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Structural Inspection Report

32 Corby Street, Balwyn North VIC 3104

Prepared for Sanjiv Vij

Prepared by: Yasin Guneysu PE0001540
April 27, 2022
Project Ref No: 16949

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CONTENTS

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INTRODUCTION

1.1 General

Our client, Sanjiv Vij, has appointed YG Consulting Engineers to undertake a structural evaluation of the building at 32 Corby Street, Balwyn North. A site inspection was conducted on September 23, 2021, to assess the existing conditions and identify defects that impact the structural integrity of the building.

1.2 Scope

As advised by the client our review was to cover the following scope:

- To visually inspect and report on the existing conditions of the subject building
- Report on existing building defects

1.3 Use of This Document

It is anticipated that this review will provide a useful overview and assist in the assessment of the subject building.

It should however be recognised that the observations made in this report were undertaken by visual means only and our findings and conclusions are based on a “walk through” review of the existing conditions of the structures and did not include areas inaccessible or hidden from view. No on-site testing of structural elements was undertaken.

1.4 Occupational Health and Safety

This report does not provide an assessment of occupational health and safety issues.

1.5 Building Code of Australia

This report has been prepared without input from the municipal building surveyor.

1.6 Limitations

This report has been specifically prepared for the Client as noted on the cover of the report.

No responsibility or liability to any third party is accepted for any loss or damage arising from the use of this report by any third party. Any third party wishing to act upon any material contained in this report should confer with the author of this report for detailed advice to consider that party’s requirements. This report should not be used for any other purpose or project.

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1.7 Definitions

Subject Site / Building:	32 Corby Street
We / Our:	YG Consulting Engineers
Client:	Sanjiv Vij

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SUMMARY OF INVESTIGATION AND FINDINGS

The subject site consists of a split-level brick dwelling supported by a suspended concrete slab. The lower ground floor consists of a carport and storeroom with shotcrete retaining walls around the perimeter of the storeroom. The upper floor is supported by a suspended concrete slab and consists of brick walls supporting the flat roof with galvanised sheeting.

The following defects were encountered during our inspection of the building:

- Strip drains have been installed within the shotcrete walls in the storeroom. The pipe outlets from the strip drains are assumed to be draining subsoil water onto the storeroom floor slab. Drainage is deemed inadequate for this area of the building as there is no sufficient passage for the water to drain out of the building. Excess moisture was observed on the surface of the storeroom floor slab due to frequent ponding of the subsoil water. A floor grate pit is required for the storeroom area to effectively drain subsoil water away from the building via a pipe installed beneath the storeroom slab. Installing a new pipe beneath the storeroom slab may require cutting the existing concrete footing beneath the storeroom brick wall. Our concern with this solution is that cutting the concrete footing may affect the stability of the building.

- The shotcrete wall within the storeroom consists of several cracks that were measured to be wider than the acceptable limit. Only three drain outlets are visible in the storeroom area, and it is assumed that there are no more outlets – the storeroom shotcrete walls require more than three drain outlets to ensure that hydrostatic pressure is not exerted onto the shotcrete walls.

- We could not verify the source of water discharging into the storeroom area. Potential greywater draining into the storeroom could result in a build-up of contamination in the storeroom.

- Several cracks are evident throughout the surface of the storeroom floor slab. We believe that the subsoil water draining into the storeroom is seeping through the joint between the floor slab and shotcrete wall and absorbing into the underlying clay soil. We believe that the clay soil could be expanding due to excess moisture (clay soil is slow draining) and therefore causing the slab to crack.

- The suspended concrete slab supporting the upper floor was measured to be approximately 130mm thick, however the thickness varies throughout the slab. Visible sag is present for the suspended slab in the storeroom and carport areas. Several areas of the slab show signs of spalling and honeycombing. We believe that the sag in the concrete slab could be caused as a result of the steel reinforcement corroding due to moisture seeping into the concrete. Honeycombing in concrete can potentially causes moisture vapour to seep into the concrete. Consequently, the corroded steel reinforcement loses bending strength which leads to a sag in the concrete slab. A sag of 28mm was recorded for the suspended concrete slab above the carport area over a length of 2m. The concrete slab for the building spans approximately 4.5m between supporting members. Given that the concrete slab is supporting masonry walls, the maximum allowed deflection over a span of 4.5m is 9mm (Table 2.3.2 AS3600-2018). The actual sag of the slab is more than three times the allowable limit for a slab supporting a masonry wall.

