 × 1220	
6670 × 860	

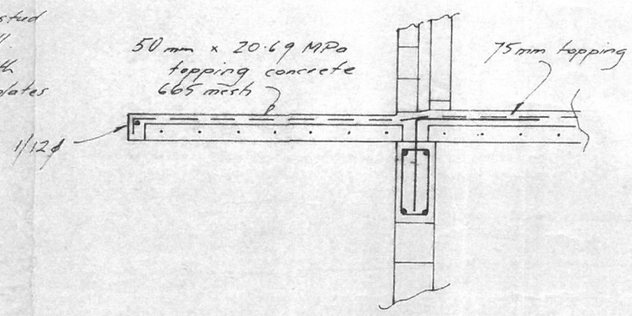


All reinforced cavities & beams to be filled or poured with 17.24 MPa concrete.

section D-D



section C-C.

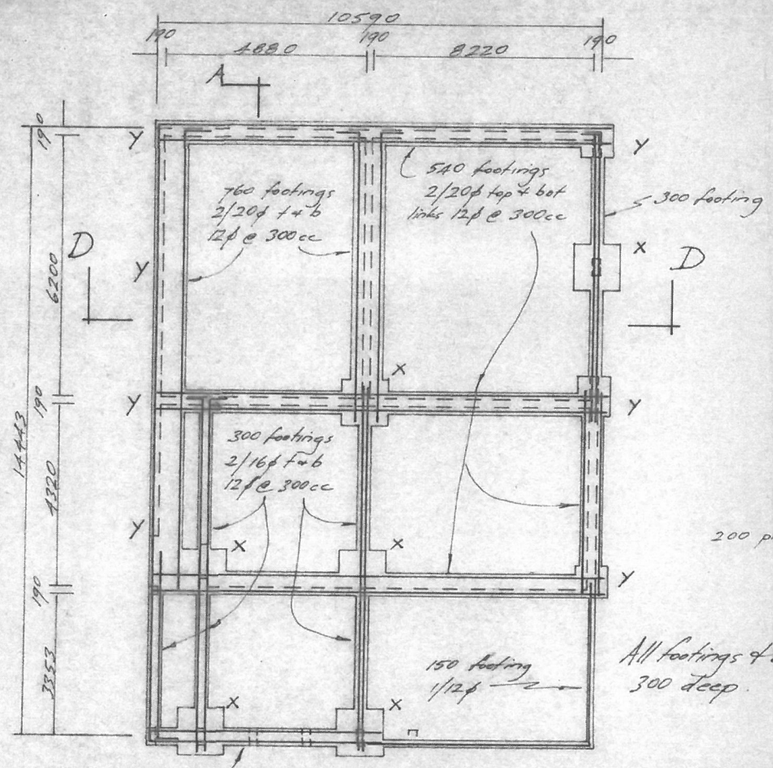


terrace section

scales 1:100, 50, 20

Developement for Glenair Properties Ltd in Wellington St

18.7.76

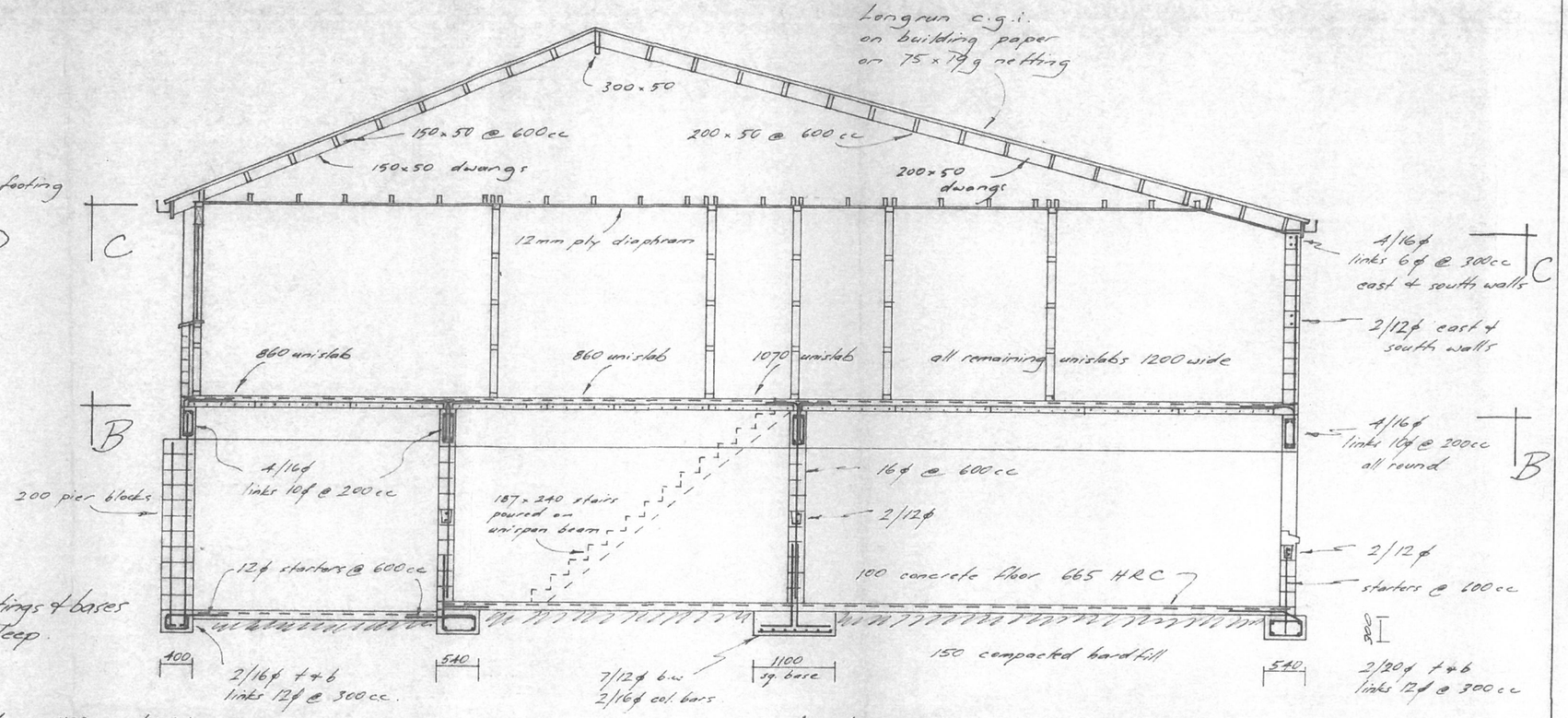


All footings & bases 300 deep.

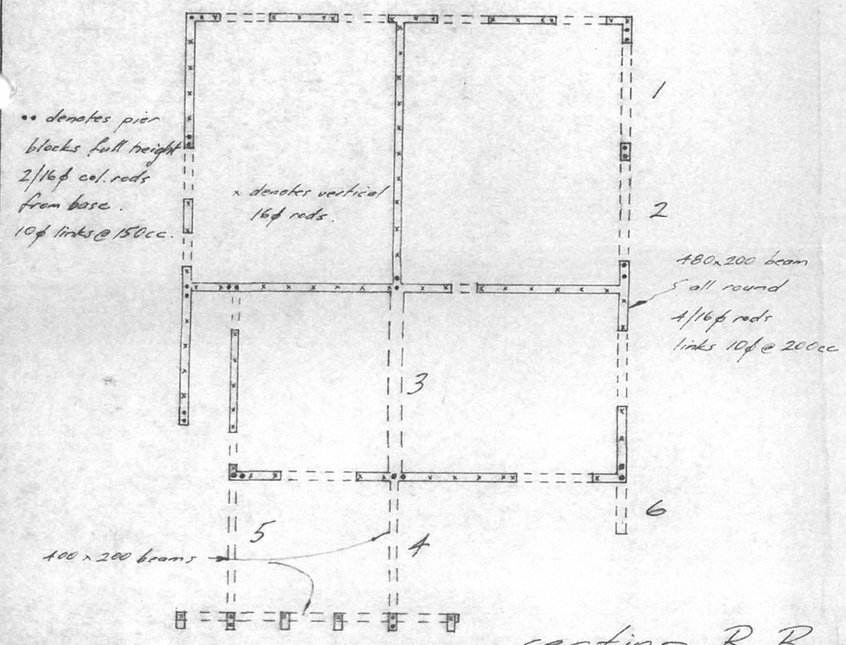
