19 March 2020

**Meinhardt (NSW) Pty Ltd**
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NBRS Architecture
Level 3,
4 Glen Street
**MILSONS POINT NSW 2061**

**ATTENTION: ALICE STEEDMAN**

Dear Madam,

**RE: 19-21 THE CORSO MANLY**
**PROPOSED ALTERATIONS AND ADDITIONS**
**REVIEW OF DESIGN LOADINGS ON EXISTING SYDNEY WATER SEWER**
**STRUCTURAL ENGINEERING VERIFICATION & CERTIFICATION**

We provide our findings in the role of S4 verifier on the structural design of the footings for the proposed alterations and additions for the above mentioned project in relation to the existing Sydney Water sewer culvert located in this site. More specifically our review is to verify that the proposed design does not cause additional loads on the sewer culvert.

The following main documents were reviewed:

- Structural drawings 11401-S0.00 to S5.00 revB 28/2/2020 by Waddington Consulting Pty Ltd (Footing plan drg S1.00 and Ground Floor Sections drg S1.01 attached for reference)
- Structural calculations by Waddington Consulting dated 28/02/2020
- Architectural DA Review issue drawings May 2019 by NBRS Architecture (drg 17349-A-10 attached for reference)
- Geotechnical Report JG18143A dated 30/4/2019 by GeoEnviro Consultancy
- Screw pile design certification by TALL consulting structural engineers
- Statement of Methodology by Waddington Consulting (attached)

The proposed project involves the refurbishment of an existing 4 storey brick building. In essence the design methodology with respect to footing loads is that existing high level footings in the zone of influence of the sewer do not have a net increase in loadings, and other additional loadings (such as the new lift) are carried on footing beam structures which straddle over the sewer and are supported on new screw piles which are founded in dense sand below the zone of influence of the sewer.

In our review we find that the proposed design does not cause additional loadings onto the existing sewer culvert.

This certificate shall not be construed as relieving any other party of their responsibility.

Yours sincerely
**MEINHARDT (NSW) PTY LIMITED**

Rod Wong
BE MEngSc MIEAust CPEng NER APEC Engineer IntPE(Aus)
Associate Director- Structures

Encl.

**Waddington Consulting Pty Ltd**
P.O. Box 1044
Manly NSW 1655
P 0414 393 807

***Proposed Alterations and Additions at 19-21 The Corso, Manly***
***Design Methodology***

**Existing Building**

The existing 4 storey apartment building is of full brick construction with some concrete and some timber framed floors and a timber framed roof. There is some evidence of settlement of the side walls and hence it is assumed that the existing building is constructed on high level strip footings.

The front half of the ground floor level has had numerous older alterations with a number of beams installed in the first floor level that appear to span across the ground floor retail tenancy. The ground level generally appears to be a concrete infill slab on ground.

**Structural Design Objectives**

Apart from normal structural engineering and Australian Code requirement, the design the structures is to avoid any additional loadings on the sewer culvert which runs through the length of the property the top of which is approximately 2.5m below ground level.

**Proposed Construction Procedure**

A construction procedure is to be devised with the goal of avoiding additional load over the sewer main. The proposed alterations involve the removal of many internal brick walls and the construction of new timber framed walls. Through the majority of the middle portion of the building either side of the main internal stairway the replacement of the existing slabs and masonry walls will be replaced with lighter timber and steel framed floors and walls and hence the overall loads on the existing walls will be reduced due to significantly reduced dead loads.

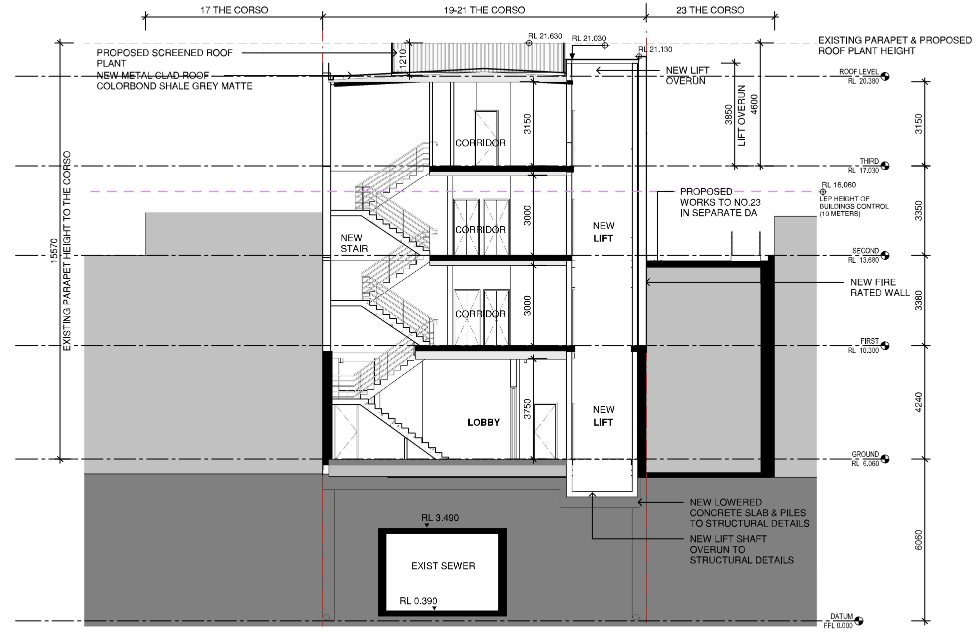
There are new slabs and masonry walls planned for the new fire stair and lift. These will all be built off new reinforced concrete raft slab/footings supported on piles.

There is one existing wall at the northern end of the existing internal stair wall that will remain and will require some steel beams to support existing timber framed floors during construction (and permanently). It is anticipated that the removal of significant dead loads from the masonry walls and some concrete slabs adjacent this wall will more than counter the effects of concentrated floor loads from new beams supporting existing timber framed floors. Refer later calculations.

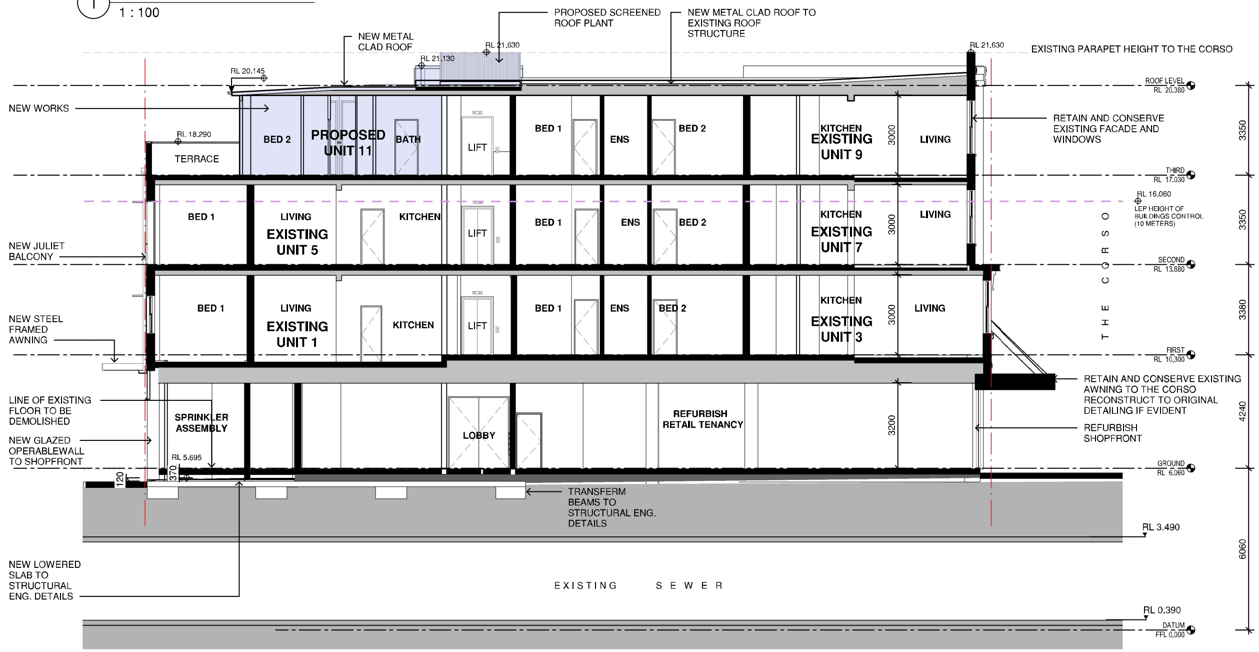
Due to the sandy nature of the soil it is considered steel screw piles will be ideal for this site due to the confined nature of the site, ease of installation and to minimise disturbance to existing, adjacent high level footings These will then be installed to support and new concrete raft slab/footing to support all new wall and floor loads such that the loads are taken below the influence line of the sewer. Concrete footings will be poured on polystyrene sheets to allow for some settlement of the piles and deflection of the raft slab and hence limit any additional loads on the sewer 2m below the 'suspended' concrete footing slabs.

Design Method

1. Estimate design bearing pressures on the top of the sewer culvert due to existing loads
2. Calculate design bearing pressures on the top of the sewer culvert at critical stages during construction, eg after full demolition of internal walls and installation of new beams to support internal floor framing that remains and installation of wet weight of footings before load is transferred to piles
3. The final design is then to support all new wall and floor loads on piled footings taken below the influence line of the sewer. Due to the sandy nature of the soil it is considered steel screw piles will be ideal due to the confined nature of the site, ease of installation and to minimise disturbance to existing, adjacent high level footings
4. Also assess impact of 5T excavator to install screw piles (before wet weight of concrete footing is added) and potentially limit access to excavator to avoid driving directly over sewer if required.




1 CROSS SECTION
1 : 100




2 LONG SECTION
1 : 100

Issue

| No. | Date | Description | Chkd |
|---|---|---|---|
| A | 01/06/18 | PRE DA SUBMISSION | AT |
| B | 14/02/19 | PRE DA SUBMISSION | AT |
| C | 27/02/19 | PRE DA SUBMISSION | AT |
| D | 02/05/2019 | DA SUBMISSION | AT |

PRELIMINARY

Drawing Title
SECTIONS

Project
MANLY CORSO APARTMENTS
REFURBISHMENT + ADDITIONS
at
S.P. 12989
19-21 THE CORSO, MANLY
for
HILROK PROPERTIES PTY LTD

Architect
NBRSARCHITECTURE.
Sydney
61 2 9922 2344
nbrsarchitecture.com



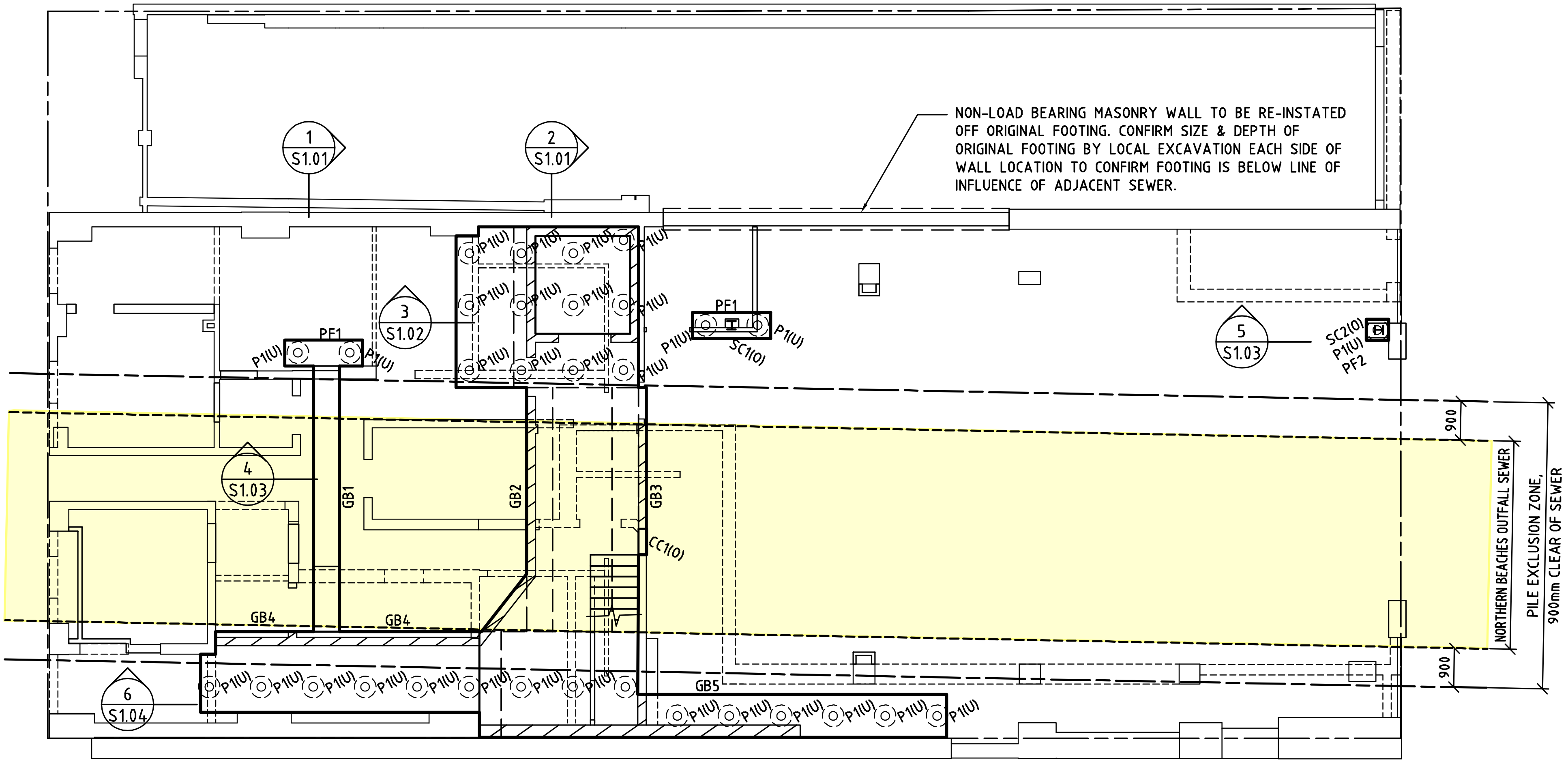
Nominated Architects:
Geoffery Deane 3766; Andrew Duffin; Garry Hoddinett 5286