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- Hairline cracks were observed along the surface of the balcony floor slab. Due to floor coverings, we could not inspect the slab in the internal areas of the upper floor. However, it is likely that the hairline cracks are present throughout the entire surface of the upper floor slab.

- Stepped cracks were observed along the brick wall supported by the upper floor slab.

- Brick retaining walls in landscaped areas have separated from the building wall. The separation could be a result of inadequate drainage at the rear of the retaining walls causing excessive hydrostatic pressure on the walls.

- Corrosion of downpipe and rotting of timber fascia was observed along the north and east walls of the building.

It is our opinion that the existing defects of the building could lead to structural failure and therefore the building is currently not safe for occupancy. We are concerned with the sag of the upper floor concrete slab, which we believe is a result of the steel reinforcement losing strength due to corrosion. Due to the difficulty of assessing the loss of strength of the reinforcement, we advise that the building is demolished to prevent the likelihood of structural failure.

In addition to the defects listed above, we have analysed existing construction drawings (see Appendix B) for the subject building. The construction drawings show the floor construction plan for the subject building, with a cross-section detail of the storeroom area marked as ‘Section A-A’. We encountered a discrepancy in which the storeroom area is shown as a subfloor with soil batter. We believe that additional construction works were undertaken in the storeroom area after the subject building was built by underpinning the walls to create a new storage space. The Client shall investigate whether a building permit was lodged with the Council for these works. As the construction drawings show soil batter in the storeroom, the upper floor slab directly above this area may not have been designed to span the entire width of the storeroom. Our concern is that these additional works could have potentially affected the structural integrity of the subject building.

Any queries regarding the contents of this report shall be directed to our office for further instruction.

Regards,

Yasin Guneysu BEng MIEAust PE0001540
Principal / Civil Engineer

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APPENDIX A

PHOTOGRAPHIC RECORD

Photograph 1

Photograph 1 – Pipes at the base of shotcrete wall for subsoil drainage

Photograph 2

Photograph 2 – Subsoil drain pipes are draining into the storeroom area

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Photograph 3

Photograph 3 – Excess moisture from shotcrete drain pipes

Photograph 4

Photograph 4 – Crack along storeroom shotcrete wall assumed to be between capping beam and piles

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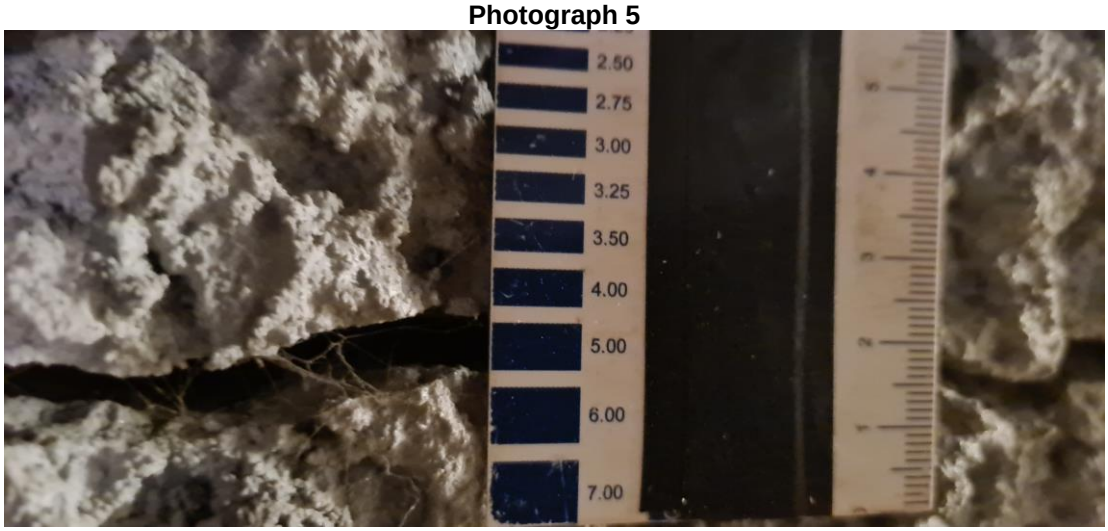
Photograph 5