400 footing
2/16ϕ top + bot
12ϕ @ 300cc

A foundation plan

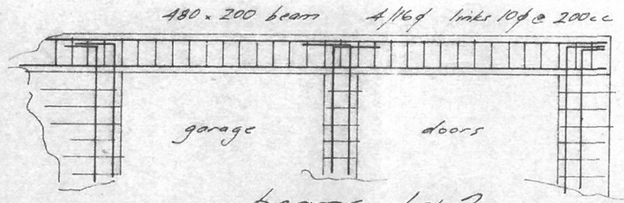
X bases 1100 sq. 7/12ϕ b.w. 75 bottom cover
Y bases 760 sq. 4/12ϕ b.w. 75 bottom cover.



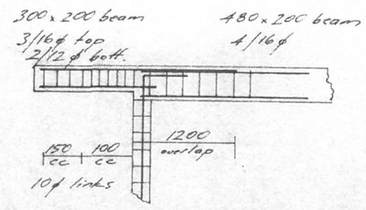
section A-A



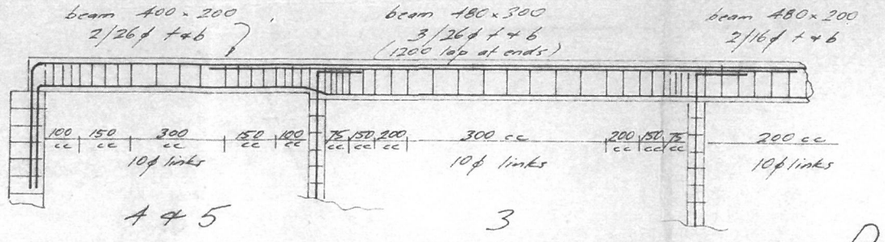
section B-B

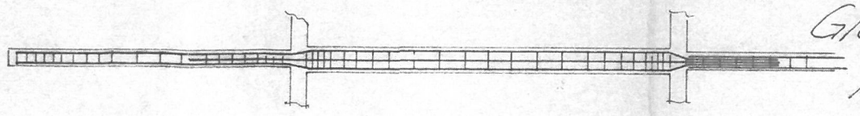


beams 1 & 2



beam 6





plan

Developement for Glenair Properties Ltd in Wellington St

18.7.76