Date 5/6/2019 2:09:26 PM
Scale 1 : 100 @ A1

Drawing Reference 17349-A-10
Revision D

NOTES:
- FOR GENERAL NOTES REFER DRG No 11401-S0.00 & S0.01




## GROUND FLOOR & FOOTING PLAN

SCALE 1:100

1. ALL RAFT SLAB FOOTINGS & PAD FOOTINGS TO BE SUPPORTED ON STEEL SCREW PILES BEARING ON DENSE SAND GREATER THAN 5.5m BELOW GROUND & HENCE BELOW THE INVERT OF THE NORTHERN BEACHES OUTFALL SEWER.
2. DENOTES:
   - P1 ........................... PROPRIETARY STEEL SCREW PILES MIN 5.5m DEEP BEARING ON DENSE SAND. PILES TO BE RATED TO MINIMUM ALLOWABLE WORKING LOAD 160kN. PILE SETOUT AT 1200mm MINIMUM CENTRES. SCREW PILES TO BE ϕ114x6.0 CHS CONCRETE FILLED WITH 40mpA BLOCK FILL MIX & WITH HELIX EFFECTIVE DIAMETER 450mm.
   - PF1 & PF2.................. REINFORCED CONCRETE PAD FOOTING ON SCREW PILES. REFER DETAILS

## MEMBER SCHEDULE

STEEL COLUMNS
SC1 & SC2................ 200 UC 46
CONCRETE COLUMNS
CC1 ......................... 200 x 600 REINFORCED CONCRETE



| ISSUE | DESCRIPTION | BY | APR | DATE |
|---|---|---|---|---|
| B | RE-ISSUED FOR SYDNEY WATER ASSESSMENT - PILES REVISED | JC | SW | 28.02.2020 |
| A | ISSUED FOR SYDNEY WATER ASSESSMENT | JC | SW | 23.10.2019 |

CHARTERED PROFESSIONAL ENGINEERS:
Waddington Consulting Pty Ltd
ACN 130 522 851
Structural and Civil Engineering Consultants
P.O. Box 1044 Manly NSW 1655
Phone 0414 393 807
Email enquiries@wadconsulting.com

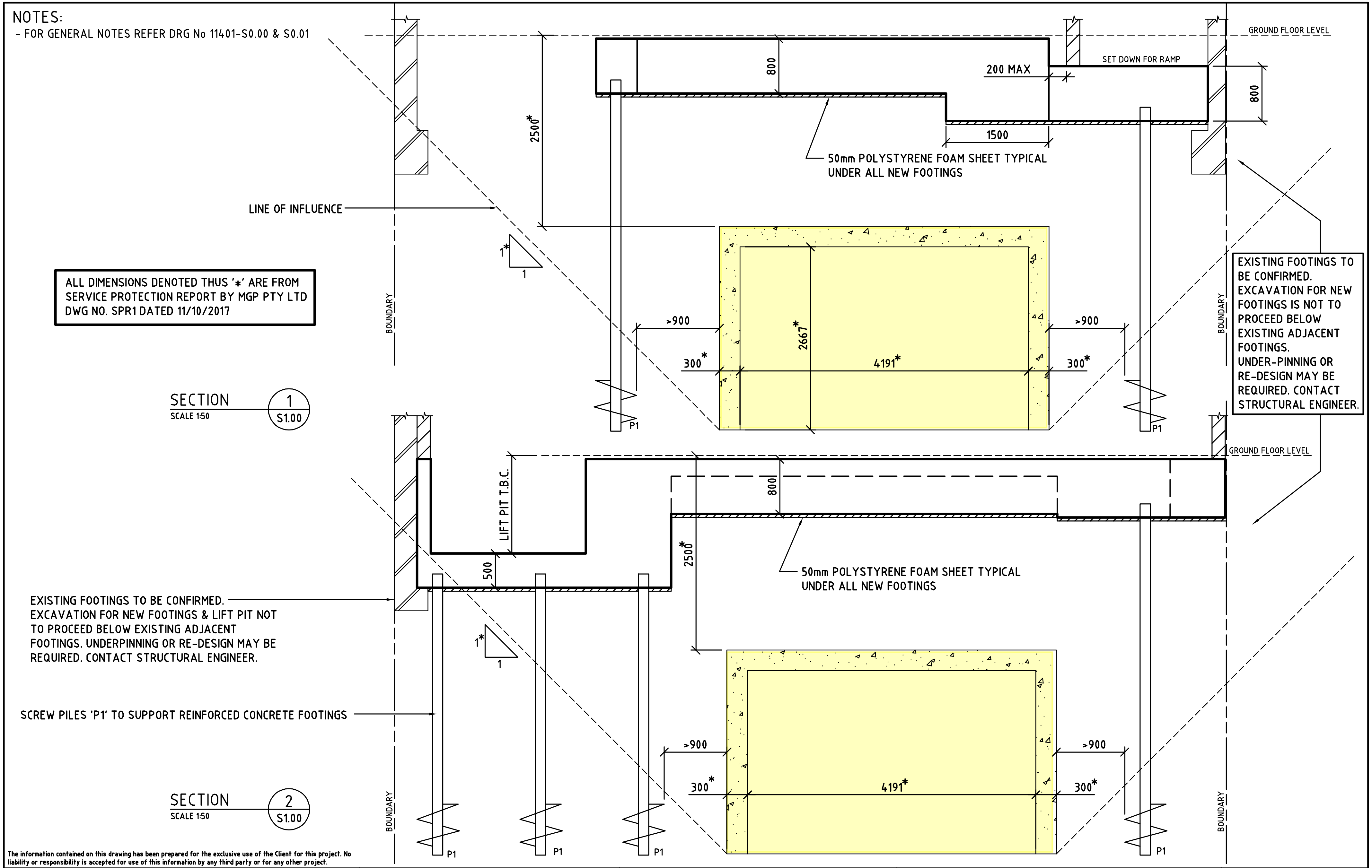
PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
GROUND FLOOR & FOOTING PLAN

DESIGN: S.W. | DATE: OCT 2019
DRAWN: J.C. | SCALE: 1:100
FILENAME: 11401-S1.00.DWG
SIGNED:
SIZE A3
DRAWING No: 11401-S1.00
REV B

NOTES:
- FOR GENERAL NOTES REFER DRG No 11401-S0.00 & S0.01

ALL DIMENSIONS DENOTED THUS '*' ARE FROM SERVICE PROTECTION REPORT BY MGP PTY LTD DWG NO. SPR1 DATED 11/10/2017




The information contained on this drawing has been prepared for the exclusive use of the Client for this project. No liability or responsibility is accepted for use of this information by any third party or for any other project.

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PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
GROUND FLOOR SECTIONS - SHT 1/4

DESIGN: S.W. DATE: OCT 2019
DRAWN: J.C. SCALE: 1:50
FILENAME: 11401-S1.01.DWG
SIGNED:
SIZE A3
DRAWING No: 11401-S1.01
REV B

**Waddington Consulting Pty Ltd**
ACN 130 522 851
Structural and Civil Engineering
P.O. Box 1044
Manly NSW 1655

P 0414 393 807

Our ref: 11401-L1

1 March 2020

Hilrok Properties Pty Ltd
17 The Corso
Manly NSW 2095

Attention: Mr Tim Peterson

Dear Tim,

***Subject: Alterations and Additions at 19-21 The Corso, Manly***
***Certificate for Engineering Design & Structural Adequacy***

Please find attached copies of engineering drawings 11401-S0.00, S0.01, S1.00, S1.01, S1.02, S1.03, S2.00, S3.00, S4.00, S5.00, revision B relating to the proposed alterations and additions at 19-21 The Corso, Manly.

I certify that the structural engineering design of the elements shown on the above-mentioned plans has been carried out in accordance with the BCA, relevant Australian Standards and normal engineering practice. Furthermore, the design has been carried out to avoid any additional loads impacting the existing sewer main running under the property.

The existing four storey building consists of full brick construction with a metal sheet roof. Overall, the structure appeared to be generally in fair condition for its age although there are significant sections of the building that are in urgent need of remedial work or replacement. There is also some evidence of settlement cracking in the brickwork particularly on the rear elevation. The existing structures that will remain are considered capable of withstanding the loading from the proposed additions and additions because a number of brick walls and concrete slabs will generally be replaced with lighter timber frame construction.

Please do not hesitate to contact me if you have any queries regarding this project or require any further structural engineering advice.

Yours sincerely,

**Simon Waddington**
MIEAust CPEng NPER (Structural)
Director
Waddington Consulting Pty Ltd

**Waddington Consulting Pty Ltd**
P.O. Box 1044
Manly NSW 1655
P 0414 393 807

***Proposed Alterations and Additions at 19-21 The Corso, Manly***
***Design Methodology***

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# PROPOSED ALTERATIONS & ADDITIONS
# at: 19-21 THE CORSO, MANLY
# for: HILROK PROPERTIES PTY LTD

## STRUCTURAL DRAWINGS



## STRUCTURAL NOTES

### GENERAL

G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.

G2 THE INFORMATION CONTAINED ON THESE DRAWINGS IS FOR STRUCTURAL ENGINEERING PURPOSES ONLY. IN ALL OTHER MATTERS, THE APPROVED ARCHITECTS DRAWINGS SHALL TAKE PRECEDENCE. ALL DISCREPANCIES THAT COULD RESULT IN CHANGES TO THE STRUCTURAL DETAILS SHALL BE REFERRED TO THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

G3 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES.

G4 DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

G5 THE BUILDER SHALL GIVE 48 HOURS NOTICE FOR ALL ENGINEERING INSPECTIONS.

G6 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES. ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.

G7 THE STRUCTURAL COMPONENTS DETAILED ON THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND LOCAL GOVERNMENT ORDINANCES.

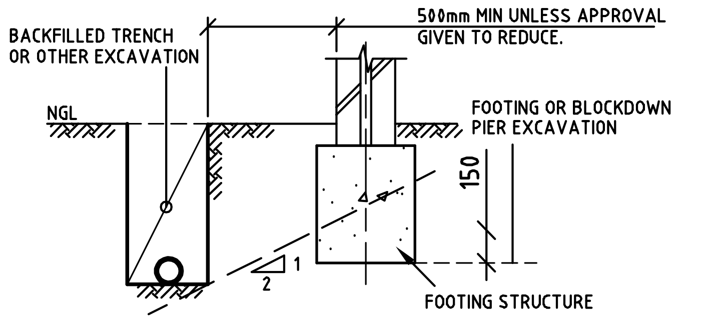
G8 WIND LOADS ARE DETERMINED IN ACCORDANCE WITH AS4055 FOR WIND CLASSIFICATION: 'N1' WITH A METAL SHEET ROOF.

### FOUNDATIONS & EARTHWORKS

F1 SCREW PILE FOUNDATIONS ARE TOP BE TAKEN TO DENSE SAND LAYER GREATER THAN 5.5m BELOW GROUND LEVEL. PROPRIETARY SCREW PILES TO BE LOAD RATED BY THE INSTALLER TO SUIT THE SPECIFIED ALLOWABLE LOAD CAPACITY PROVIDED.

F2 TOPSOIL INCLUDING GRASS ROOTS IS TO BE REMOVED FROM THE AREA TO SUPPORT SLABS AND FOOTINGS. FOOTINGS TO BE CONSTRUCTED AND BACKFILLED AS SOON AS POSSIBLE FOLLOWING EXCAVATION TO AVOID SOFTENING OR DRYING OUT BY EXPOSURE. TRENCHES TO BE DEWATERED & CLEANED OUT PRIOR TO CONCRETE PLACEMENT.

F3 UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE LIMITS OF EXCAVATIONS NEAR EXISTING FOOTINGS SHALL BE AS SET OUT IN THE DETAIL BELOW.




PRIOR TO ANY EXCAVATION NEAR EXISTING FOOTINGS, THE BUILDER SHALL DETERMINE THE DEPTH OF FOUNDING OF EXISTING FOOTINGS BY LOCAL INVESTIGATORY EXCAVATION. GENERAL EXCAVATION SHALL NOT PROCEED BELOW A LEVEL 150mm ABOVE THE UNDERSIDE OF EXISTING FOOTINGS UNTIL INSTRUCTION IS OBTAINED FROM THE ENGINEER ON PROCEDURES & PRECAUTIONS TO BE TAKEN.

F4 CONTROLLED FILL: SAND FILL UP TO 0.8m DEEP, WELL COMPACTED IN NOT MORE THAN 300mm THICK LAYERS BY A VIBRATING PLATE OR VIBRATING ROLLER. NON-SAND FILL UP TO 0.4m DEEP, WELL COMPACTED IN LAYERS NOT MORE THAN 150mm DEEP BY A MECHANICAL ROLLER. CLAY FILL SHALL BE MOIST DURING COMPACTION.

### FORMWORK

CF1 THE DESIGN, CONSTRUCTION, CERTIFICATION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE BUILDER, EXCEPT TO THE EXTENT THAT THE FORMWORK DESIGN IS SHOWN ON THE DRAWINGS.

CF2 DESIGN AND CONSTRUCTION AND STRIPPING TIMES TO COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE APPROVED BY THE ENGINEER.

CF3 DURING CONSTRUCTION, SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORTED SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED, THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LOADS SET OUT IN THE GENERAL NOTES.

CF4 THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE FORMWORK CONTRACTOR SHALL PROVIDE FORMWORK CERTIFICATION AS REQUIRED BY THE WORKCOVER AUTHORITY OF NSW.

CF5 DO NOT PLACE PERMANENT LOADS, INCLUDING MASONRY WALLS ON THE CONCRETE STRUCTURE UNTIL AFTER FORMWORK AND PROPPING IS REMOVED.

CF6 DESIGN INFORMATION CONCERNING THE FOUNDATION FORMWORK SHALL BE DETERMINED FROM THE CONDITIONS EXISTING ON SITE AT THE TIME OF CONSTRUCTION. REFER ALSO TO THE GEOTECHNICAL REPORT WHERE AVAILABLE.