Photograph 5 – Horizontal cracks of up to 5mm were measured in the storeroom area

Photograph 6

Photograph 6 – Vertical crack in the storeroom area shotcrete wall measured at 10mm

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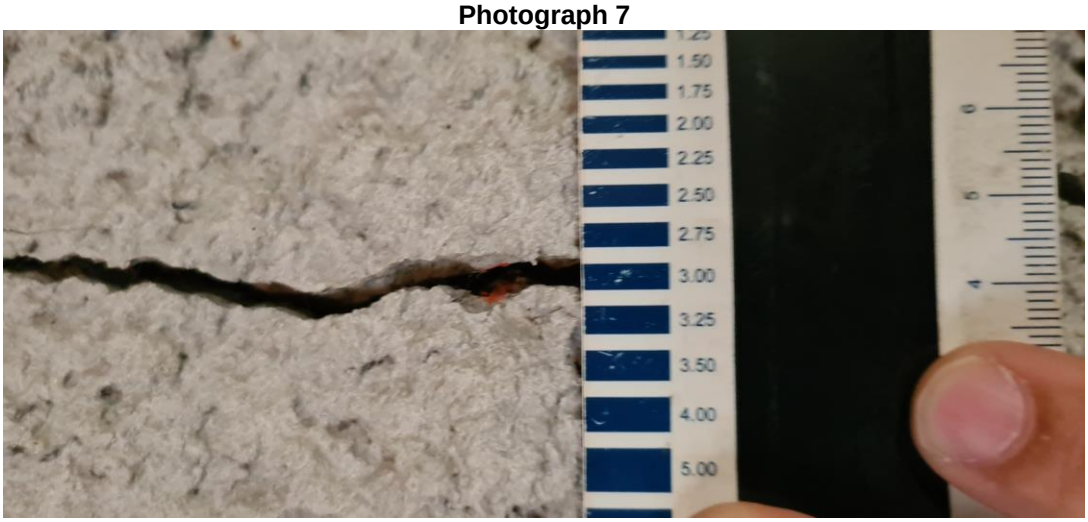
Photograph 7



Photograph 7 – Shotcrete wall crack in the storeroom area measured at 3mm

Photograph 8

Photograph 8 – Cracks of up to 1mm appear throughout the surface of the shotcrete wall

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Photograph 9

Photograph 9 – Surface cracks throughout the floor slab of the storeroom area

Photograph 10

Photograph 10 – Water is ponding in areas where the floor slab has cracks

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Photograph 11

Photograph 11 – Upper floor concrete slab sagging

Photograph 12

Photograph 12 – Upper floor concrete slab sagging

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Photograph 13

Photograph 13 – Upper floor concrete slab sagging

Photograph 14

Photograph 14 – Upper floor concrete slab sagging

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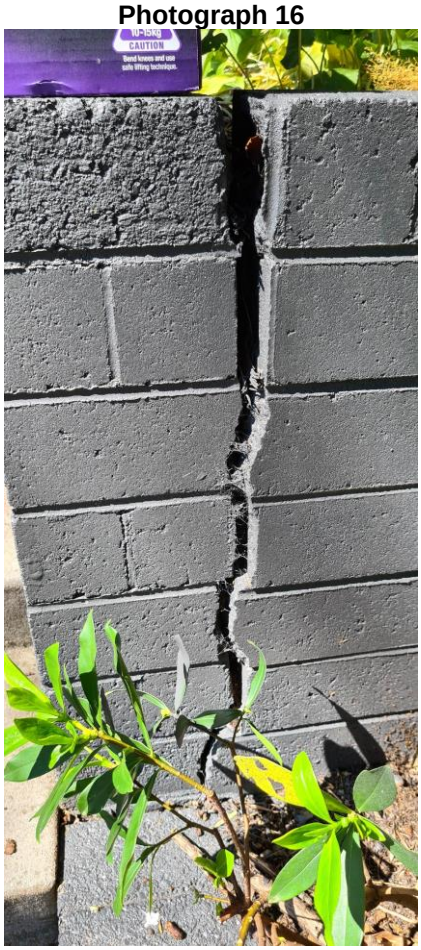
Photograph 15

Photograph 15 – Horizontal crack along shotcrete wall

Photograph 16



Photograph 16 – Brick wall separation between retaining wall and carport wall

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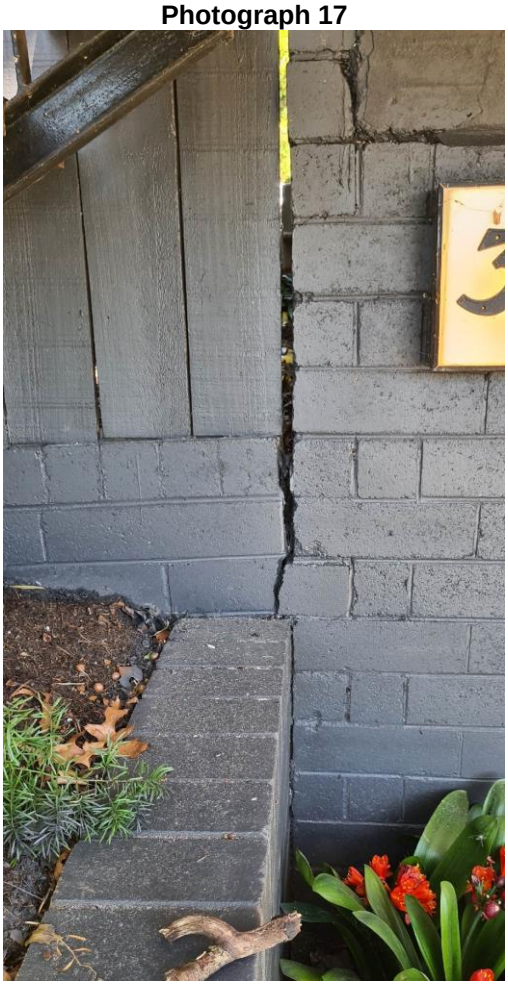
Photograph 17



Photograph 17 – Brick wall separation between retaining wall and carport wall

Photograph 18

Photograph 18 – Stepped crack in brick wall between carport and storeroom

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Photograph 19

Photograph 19 – Stepped crack in brick wall between carport and storeroom

Photograph 20

Photograph 20 – Stepped crack in brick wall between carport and storeroom

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Photograph 21

Photograph 21 – Concrete spalling and honeycombing present along the slab soffit in the carport area

Photograph 22

Photograph 22 – Missing brickwork along bottom course of west brick wall

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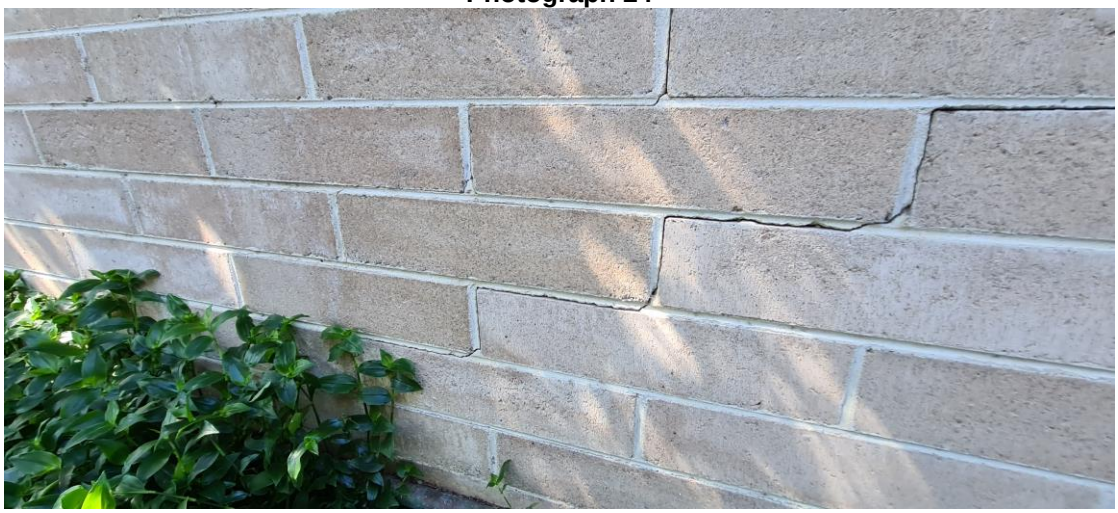
Photograph 23