CF7 UNLESS NOTED OTHERWISE PROVIDE UPWARD CAMBER TO FORMWORK OF CANTILEVERS OF 'L'/120, WHERE 'L' IS THE SHORTEST PROJECTION BEYOND COLUMN OR WALL FACE, AND TO FORMWORK OF SLABS WHERE NOTED ON PLAN. MAINTAIN THE SLAB AND BEAM DEPTHS SHOWN.

### REINFORCEMENT

R1 ALL REINFORCING BARS SHALL BE GRADE D500N TO AS4671 UNLESS NOTED OTHERWISE. ALL MESH SHALL BE GRADE 500L TO AS4671 AND SHALL BE SUPPLIED IN FLAT SHEETS.

R2 REINFORCEMENT NOTATION SHALL BE AS FOLLOWS IN THE FOLLOWING ORDER

```
NUMBER OF BARS IN GROUP
 |  ____________________ BAR GRADE AND TYPE
17N20-250
   |  __________________ SPACING IN mm
NOMINAL BAR SIZE IN mm
```

R3 REINFORCEMENT SYMBOLS:

'N' - DENOTES GRADE 500 N DEFORMED BARS TO AS4671 GRADE N.
'R' - DENOTES GRADE 250 R HOT ROLLED PLAIN BARS TO AS4671.
'F' - DENOTES HARD-DRAWN WIRE REINFORCING MESH TO AS4671.
'W' - DENOTES HARD-DRAWN PLAIN WIRE TO AS4672.
'SL'or 'RL' - DENOTES WELDED GRADE 500 REINFORCING MESH TO AS 4671

### REINFORCEMENT Cont

R4 SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN OR OTHERWISE APPROVED IN WRITING BY THE ENGINEER. LAPS SHALL BE IN ACCORDANCE WITH AS 3600 AND NOT LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR. AS SHOWN IN THE TABLE BELOW.

SPLICE SCHEDULE

| BAR DIA | TENSION SPLICE LENGTH | COMPRESSION SPLICE LENGTH |
|---|---|---|
| N12 | 475 | 450 |
| N16 | 750 | 600 |
| N20 | 1000 | 750 |
| N24 | 1100 | 900 |

R5 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.

R6 WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY THE ENGINEER.

R7 MESH SHALL BE LAPPED 2 TRANSVERSE WIRES PLUS 50mm. BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF THE WIRE.

R8 SLAB REINFORCEMENT SHALL EXTEND AT LEAST 65mm ONTO MASONRY SUPPORT WALLS AND 50% OF BOTTOM REINFORCEMENT SHALL BE COGGED TO ACHIEVE ANCHORAGE AT SIMPLY SUPPORTED ENDS. IF THIS CANNOT BE ACHIEVED DUE TO COVER REQUIREMENTS THEN ALL THE BARS SHALL BE COGGED. FOR MESH THE LAST WELDED CROSS ROD SHALL BE LOCATED OVER THE WALL AND 50mm MINIMUM BEYOND THE FACE OF THE WALL.

R9 WHERE TRANSVERSE TIE BARS ARE NOT SHOWN PROVIDE N12-400 SPLICED WHERE NECESSARY AND LAP WITH MAIN BARS 400MM UNLESS NOTED OTHERWISE.

R10 NO OPENINGS IN BEAMS OR COLUMNS SHALL BE MADE OTHER THAN THOSE SPECIFICALLY DETAILED. FOR OPENINGS IN SLABS UP TO 300mm SQUARE THE REINFORCEMENT SHALL BE DISPLACED TO THE SIDES. FOR OPENINGS BETWEEN 300mm SQUARE AND 600mm SQUARE THE REINFORCEMENT CROSSING THE PROPOSED OPENING SHALL BE CUT AND THE HOLES TRIMMED USING 2N12 BARS TOP AND BOTTOM EXTENDING 1500mm PAST EACH SIDE OF OPENING. OPENINGS LARGER THAN 600mm SQUARE SHALL BE DETAILED BY THE ENGINEER.

R11 JOGGLES TO BARS SHALL COMPRISE A LENGTH OF 12 BAR DIAMETERS BETWEEN BEGINNING AND END OF AN OFFSET OF 1 BAR DIAMETER.

R12 ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1 METRE CENTRES BOTH WAYS, AND 800 EACH WAY FOR MESH. WHEN POURED ON GROUND AS FORMWORK PROVIDE PLATES UNDER ALL BAR CHAIRS.
PLASTIC TIPPED STEEL CHAIRS SHALL NOT BE USED ON EXPOSED FACES IN EXPOSURE CLASSIFICATION B1, B2 AND C ONLY PLASTIC OR CONCRETE CHAIRS.

R13 SITE BENDING OF REINFORCEMENT SHALL BE AVOIDED IF POSSIBLE. WHERE SITE BENDING IS UNAVOIDABLE IT SHALL BE CARRIED OUT COLD, WITHOUT THE APPLICATION OF HEAT, AND IN ACCORDANCE WITH THE PRACTICE NOTE 'RPN1' OF THE STEEL REINFORCEMENT INSTITUTE OF AUSTRALIA USING MECHANICAL BENDING TOOLS.



| ISSUE | DESCRIPTION | BY | APR | DATE |
|---|---|---|---|---|
| B | RE-ISSUED FOR SYDNEY WATER ASSESSMENT - PILES REVISED | JC | SW | 28.02.2020 |
| A | ISSUED FOR SYDNEY WATER ASSESSMENT | JC | SW | 23.10.2019 |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PROJECT: PROPOSED ALTERATIONS & ADDITIONS at: 19-21 THE CORSO, MANLY for: HILROK PROPERTIES PTY LTD

DRAWING TITLE: STRUCTURAL NOTES-SHT 1 of 2

DESIGN: S.W. | DATE: OCT 2019
DRAWN: J.C. | SCALE: N/A
FILENAME: 11401-S1.00.DWG
SIGNED:
SIZE: A3
DRAWING No: 11401-S0.00 | REV: B

## CONCRETE

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS. READYMIX CONCRETE SUPPLY SHALL COMPLY WITH AS 1379. ALL CEMENT TO BE TYPE 'SL' PORTLAND.

C2 MAXIMUM DRYING SHRINKAGE SHALL BE 600 MICROSTRAIN AT 56 DAYS. PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING.

C3 CLEAR CONCRETE COVER TO ALL REINFORCEMENT SHALL BE AS FOLLOWS UNLESS SHOWN OTHERWISE.

| LOCATION | CONCRETE GRADE (MPa) | CAST AGAINST GROUND | CAST IN FORMS WITH EXPOSURE | CAST IN FORMS & NOT EXPOSED |
|---|---|---|---|---|
| FOOTINGS | 32 | 50 | 50 | 30 |
| SLABS ON GROUND | 32 | 40 | 40 | 25 |
| SUSPENDED SLABS | 32 | 40 | 40 | 25 |

NOTE: WHERE CONCRETE IS POURED ON A VAPOURPROOF MEMBRANE 0.2 mm MINIMUM THICKNESS, THE COVER TO CONCRETE CAST AGAINST GROUND MAY BE REDUCED BY 10 mm.

C4 NO ADMIXTURES OTHER THAN LOW RANGE WRA SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING.

C5 DEPTHS OF BEAMS ARE GIVEN FIRST AND INCLUDE SLAB THICKNESS.

C6 CONCRETE SIZES SHOWN DO NOT INCLUDE THICKNESSES OF APPLIED FINISHES. FINISHES. NO FINISH WHICH DECREASES COVER IS ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

C7 FOR CHAMFERS, DRIP GROOVES, REGLETS, ETC REFER TO ARCHITECT'S DETAILS, MAINTAIN COVER TO REINFORCEMENT AT THESE DETAILS.

C8 NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ENGINEER.

C9 CONSTRUCTION JOINTS AND CLOSING STRIPS SHALL BE USED TO CONTROL AND REDUCE SHRINKAGE CRACKING IN WALLS AND FLOORS, AND COLD JOINTS IN LARGE POURS. THESE JOINTS SHALL BE PLANNED IN ADVANCE, TO THE APPROVAL OF THE ENGINEER.

C10 THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.

C11 CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 3 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 7 DAYS FOLLOWED BY A GRADUAL DRYING OUT. APPROVED SPRAYED ON CURING COMPOUNDS COMPLYING WITH AS 3799 MAY BE USED WHERE NO FLOOR FINISHES ARE PROPOSED. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC.

C12 CONDUITS, PIPES, ETC, SHALL ONLY BE LOCATED IN THE MIDDLE ONE THIRD OF SLAB DEPTH AND SPACED AT NOT LESS THAN 3 DIAMETERS AND SHALL NOT BE PLACED WITHIN THE REINFORCEMENT COVER

C13 REPAIRS TO CONCRETE SHALL NOT BE ATTEMPTED WITHOUT THE PERMISSION OF THE ENGINEER.

## STRUCTURAL STEEL

S1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 4100 AND AS 1554 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

S2 UNLESS NOTED OTHERWISE ALL MATERIAL SHALL BE:
- GRADE 250 HOT-ROLLED PLATES COMPLYING WITH AS 3678;
- GRADE 250 HOT-ROLLED FLATS, TFC, TFB, ANGLES 100x100EA OR 125x75UA AND SMALLER COMPLYING WITH AS 3679.1;
- GRADE 300PLUS UB, UC, PFC AND ANGLES 125x125EA OR 150x90UA AND LARGER;
- GRADE 300 WB, WC COMPLYING WITH AS 3679.2;
- GRADE C350 RHS, CHS COMPLYING WITH AS 1163;

S3 THREE(3) COPIES OF WORKSHOP FABRICATION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AT LEAST 7 DAYS PRIOR TO COMMENCEMENT OF FABRICATION AND PERMISSION TO USE OBTAINED PRIOR TO FABRICATION. PERMISSION TO USE DOES NOT RELIEVE THE BUILDER OF THE FULL RESPONSIBILITY FOR DIMENSIONS, FIT AND COMPLIANCE WITH ARCHITECTURAL AND ENGINEERING DRAWINGS.

S4 BOLTS:-
4.6/S.....COMMERCIAL BOLTS OF GRADE 4.6 TO AS 1111, SNUG TIGHTENED.
8.8/S.....HIGH STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS 1252, SNUG TIGHTENED.
8.8/TB.....HIGH STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS 1252 FULLY TENSIONED TO AS 4100 AS BEARING JOINT
8.8/TF.....HIGH STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS 1252 FULLY TENSIONED TO AS 4100 AS A FRICTION JOINT WITH FACING SURFACES LEFT UNCOATED
ALL BOLTS SHALL BE M20 GRADE 8.8/S UNLESS NOTED.
NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS.
ALL BOLTS, NUTS & WASHERS TO BE GALVANISED.
TB AND TF BOLTS TO BE INSTALLED USING APPROVED LOAD INDICATING WASHERS, OR BY TURN OF NUT CONTROL OF TENSIONING.

S5 WELDING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1554.1. WELDING CONSUMABLES SHALL BE E48XX OR W50X U.N.O. ALL WELD SHALL BE 6 mm CFW SP CATEGORY U.N.O. CPBW SHALL BE SP CATEGORY U.N.O. INSPECTION SHALL BE CARRIED OUT TO AS 1554.1. ALL GP/SP WELDS SHALL BE 100% VISUALLY SCANNED. SP WELDS ALLOW FOR 10% VISUAL EXAMINATION U.N.O. BUTT WELDS SHALL BE COMPLETE PENETRATION WELDS TO AS 1554.

S6 ALL DETAILS, GAUGE LINES ETC. WHERE NOT SPECIFICALLY SHOWN ARE TO BE IN ACCORDANCE WITH AISC DESIGN CAPACITY TABLES FOR STRUCTURAL STEEL AND AISC STANDARDIZED STRUCTURAL CONNECTIONS. PLATES TO BE 10mm THICK, EX-STANDARD SQUARE EDGE FLATS U.N.O.

S7 PROVIDE SEAL PLATES TO ALL HOLLOW SECTIONS. PROVIDE VENT HOLES TO HOLLOW MEMBERS & DRAIN HOLES TO ALL MEMBERS TO BE HOT DIP GALVANISED.

S8 IT IS THE BUILDER'S RESPONSIBILITY TO ENSURE THAT STEELWORK IS SECURELY TEMPORARILY BRACED AS NECESSARY TO STABILISE THE STRUCTURE DURING ERECTION.

S9 STRUCTURAL STEELWORK SHALL HAVE THE FOLLOWING SURFACE TREATMENT IN ACCORDANCE WITH THE SPECIFICATION.

| ELEMENT | SURFACE CLEANING | PROTECTIVE COATING |
|---|---|---|
| INTERNAL | POWER WIRE BRUSHING or ABRASIVE GRIT BLASTING | 1 COATRUST INHIBITIVE ALKYD PRIMER OR EQUIV. + 1 TOP COAT ALL WEATHER GLOSS ACRYLIC |
| EXTERNAL | ABRASIVE GRIT BLASTING (CLASS 2.5) or PICKLING | 1 COAT INORGANIC ZINC SILICATE PRIMER OR EQUIV. + 1 TOP COAT ALL WEATHER GLOSS ACRYLIC WITH UV PROTECTOR |
| EXTERNAL (ALT.) | PICKLING | HOT DIP GALVANISED |

S10 THE BUILDER SHALL PROVIDE ALL CLEATS AND DRILL ALL HOLES NECESSARY FOR FIXING STEEL TO STEEL AND TIMBER TO STEEL WHETHER OR NOT DETAILED ON THE DRAWINGS.
THE FABRICATION AND ERECTION OF THE STRUCTURAL STEELWORK SHALL SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, ENSURING ALL REQUIREMENTS OF THE DESIGN ARE MET.

S11 ALL BEAMS AND RAFTERS SHALL BE INSTALLED AND ERECTED WITH NATURAL CAMBER UP.
ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS.
SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.

## BLOCKWORK

BL1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700.

BL2 STRENGTHS OF MASONRY UNITS AND TYPE OF MORTAR SHALL BE AS FOLLOWS:
CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH f'uc = 15 MPa
MORTAR (CEMENT : LIME : SAND) = 1 : 0.25 : 3
MORTAR ADMIXTURES SHALL NOT BE USED WITHOUT THE WRITTEN APPROVAL OF THE SUPERINTENDENT.