Photograph 23 – Stepped crack along west brick wall

Photograph 24



Photograph 24 – Continuation of stepped crack along west brick wall

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Photograph 25

Photograph 25 – Corrosion of downpipe on east side of building

Photograph 26

Photograph 26 – Timber fascia rot on east side of building

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Photograph 27

Photograph 27 – Hairline cracks on balcony floor slab

Photograph 28

Photograph 28 – Hairline cracks on balcony floor slab

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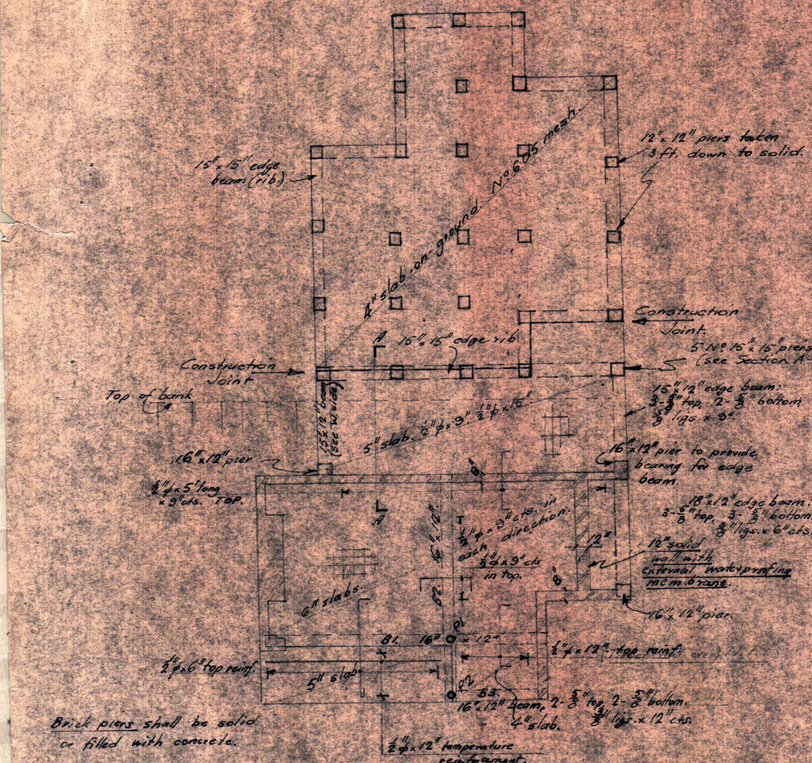
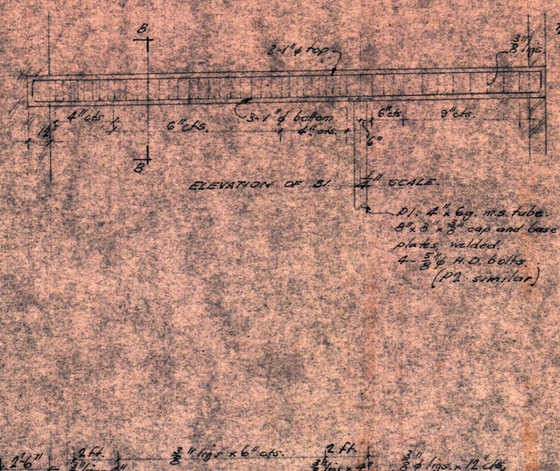
APPENDIX B

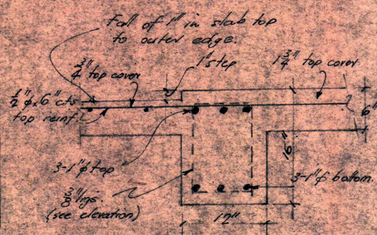
CONSTRUCTION DRAWINGS

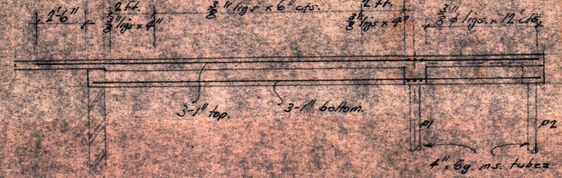
Note: bws. means reinf. both ways.



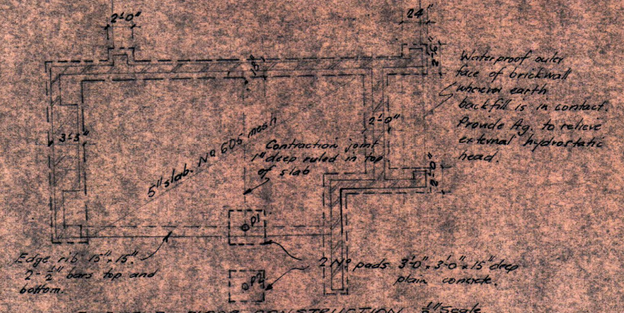
FLOOR CONSTRUCTION PLAN ¼" Scale.
(Showing walls, columns, etc. under.)







ELEVATION OF B2. ½" Scale.



BASEMENT FLOOR CONSTRUCTION. ½" Scale.

GENERAL NOTES:

All concrete 2,500 p.s.i. at 28 days.

Maintain all bars in correct location by metal bar chairs and spacers. Top bars must be accurately placed and Engineer must approve before ANY concrete is poured in suspended floor.

All footings to be taken to firm undisturbed bottom. Reinforc wall footings:
18" wide x 12" deep - 3-½" bws. 3-⅜" bolt. ¼" ligs. x 24".
24" " x 12" " - 3-⅜" " 3-⅜" " do.
3'3" " x 15" " - 305 mesh top and bottom.

All work shall comply with Victorian Building Regulations.

31581

COMPUTATIONS FOR STRUCTURE.

Live Load - 40 #/f². Max earth pressure 1½ ton/f². Concrete f'_c = 2,500 p.s.i.

Spacing piers (12" x 12") under rear section:
load/ft:
roof 6' x 15 #/f² = 90
wall 8 x 5# = 40
floor 3 x 100 = 300
edge rib. say 150
580
∴ spacing = $\frac{2240}{680}$ = 5.8'
make 6' ctrs.

Rib at edge (rear section): make nominal size for 6' span, 15" deep x 15" wide. 3-⅜" top & bottom. ¼" ligs. x 18" ctrs.
V = 3 x 320 = 960 #
say 1140
$v = \frac{1140}{15 \times 86 \times 12}$ = 11 p.s.i.

Slab 9'6" span (rib - wall). w = 40, 60, 100 #/f². M = 115 x 9.5² x $\frac{12}{9}$ = 14,000 #/f. 6" slab. 2 x 9' ½" x 15".
$A_s = \frac{14.0}{18.0 \times 86.4} = .23$

Footing to 9" wall (rear garage):
w = floor 12 x 1.5 = 1330
wall 8 x 90 = 720
2100 #/f.
make 18" wide.

Floor slab 15' x 15'.
M = ½ x 115 x 15 x 1.5 = 21,000
$A_s = \frac{21}{18 \times 86 \times 5} = .28$
6" slab. ½ x 3 bws.

Cantilever slab: M = 100 x 6 x 6 = 22,000 in-lb.
5" slab. $A_s = \frac{22.0}{18.0 \times 86.4} = .85$
5" slab. ½ x 6'. ½ x wall ½".

Beam B1. 16' span.
w = 12 x 100 = 1200 floor
+ 120 self
1320
$M_{pos} = \frac{1320 \times 16}{1.4} = 475,000$ in-lb.
($M_{neg} = \frac{1320 \times 16}{1.4}$ also)
$V_{max} = 1.15 \times 8 \times 1320 = 12.2$ k
try b = 16, d = 14: $K = \frac{475,000}{12 \times 14^2} = 2.89$ (allowable = 2.4). O.K.
b = 12, $A_s = \frac{475.9}{18.0 \times 86.4} = 2.21$
$Z_o = \frac{12 \times 2}{9 \times 86 \times 14} = .11$
$v = \frac{12,200}{12 \times 86 \times 14} = 83$ O.K.
16 x 12 beam
3-1" top
3-1" bottom
⅜" ligs. x 6" ctrs.

Beam B2. 16' span.
make similar to B1.

Footing to P1: load = 120 # x 12.10 = 14,400 #
wt of pad 2,000
16.4 k = 8 T.
area required = $\frac{8}{1.9}$ = 5 s.ft.
3'-3" x 15" plain conc. pad.

WITHERS HOUSE: CORBY RD. N. BALWYN.

ALISTAIR KNOX: DESIGN AND CONSTRUCTION.

GORDON DOGRING B.C.E. ENGINEER.

August 1962.