BL3 ONLY LOAD BEARING MASONRY WALLS ARE SHOWN UNDER CONCRETE SLABS.

BL4 OTHER THAN REINFORCED CONCRETE BLOCKWORK, MASONRY SUPPORTING SLABS AND BEAMS SHALL BE TROWELLED SMOOTH WITH MORTAR FILLING ALL VOIDS. TWO LAYERS OF MALTHOID SHALL BE PLACED FULL WIDTH ACROSS SUCH LOAD BEARING SURFACES EXCEPT WHERE PROPRIETARY BEARING STRIP IS NOTED OR ALTERNATIVE DETAIL IS DOCUMENTED. THE HEADS OF LOAD BEARING WALLS SHALL NOT EXTEND ABOVE THE SOFFIT OF THE CONCRETE SLAB ABOVE.

BL5 ALL MASONRY SUPPORTING OR SUPPORTED BY CONCRETE FLOORS SHALL BE PROVIDED WITH VERTICAL JOINTS TO MATCH ANY CONTROL JOINTS IN THE CONCRETE.

BL6 NO CHASES OR RECESSES ARE PERMITTED IN LOAD BEARING MASONRY WITHOUT THE APPROVAL OF THE ENGINEER.

BL7 PROVIDE VERTICAL CONTROL JOINTS AT 10 m MAX. CENTRES GENERALLY, AND 5 m MAX. FROM CORNERS FOR BRICKWORK AND UNREINFORCED BLOCKWORK.

BL8 REFER TO CONCRETE NOTES FOR DE-PROPPING PRIOR TO CONSTRUCTION OF MASONRY WALLS ON SUSPENDED SLABS.

BL9 REINFORCED CONCRETE BLOCKWORK SHALL COMPLY WITH THE FOLLOWING, UNLESS NOTED:
* PROVIDE CLEANOUT HOLES 100 mm SQUARE MINIMUM AT BASE OF ALL WALLS AND ROD CORE HOLES TO REMOVE PROTRUDING MORTAR FINS PRIOR TO GROUTING.
* CORE FILLING GROUT SHALL BE :- f'c = 20 MPa
MINIMUM CEMENT CONTENT = 300 kg/m,
SLUMP = 230 ± 30 mm.
* REINFORCEMENT PROJECTING FROM FOUNDATION OR SLABS INTO CORES, SHALL BE SET ACCURATELY IN PLACE USING TEMPLATES TO ALIGN WITH THE CENTRE OF THE LENGTH OF CORES AND WITH COVER AS NOTED. WHERE HORIZONTAL BARS ARE INDICATED, THE WEBS OF THE BLOCKS BELOW THE BARS SHALL BE CUT DOWN TO ACCOMMODATE THE BARS.
* GROUT ALL CORES IN REINFORCED BLOCKWORK UNLESS OTHERWISE NOTED. HEIGHT OF BLOCKWORK TO BE GROUTED ON ONE DAY SHALL BE 2400mm. GROUT SHALL BE PLACED IN LIFTS OF 1200mm MAXIMUM AND COMPACTED BY POKER VIBRATOR. A SHORT TIME SHOULD ELAPSE BETWEEN SUCCESSIVE LIFTS TO ALLOW PLASTIC SETTLEMENT TO OCCUR.
* PROVIDE 50 mm COVER FROM THE OUTSIDE OF THE BLOCKWORK UNLESS NOTED.

BL10 BACKFILL TO RETAINING WALLS SHALL BE FREE DRAINING GRANULAR MATERIAL. PROVIDE SUBSOIL DRAIN AT BASE OF WALL. DO NOT BACKFILL UNTIL 14 DAYS AFTER GROUTING, OR IF APPLICABLE, AFTER RESTRAINING SLAB OVER HAS BEEN POURED AND CURED FOR 7 DAYS. BACKFILL SHALL BE COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT ± 2 %.

## BRICKWORK

Bk1 ALL MATERIALS AND WORKMANSHIP TO BE TO AS 3700.

Bk2 ONLY LOAD BEARING MASONRY WALLS ARE SHOWN UNDER CONCRETE SLABS.

Bk3 MINIMUM CLAY BRICK COMPRESSIVE STRENGTH TO BE 20MPa. RATE OF ABSORPTION TO BE LESS THAN 1.5KG/M2/MIN AT THE TIME OF LAYING. CLAY BRICKS SHALL BE AT LEAST 30 DAYS OUT OF THE KILN AND WILL OFTEN REQUIRE PRE-WETTING UNLESS PROOF OF A MOISTURE EXPANSION LESS THAN 0.6MM/M IS PRODUCED. UNLESS NOTED OTHERWISE MORTAR FOR CLAY BRICKWORK IS TO BE CEMENT: LIME: SAND IN THE RATIO OF 1 : 1 : 6 AND THE WATER RETENTIVITY MUST BE AT LEAST 90%. NO ADDITIVES SHALL BE USED UNLESS APPROVED IN WRITING. BRICKWORK IS TO BE ADEQUATELY CURED PRIOR TO CONSTRUCTION OF SUSPENDED SLABS OVER.

Bk4 UNLESS NOTED OTHERWISE CLAY BRICKWORK IS TO CONTAIN MOVEMENT JOINTS 20MM WIDE AT MAXIMUM SPACING OF 10M (15M IN INDUSTRIAL USE) AND ARE TO CONTAIN 40MM TAR IMPREGNATED POLYURETHANE STRIP. WHERE INTERNAL SKIN IS INTERRUPTED BY STEEL FRAMES THE ABOVE JOINTING APPLIES TO EXTERNAL SKIN ONLY.

Bk5 ALL MASONRY SUPPORTING OR SUPPORTED BY CONCRETE FLOORS SHALL BE PROVIDED WITH VERTICAL JOINTS TO MATCH ANY CONTROL JOINTS IN THE CONCRETE.

Bk6 NON LOAD BEARING WALLS BUILT PRIOR TO POURING CONCRETE SHALL BE SEPARATED FROM CONCRETE ABOVE BY 16 mm THICK CLOSED CELL POLYSTYRENE STRIP. WHERE BUILT AFTER CONCRETE IS POURED LEAVE 12mm CLEAR OF CONCRETE SOFFIT.

Bk7 BRICKWORK SUPPORTING SLABS AND BEAMS SHALL BE TROWELLED SMOOTH WITH MORTAR FILLING ALL VOIDS. TWO LAYERS OF MALTHOID SHALL BE PLACED FULL WIDTH ACROSS SUCH LOAD BEARING SURFACES EXCEPT WHERE PROPRIETARY BEARING STRIP IS NOTED OR ALTERNATIVE DETAIL IS DOCUMENTED. THE HEADS OF LOAD BEARING WALLS SHALL NOT EXTEND ABOVE THE SOFFIT OF THE CONCRETE SLAB ABOVE.

Bk8 ALL DOUBLE SKIN SOLID WALLS SUCH AS 230mm THICK BRICKWORK SHALL BE BONDED BY A HEADER COURSE EVERY 4th COURSE.

## TIMBER

T1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS1684 AND AS1720.1.

T2 TIMBER TO BE SEASONED & MINIMUM GRADE F7 UNLESS NOTED OTHERWISE.

T3 ALL BOLTS, NUTS AND WASHERS FOR TIMBER CONNECTIONS TO BE HOT-DIP GALVANISED & GRADE 4.6. WHERE POSSIBLE, BOLTS SHALL BE RETIGHTENED AT THE END OF THE MAINTAINANCE PERIOD. BOLT HOLES SHALL BE DRILLED NO MORE THAN 1 mm OVERSIZE. WASHERS UNDER ALL HEADS AND NUTS SHALL BE AT LEAST 2.5 x BOLT DIA.

T4 MINIMUM BOLT SPACINGS IN TIMBER TO BE 5xBOLT DIAMETER. MIN EDGE DISTANCES FOR BOLTED CONNECTIONS TO BE 4xBOLT DIAMETER. MIN END DISTANCE FOR BOLTED CONNECTIONS TO BE 5xBOLT DIAMETER.

T5 MINIMUM TIMBER CONNECTIONS TO BE NOMINAL FIXINGS IN ACCORDANCE WITH AS 1684 UNLESS NOTED OTHERWISE.

T6 TIE-DOWN SHALL BE IN ACCORDANCE WITH AS1684.2 SECTION 9 UNLESS NOTED OTHERWISE.

T7 ALL TIMBER JOINTS AND NOTCHES ARE TO BE 100mm MINIMUM AWAY FROM LOOSE KNOTS, SEVERE SLOPING GRAIN, GUM VEINS OR OTHER MINOR DEFECTS.

T8 ALL TIMBER TO BE EITHER PLANTATION TIMBERS, TIMBER PRODUCTS MANUFACTURED FROM SUSTAINABLY MANAGED FORESTS OR RECYCLED TIMBERS.

T9 EXTERNAL TIMBER SHALL BE EITHER HARDWOOD DURABILITY CLASS I OR II TO AS 1720.2 OR IMPREGNATED PINE GRADE F7, PRESSURE TREATED TO AS1604 AND RE-DRIED PRIOR TO USE. SUPPLEMENTARY TREATMENT SHALL BE APPLIED TO ALL CUT SURFACES. SUPPLY SUPPORTING DOCUMENTATION FOR PRESERVATIVE TREATMENT.



| ISSUE | DESCRIPTION | BY | APR | DATE |
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PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
STRUCTURAL NOTES-SHT 2 of 2

| | |
|---|---|
| DESIGN: S.W. | DATE: OCT 2019 |
| DRAWN: J.C. | SCALE: N/A |
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NOTES:
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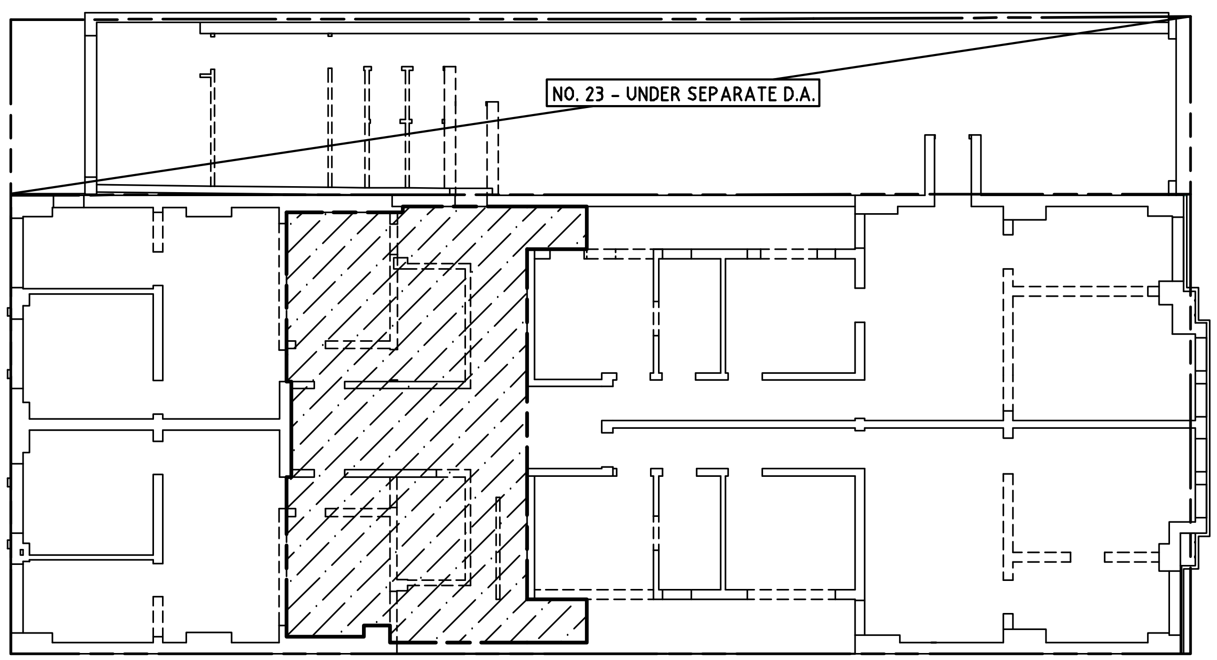
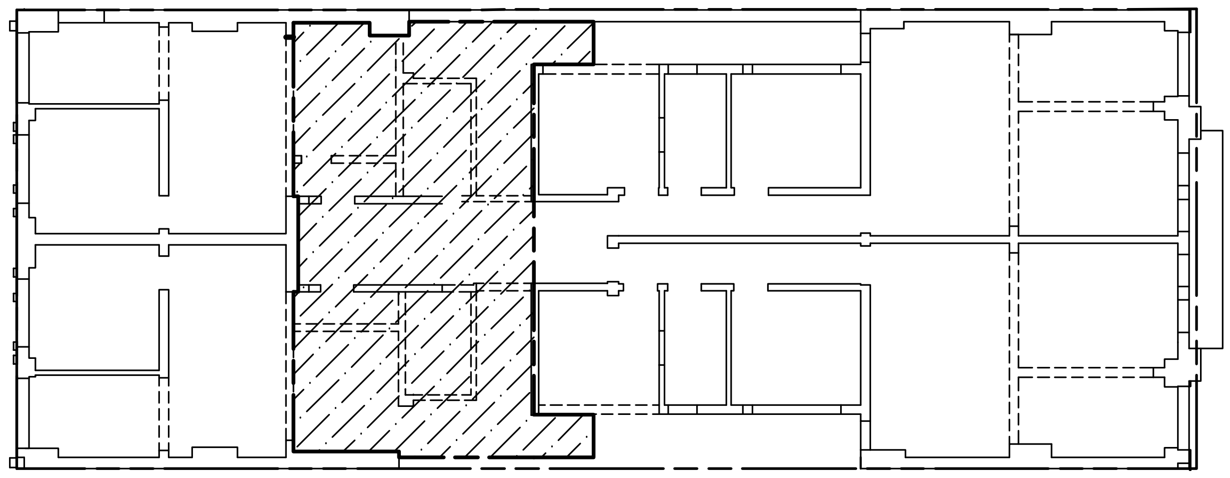



FIRST FLOOR PLAN
SCALE 1:200



SECOND FLOOR PLAN
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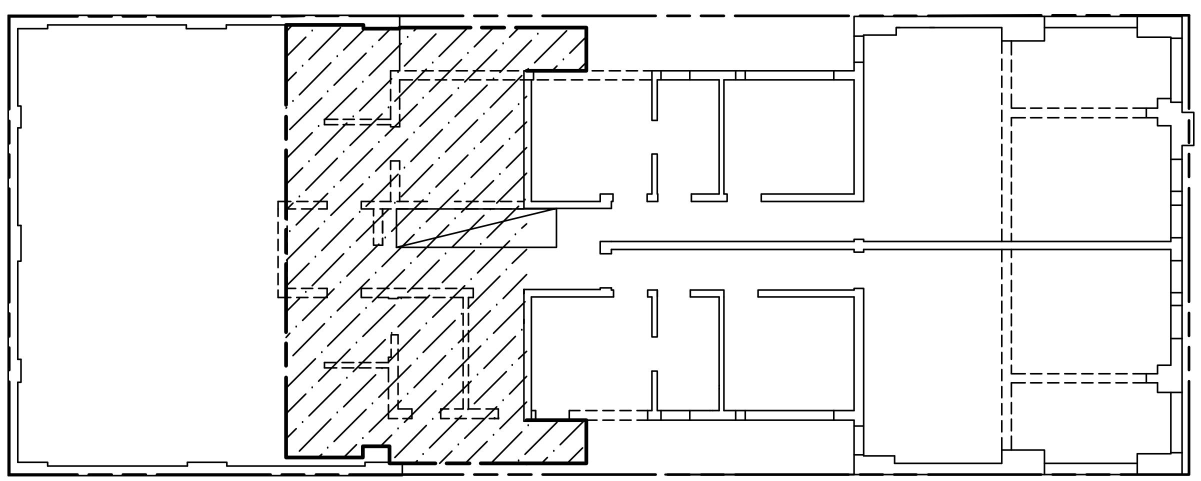

THIRD FLOOR PLAN
SCALE 1:200

# UPPER LEVEL STAGE 1 DEMOLITION PLANS

SCALE 1:200

1. THESE PLANS SHOW THE UPPER LEVEL BRICK WALLS & FLOOR AREA TO BE REMOVED BEFORE DEMOLITION OF THE GROUND FLOOR SLAB & SUBSEQUENT CONSTRUCTION OF THE FOOTINGS IN ORDER TO MINIMISE ADDITIONAL CONCENTRATED LOADS ON THE SEWER BELOW.
2. THE EXISTING FLOOR THAT REMAINS ON EACH LEVEL WILL REQUIRE TEMPORARY PROPPING OR THE INSTALLATION OF PERMANENT STRUCTURAL BEAMS. REFER LATER STRUCTURAL DETAILS.
3. SOME EXISTING WALLS THAT REMAIN WILL REQUIRE TEMPORARY LATERAL PROPPING WHEN THE FLOORS ARE REMOVED. CONFIRM ON SITE.
4. IT IS NOTED THAT THIS PROJECT REQUIRES ADDITIONAL AREAS TO BE DEMOLISHED THAN THOSE SHOWN ABOVE. REFER ARCHITECTURAL & LATER STRUCTURAL DRAWINGS FOR FURTHER DETAILS.

.......................... DENOTES FLOOR AREA TO BE REMOVED PRIOR TO DEMOLITION OF GROUND FLOOR SLAB & CONSTRUCTION OF NEW SLAB & FOOTINGS

========.......................... DENOTES WALLS TO BE DEMOLISHED SHOWN DASHED



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PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
UPPER FLOOR DEMOLITION PLAN

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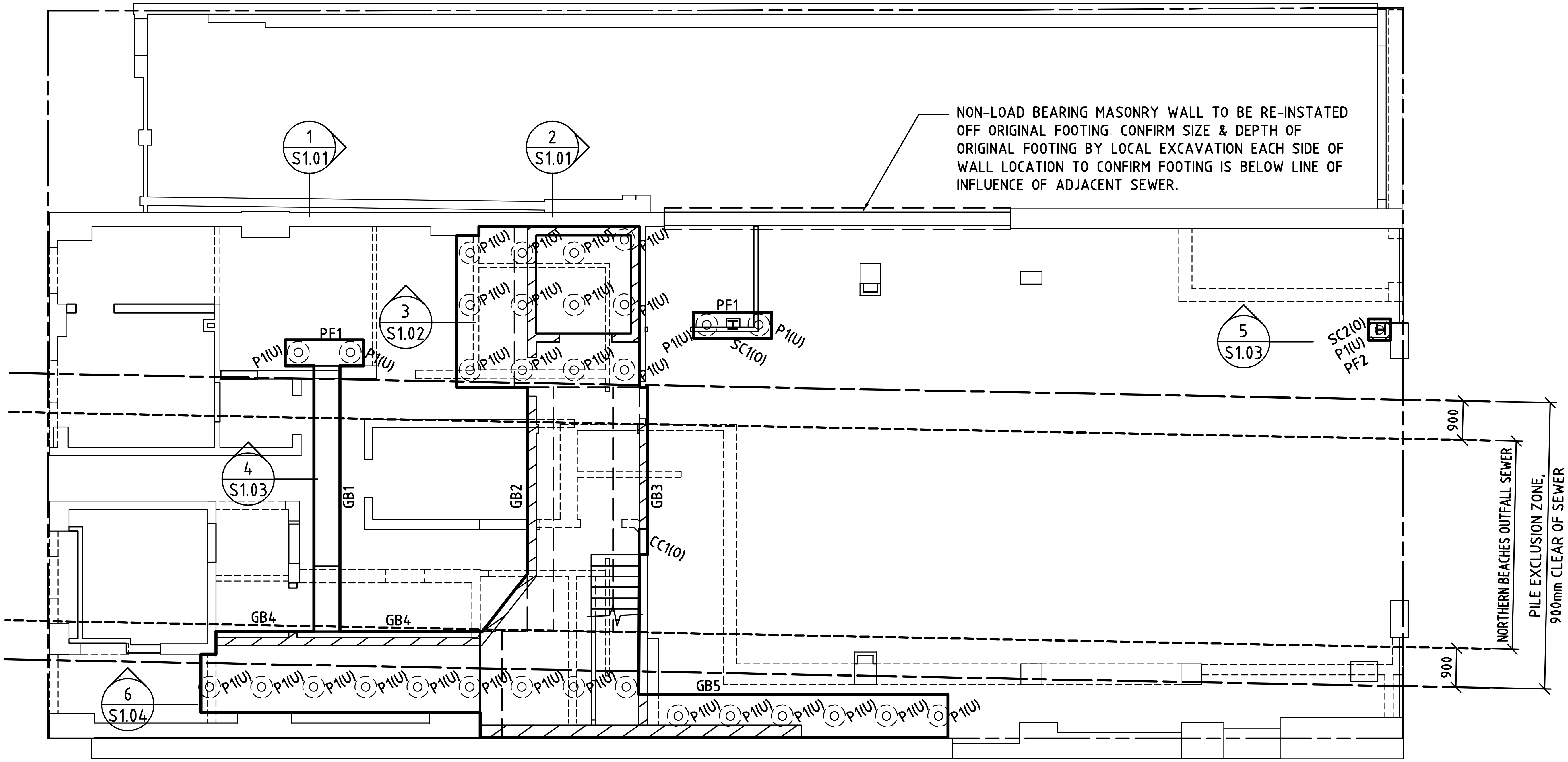


# GROUND FLOOR & FOOTING PLAN

SCALE 1:100

1. ALL RAFT SLAB FOOTINGS & PAD FOOTINGS TO BE SUPPORTED ON STEEL SCREW PILES BEARING ON DENSE SAND GREATER THAN 5.5m BELOW GROUND & HENCE BELOW THE INVERT OF THE NORTHERN BEACHES OUTFALL SEWER.
2. DENOTES:
   - P1 ........................... PROPRIETARY STEEL SCREW PILES MIN 5.5m DEEP BEARING ON DENSE SAND. PILES TO BE RATED TO MINIMUM ALLOWABLE WORKING LOAD 160kN. PILE SETOUT AT 1200mm MINIMUM CENTRES. SCREW PILES TO BE Ø114x6.0 CHS CONCRETE FILLED WITH 40mpA BLOCK FILL MIX & WITH HELIX EFFECTIVE DIAMETER 450mm.
   - PF1 & PF2.................. REINFORCED CONCRETE PAD FOOTING ON SCREW PILES. REFER DETAILS

## MEMBER SCHEDULE

STEEL COLUMNS
SC1 & SC2................ 200 UC 46
CONCRETE COLUMNS
CC1 ......................... 200 x 600 REINFORCED CONCRETE



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DRAWING TITLE: GROUND FLOOR & FOOTING PLAN

DESIGN: S.W. DATE: OCT 2019
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SIGNED:
SIZE: A3
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REV: B

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ALL DIMENSIONS DENOTED THUS '*' ARE FROM SERVICE PROTECTION REPORT BY MGP PTY LTD DWG NO. SPR1 DATED 11/10/2017

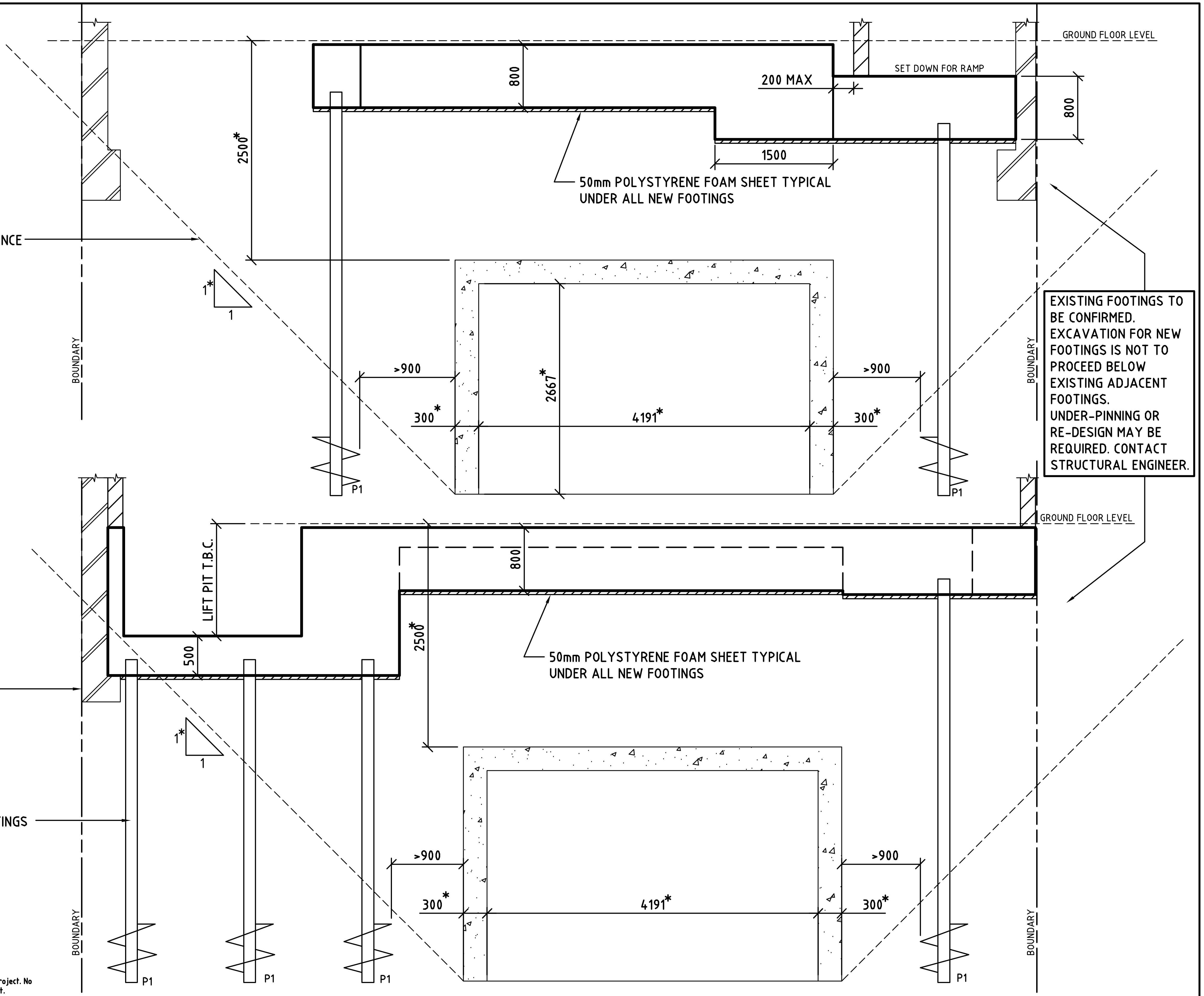
LINE OF INFLUENCE

SECTION 1 / S1.00
SCALE 1:50

EXISTING FOOTINGS TO BE CONFIRMED. EXCAVATION FOR NEW FOOTINGS & LIFT PIT NOT TO PROCEED BELOW EXISTING ADJACENT FOOTINGS. UNDERPINNING OR RE-DESIGN MAY BE REQUIRED. CONTACT STRUCTURAL ENGINEER.

SCREW PILES 'P1' TO SUPPORT REINFORCED CONCRETE FOOTINGS

SECTION 2 / S1.00
SCALE 1:50




EXISTING FOOTINGS TO BE CONFIRMED. EXCAVATION FOR NEW FOOTINGS IS NOT TO PROCEED BELOW EXISTING ADJACENT FOOTINGS. UNDER-PINNING OR RE-DESIGN MAY BE REQUIRED. CONTACT STRUCTURAL ENGINEER.



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DRAWING TITLE:
GROUND FLOOR SECTIONS - SHT 1/4

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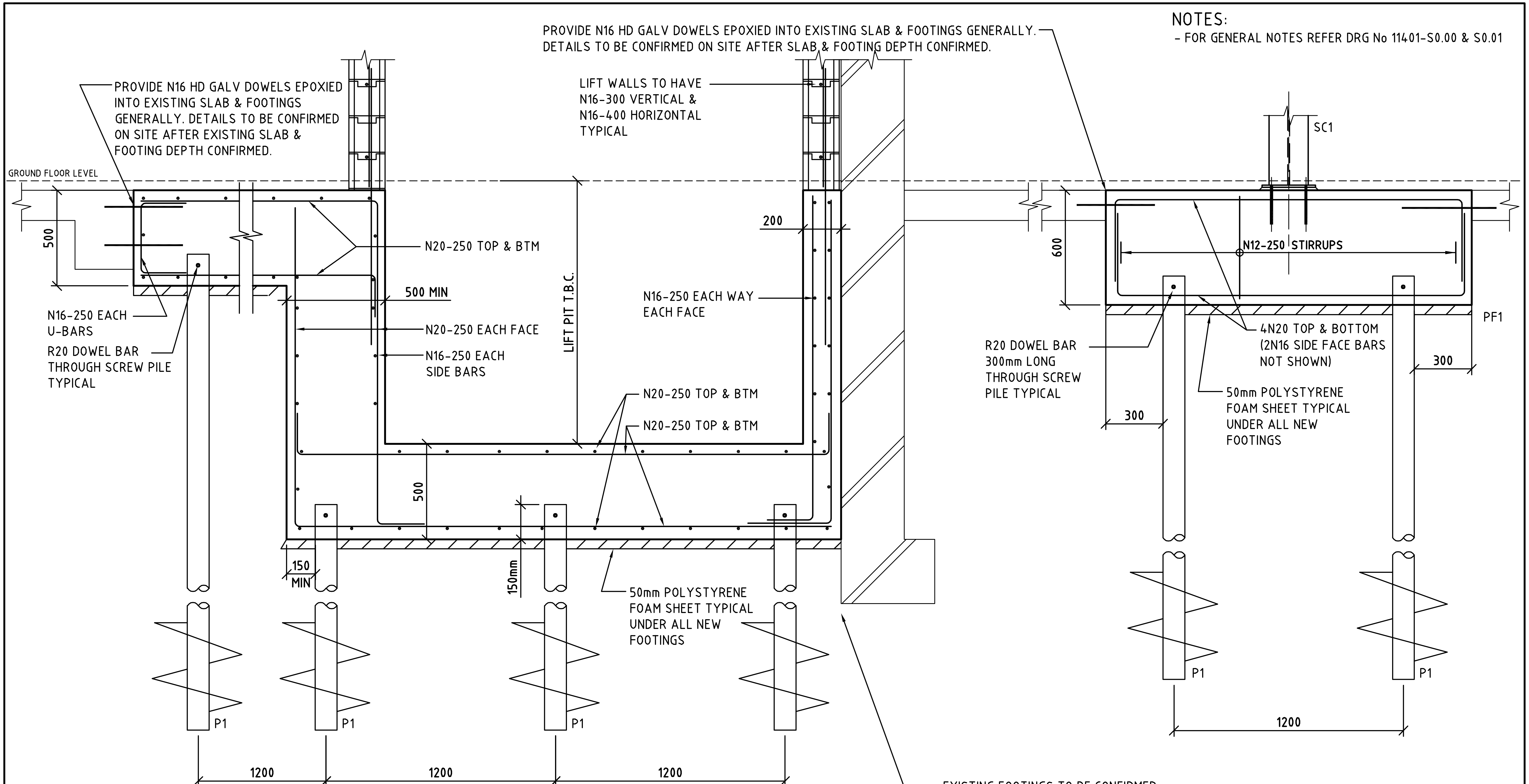


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EXISTING FOOTINGS TO BE CONFIRMED.
EXCAVATION FOR NEW FOOTINGS & LIFT PIT NOT TO PROCEED BELOW EXISTING ADJACENT FOOTINGS.
UNDERPINNING OR RE-DESIGN MAY BE REQUIRED.
CONTACT STRUCTURAL ENGINEER.

SECTION 3 / S1.00
SCALE 1:20



| ISSUE | DESCRIPTION | BY | APR | DATE |
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DRAWING TITLE:
GROUND FLOOR SECTIONS - SHT 2/4

DESIGN: S.W. DATE: OCT 2019
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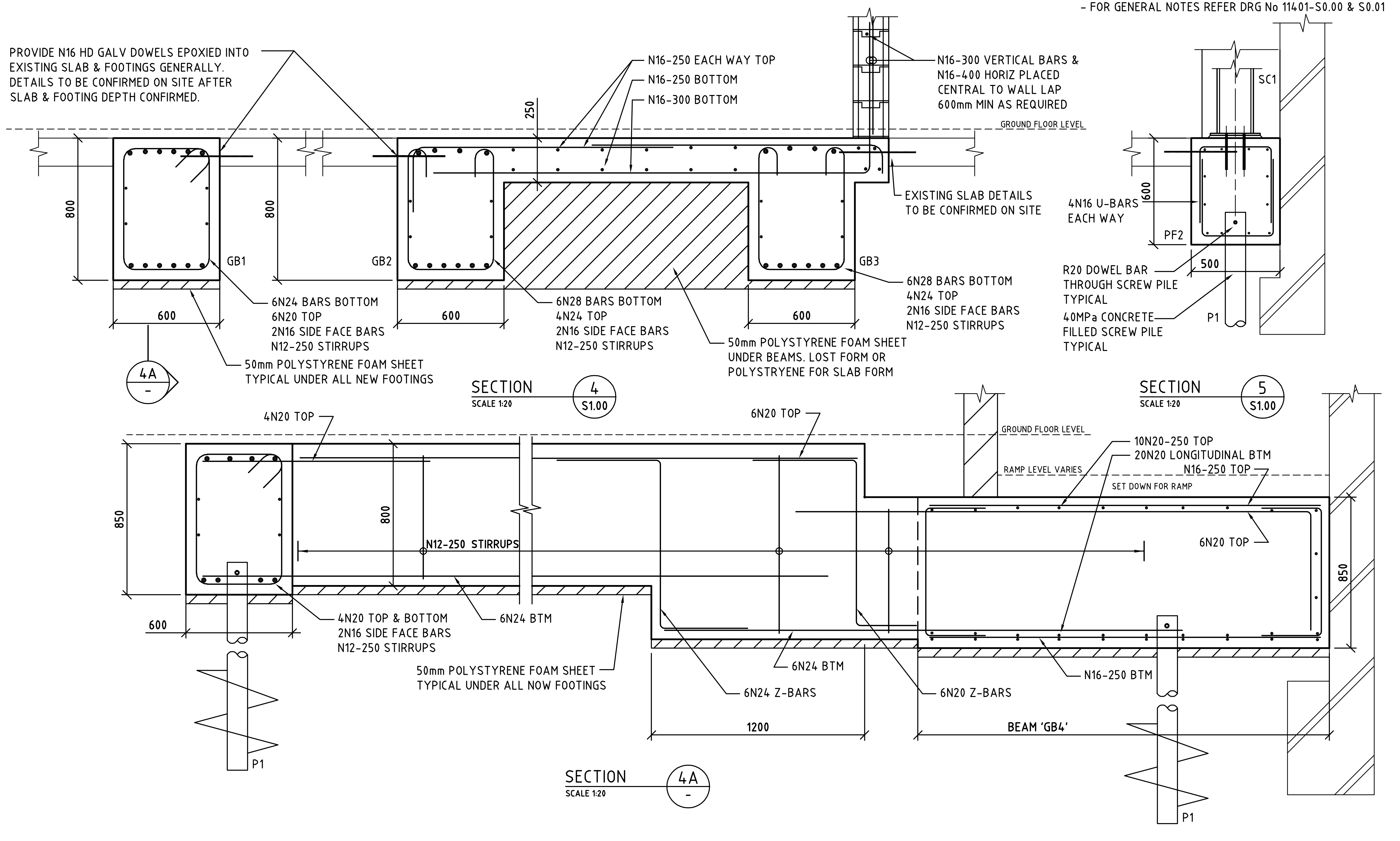




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DRAWING TITLE:
# GROUND FLOOR SECTIONS - SHT 3/4

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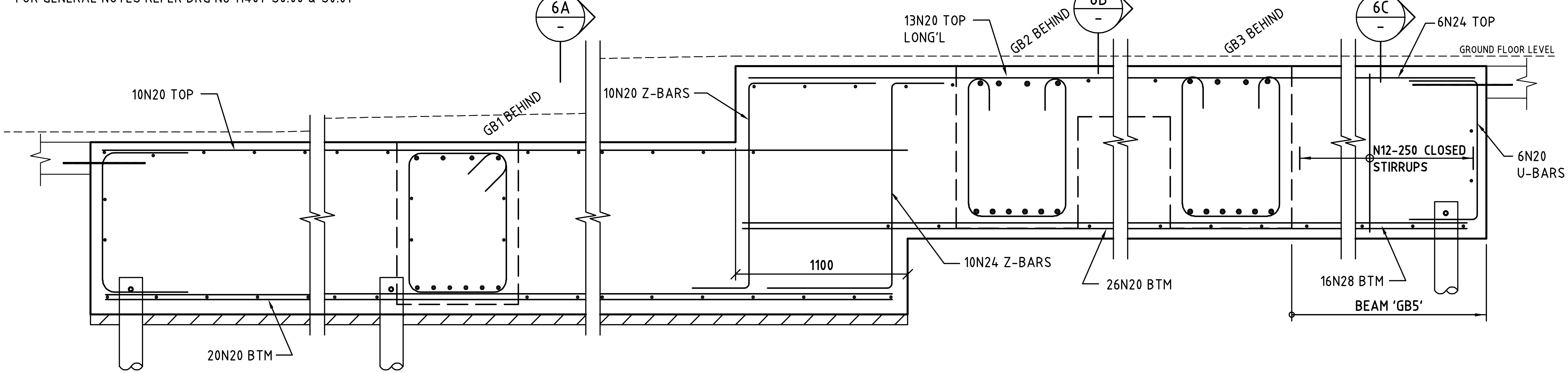
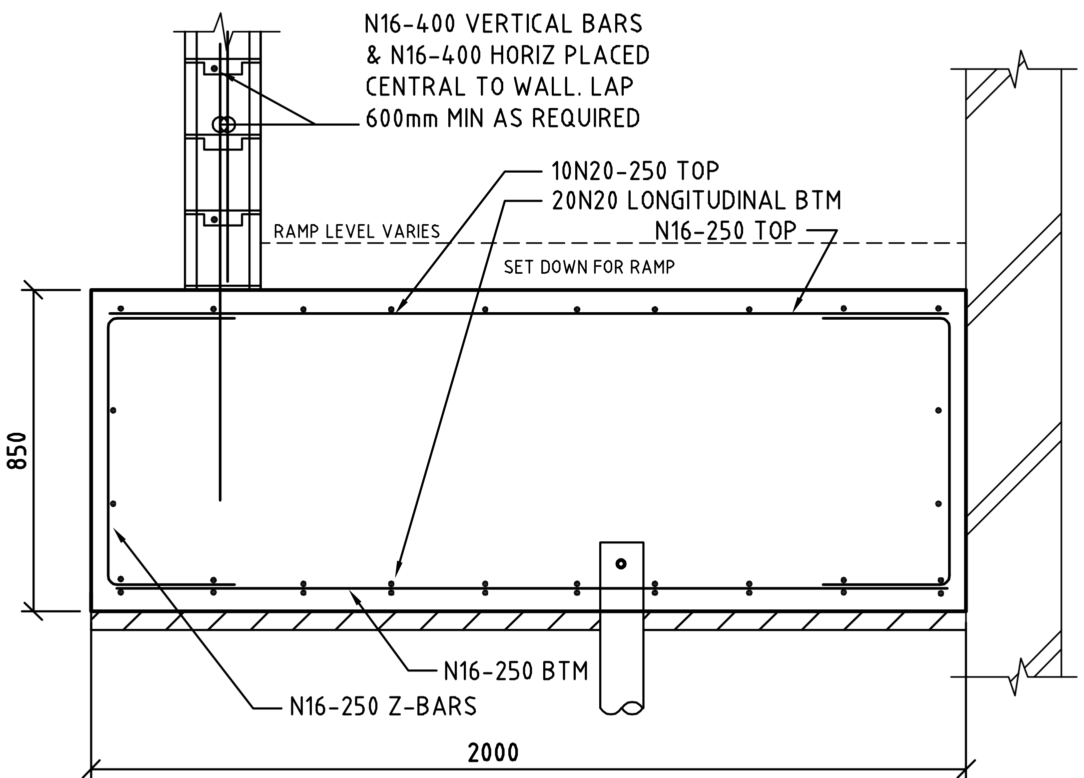
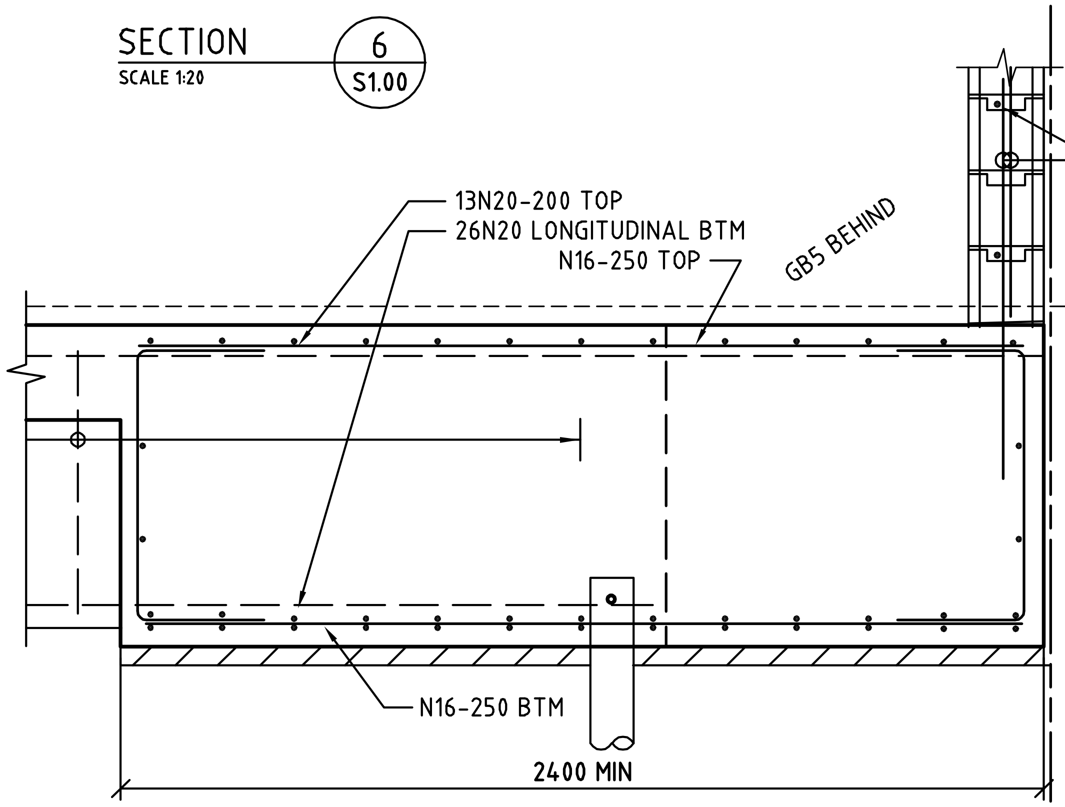



SECTION 6 / S1.00
SCALE 1:20

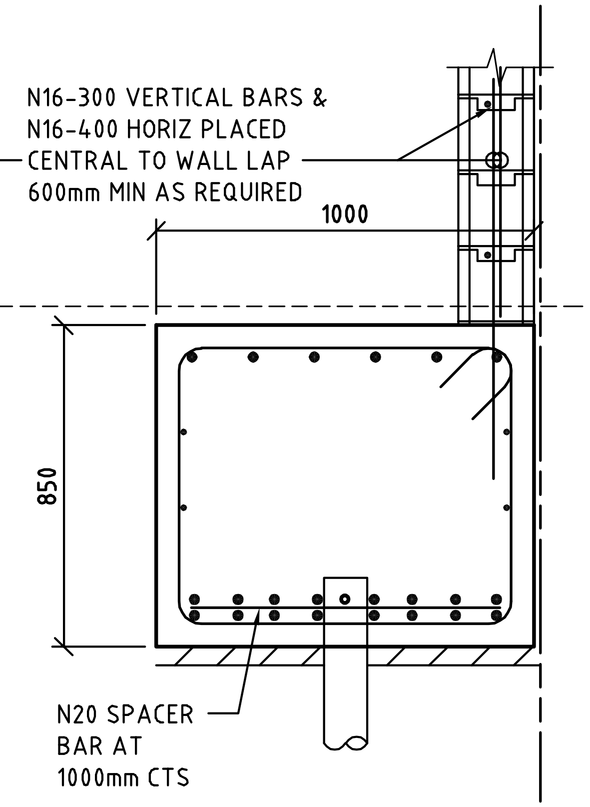



BEAM 'GB5' TYPICAL DETAILS

SECTION 6A / S1.00
SCALE 1:20




SECTION 6B / -
SCALE 1:20




BEAM 'GB5'TYPICAL DETAILS

SECTION 6C / -
SCALE 1:20



| ISSUE | DESCRIPTION | BY | APR | DATE |
|---|---|---|---|---|
| B | RE-ISSUED FOR SYDNEY WATER ASSESSMENT - PILES REVISED | JC | SW | 28.02.2020 |
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Phone 0414 393 807
Email enquiries@wadconsulting.com

PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
GROUND FLOOR SECTIONS - SHT 4/4

| | | | |
|---|---|---|---|
| DESIGN: S.W. | DATE: OCT 2019 | | |
| DRAWN: J.C. | SCALE: 1:50 | | |
| FILENAME: 11401-S1.00.DWG | | | |
| SIGNED: | | SIZE | A3 |
| DRAWING No: 11401-S1.04 | | REV | B |

NOTES:
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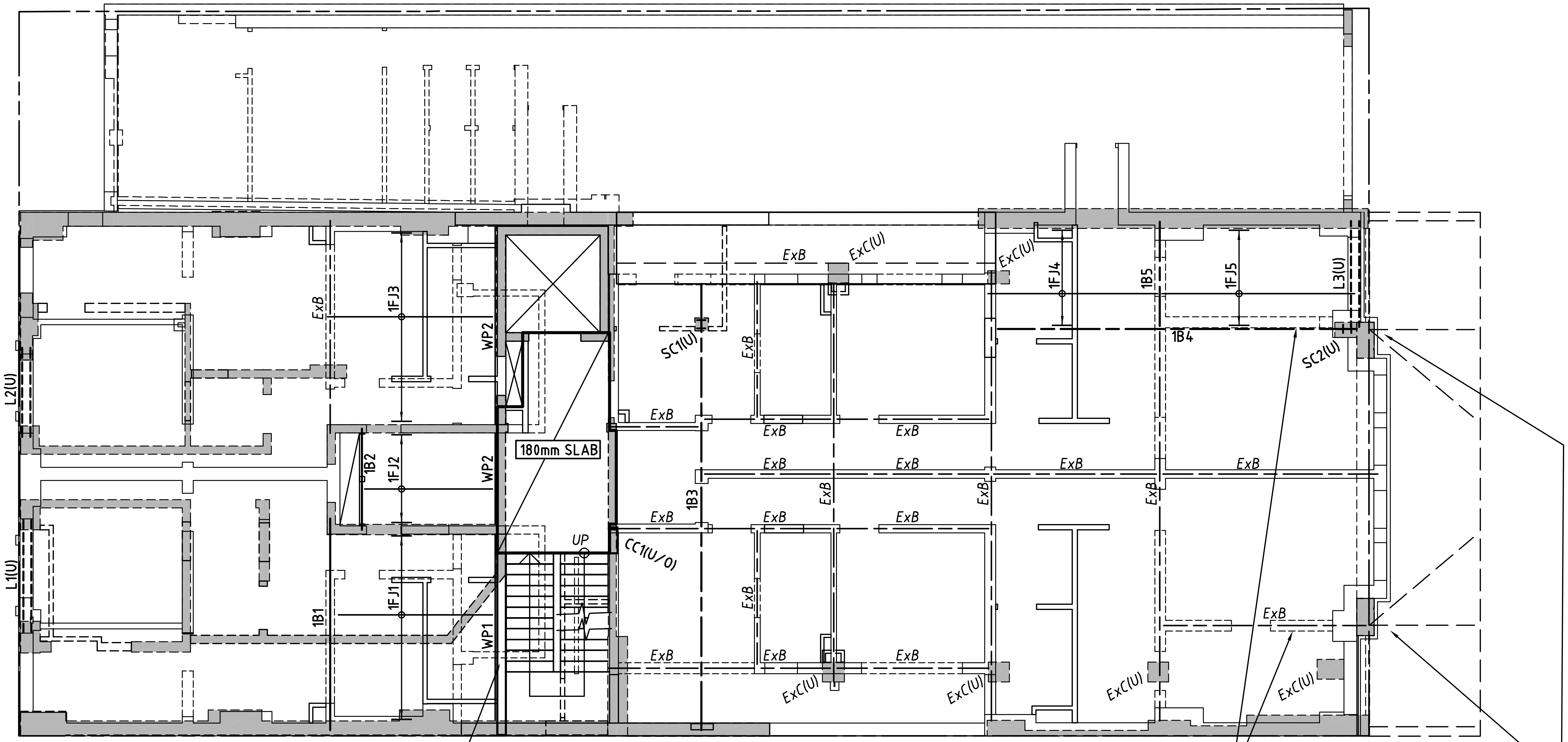


# FIRST FLOOR PLAN

SCALE 1:100

UPSTAND RC BEAM IN STAIR FLIGHT TO SUPPORT WALL OVER

1. THIS DRAWING SHOWS PRIMARY STEEL/TIMBER FLOOR SUPPORT BEAMS ONLY. ALL TIMBER FLOOR FRAMING INCLUDING CONNECTIONS, BRACING & TIE DOWNS SHALL BE BY THE BUILDER IN ACCORDANCE WITH 'AS1684'.
2. STRUCTURAL ENGINEER TO INSPECT EXISTING STRUCTURES AFTER LININGS HAVE BEEN REMOVED DURING DEMOLITION TO CONFIRM ALL BEAM SIZES & DETAILS.

## SUSPENDED SLABS

1. ALL SLABS TO BE 150mm THICK THROUGHOUT, UNLESS NOTED OTHERWISE.
2. ALL SLABS TO BE REINFORCED WITH N12-200 EACHWAY TOP & BTM THROUGHOUT, UNLESS NOTED OTHERWISE, PLUS EXTRA BARS AS SHOWN ON PLAN & SECTIONS.
3. REINFORCEMENT LAYERS: (BARS LAID IN PLAN)

DENOTES BOTTOM BARS LAID SECOND.
DENOTES TOP BARS LAID THIRD.

DENOTES BOTTOM BARS LAID FIRST.
DENOTES TOP BARS LAID LAST.

## MEMBER SCHEDULE

STEEL COLUMNS
SC1 & SC2 ................ 200 UC 46
FIRST FLOOR JOISTS
1FJ1 to 1FJ3 ............. 200 x 45 LVL AT 450 CTS
1FJ4 & 1FJ5 ............. 240 x 45 LVL AT 450 CTS
FIRST FLOOR BEAMS
1B1 ....................... 250 UB 31
1B2 ....................... 240 x 45 LVL
1B3 ....................... 2 / 610 UB 125
1B4 ....................... 410 UB 59
1B5 ....................... 240 x 63 LVL
GROUND FLOOR LINTELS UNDER
L1 to L3 ................... 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN
WALL PLATES
WP1 ....................... 200 x 45 LVL BOLTED TO RC BLOCK WALL WITH M12-450 MASONRY ANCHORS
WP2 ....................... 200 x 45 LVL BOLTED TO RC SLAB WITH M12-450 MASONRY ANCHORS

INVESTIGATE TIE-RODS ANCHORAGES FOR EXISTING AWNING. AWNING OR FRONT WALL WILL REQUIRE STRENGTHENING OR RE-DESIGN WITH RETURN WALL BEHIND TO BE REMOVED.

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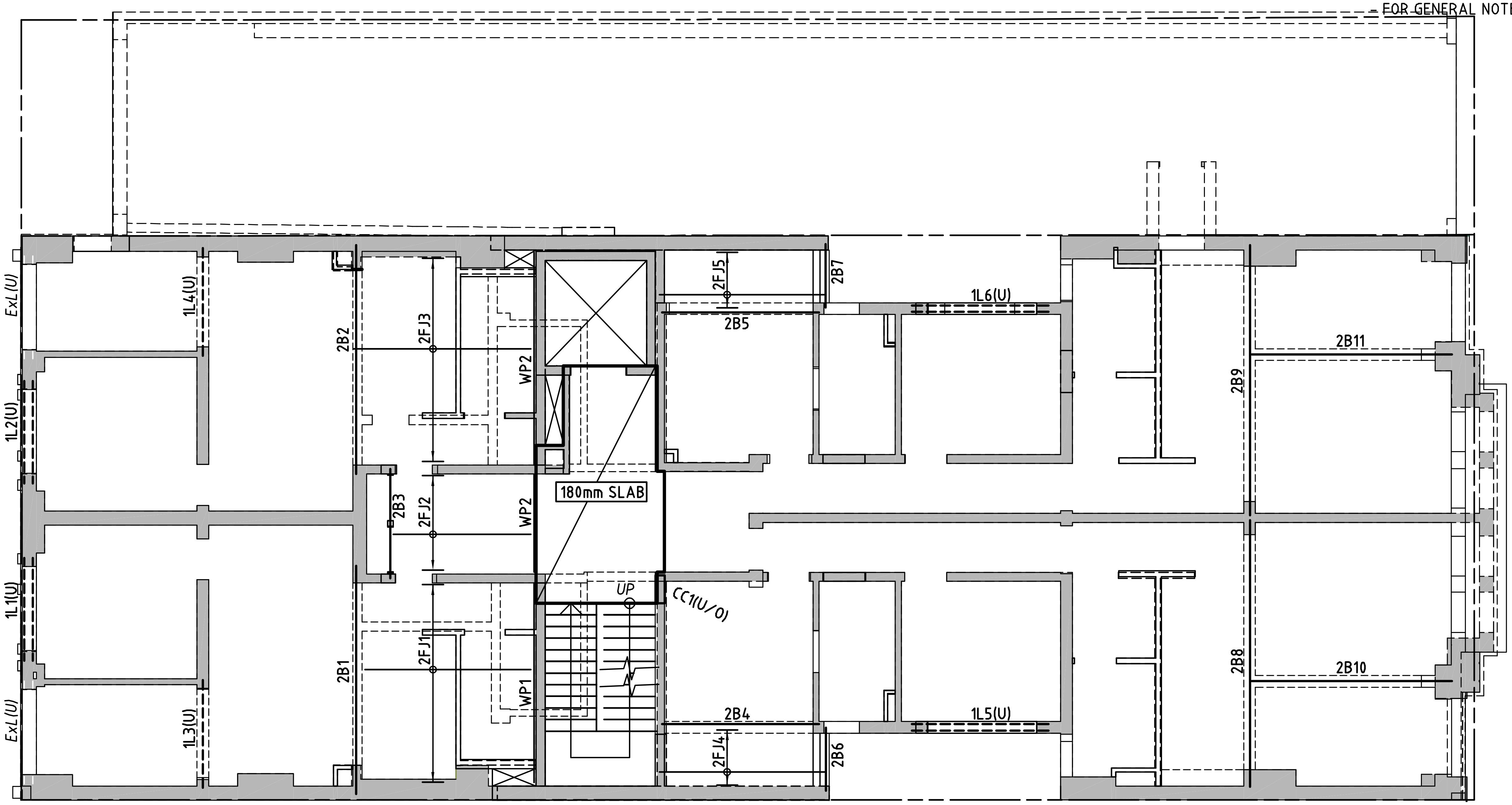
PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
FIRST FLOOR PLAN

DESIGN: S.W. DATE: OCT 2019
DRAWN: J.C. SCALE: 1:100
FILENAME: 11401-S1.00.DWG
SIGNED:
SIZE A3
DRAWING No: 11401-S2.00 REV B

NOTES:
- FOR GENERAL NOTES REFER DRG No 11401-S0.00 & S0.01




# SECOND FLOOR PLAN

SCALE 1:100

1. THIS DRAWING SHOWS PRIMARY STEEL/TIMBER FLOOR SUPPORT BEAMS ONLY. ALL TIMBER FLOOR FRAMING INCLUDING CONNECTIONS, BRACING & TIE DOWNS SHALL BE BY THE BUILDER IN ACCORDANCE WITH 'AS1684'.
2. STRUCTURAL ENGINEER TO INSPECT EXISTING STRUCTURES AFTER LININGS HAVE BEEN REMOVED DURING DEMOLITION TO CONFIRM ALL BEAM SIZES & DETAILS.

## SUSPENDED SLABS

1. ALL SLABS TO BE 150mm THICK THROUGHOUT, UNLESS NOTED OTHERWISE.
2. ALL SLABS TO BE REINFORCED WITH N12-200 EACHWAY TOP & BTM THROUGHOUT, UNLESS NOTED OTHERWISE, PLUS EXTRA BARS AS SHOWN ON PLAN & SECTIONS.
3. REINFORCEMENT LAYERS: (BARS LAID IN PLAN)

DENOTES BOTTOM BARS LAID SECOND.
DENOTES TOP BARS LAID THIRD.

DENOTES BOTTOM BARS LAID FIRST.
DENOTES TOP BARS LAID LAST.

## MEMBER SCHEDULE

SECOND FLOOR JOISTS
2FJ1 to 2FJ3............ 200 x 45 LVL AT 450 CTS
2FJ4 & 2FJ5............ 200 x 45 LVL AT 450 CTS

SECOND FLOOR BEAMS
2B1 ...................... 250 UB 31
2B2 ...................... 250 UB 31
2B3 ...................... 240 x 45 LVL
2B4 to 2B7............... 200 x 63 LVL - SUPPORTING TIMBER FLOOR JOISTS
2B8 & 2B9 ............... 2/250PFC BACK-TO-BACK FIXED WITH 2M16 BOLTS AT 600 CTS.
2B10 & 2B11 ............ 250 UB 31

FIRST FLOOR LINTELS UNDER
1L1 & 1L2................. 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN
1L3 & 1L4................. 150 UC 23
1L5 & 1L6................. 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN

WALL PLATES
WP1 ...................... 200 x 45 LVL BOLTED TO RC BLOCK WALL WITH M12-450 MASONRY ANCHORS
WP2 ...................... 200 x 45 LVL BOLTED TO RC SLAB WITH M12-450 MASONRY ANCHORS



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PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
SECOND FLOOR PLAN

DESIGN: S.W. DATE: OCT 2019
DRAWN: J.C. SCALE: 1:100
FILENAME: 11401-S1.00.DWG
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SIZE A3
DRAWING No: 11401-S3.00 REV B

NOTES:
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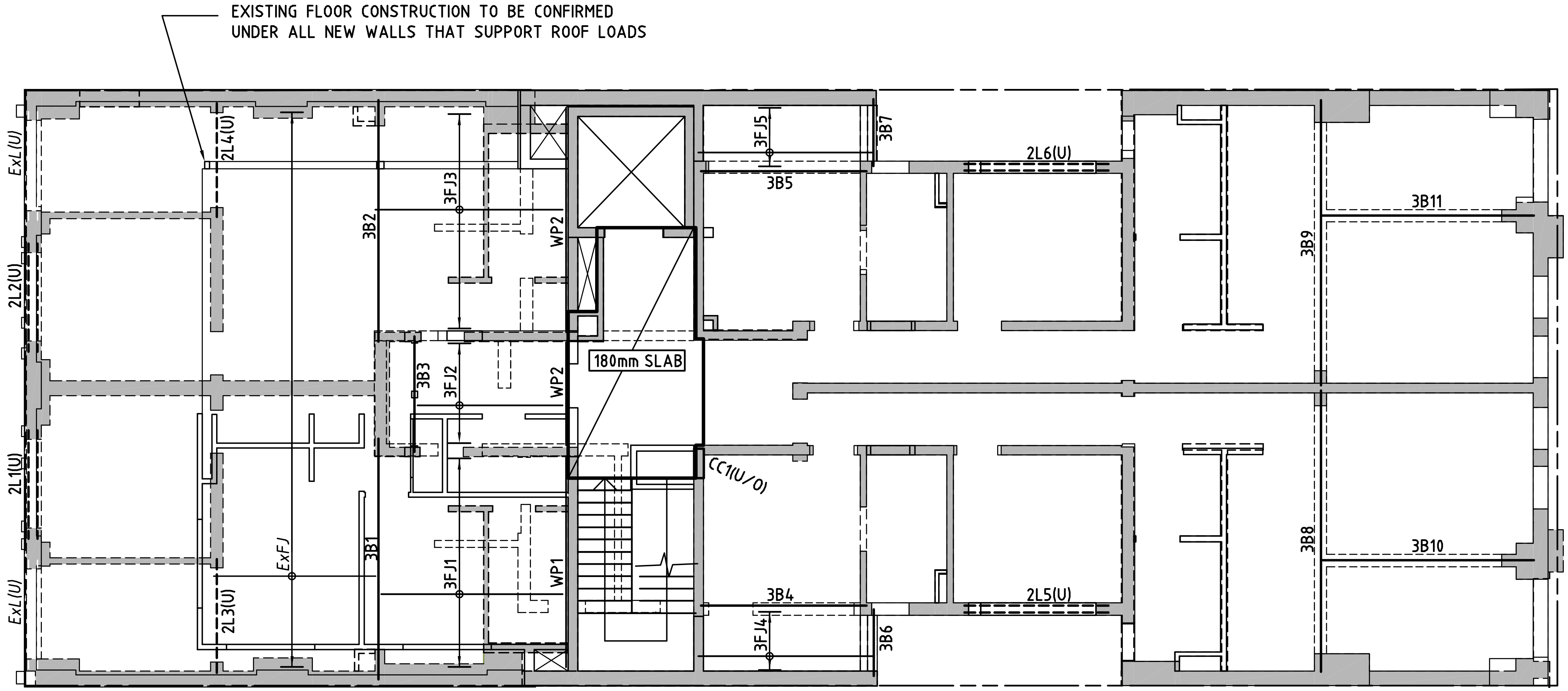


# THIRD FLOOR PLAN

SCALE 1:100

1. THIS DRAWING SHOWS PRIMARY STEEL/TIMBER FLOOR SUPPORT BEAMS ONLY. ALL TIMBER FLOOR FRAMING INCLUDING CONNECTIONS, BRACING & TIE DOWNS SHALL BE BY THE BUILDER IN ACCORDANCE WITH 'AS1684'.
2. STRUCTURAL ENGINEER TO INSPECT EXISTING STRUCTURES AFTER LININGS HAVE BEEN REMOVED DURING DEMOLITION TO CONFIRM ALL BEAM SIZES & DETAILS.

## SUSPENDED SLABS

1. ALL SLABS TO BE 150mm THICK THROUGHOUT, UNLESS NOTED OTHERWISE.
2. ALL SLABS TO BE REINFORCED WITH N12-200 EACHWAY TOP & BTM THROUGHOUT, UNLESS NOTED OTHERWISE, PLUS EXTRA BARS AS SHOWN ON PLAN & SECTIONS.
3. REINFORCEMENT LAYERS: (BARS LAID IN PLAN)

DENOTES BOTTOM BARS LAID SECOND.
DENOTES TOP BARS LAID THIRD.

DENOTES BOTTOM BARS LAID FIRST.
DENOTES TOP BARS LAID LAST.

## MEMBER SCHEDULE

THIRD FLOOR JOISTS
3FJ1 to 3FJ3............ 200 x 45 LVL AT 450 CTS
3FJ4 & 3FJ5............ 200 x 45 LVL AT 450 CTS

THIRD FLOOR BEAMS
3B1 ...................... 250 UB 31
3B2 ...................... 250 UB 31
3B3 ...................... 240 x 45 LVL
3B4 to 3B7............... 200 x 63 LVL - SUPPORTING TIMBER FLOOR JOISTS
3B8 & 3B9 ............... 2/250PFC BACK-TO-BACK FIXED WITH 2M16 BOLTS AT 600 CTS.
3B10 & 3B11 ............ 250 UB 31

SECOND FLOOR LINTELS UNDER
2L1 & 2L2................ 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN
2L3 & 2L4................ 150 UC 23
2L5 & 2L6................ 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN

WALL PLATES
WP1 ...................... 200 x 45 LVL BOLTED TO RC BLOCK WALL WITH M12-450 MASONRY ANCHORS
WP2 ...................... 200 x 45 LVL BOLTED TO RC SLAB WITH M12-450 MASONRY ANCHORS



| ISSUE | DESCRIPTION | BY | APR | DATE |
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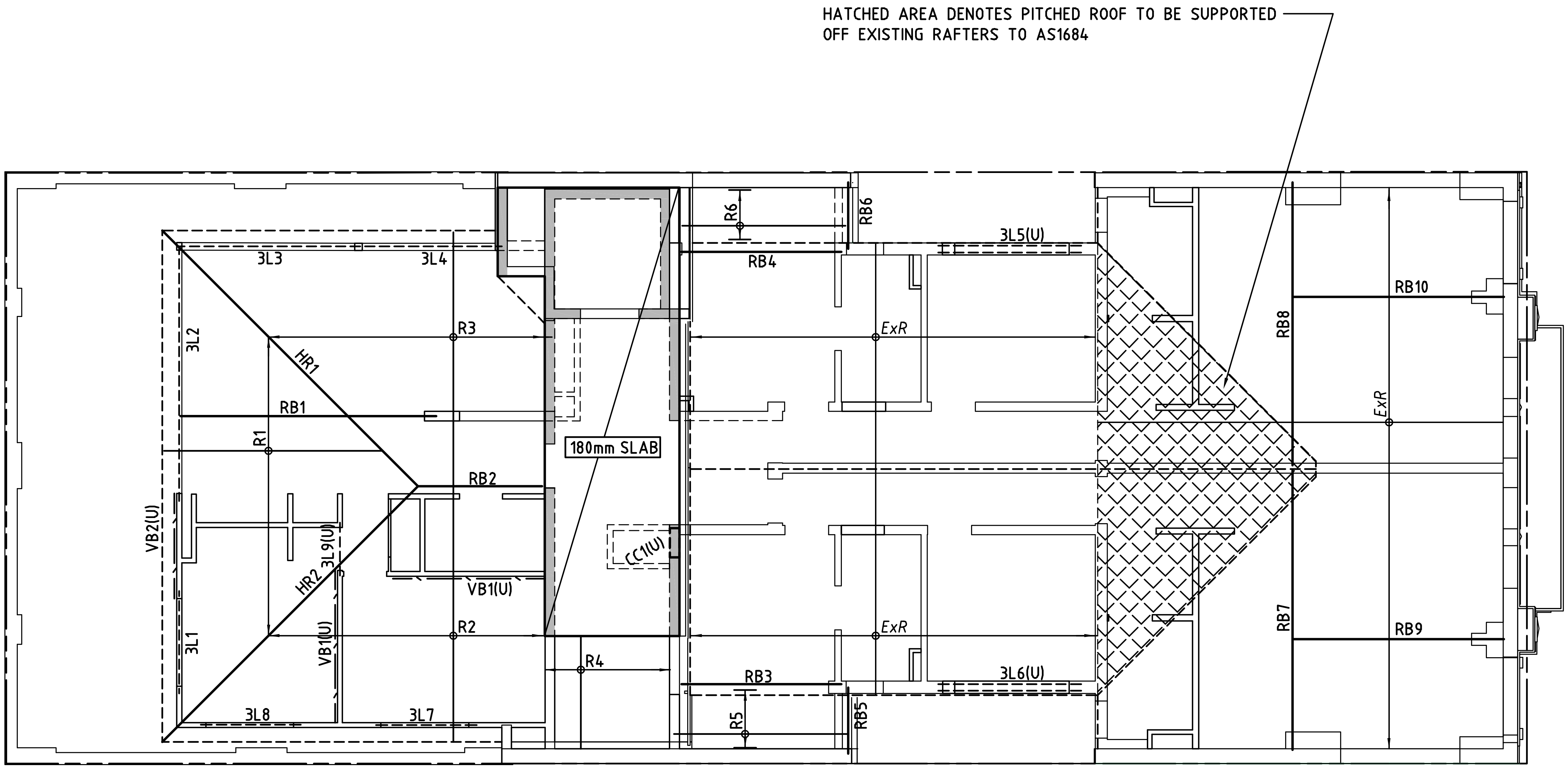
PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE: THIRD FLOOR PLAN

DESIGN: S.W. | DATE: OCT 2019
DRAWN: J.C. | SCALE: 1:100
FILENAME: 11401-S1.00.DWG
SIGNED:
SIZE: A3
DRAWING No: 11401-S4.00 | REV: B

NOTES:
- FOR GENERAL NOTES REFER DRG No 11401-S0.00 & S0.01




## ROOF PLAN

SCALE 1:100

1. THIS DRAWING SHOWS PRIMARY STEEL/TIMBER FLOOR SUPPORT BEAMS ONLY. ALL TIMBER FLOOR FRAMING INCLUDING CONNECTIONS, BRACING & TIE DOWNS SHALL BE BY THE BUILDER IN ACCORDANCE WITH 'AS1684'.
2. STRUCTURAL ENGINEER TO INSPECT EXISTING STRUCTURES AFTER LININGS HAVE BEEN REMOVED DURING DEMOLITION TO CONFIRM ALL BEAM SIZES & DETAILS.

### SUSPENDED SLABS

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2. ALL SLABS TO BE REINFORCED WITH N12-200 EACHWAY TOP & BTM THROUGHOUT, UNLESS NOTED OTHERWISE, PLUS EXTRA BARS AS SHOWN ON PLAN & SECTIONS.
3. REINFORCEMENT LAYERS: (BARS LAID IN PLAN)

DENOTES BOTTOM BARS LAID SECOND.
DENOTES TOP BARS LAID THIRD.

DENOTES BOTTOM BARS LAID FIRST.
DENOTES TOP BARS LAID LAST.

## MEMBER SCHEDULE

RAFTERS
- R1 to R6 .............. 170 x 45 LVL AT 600 CTS

HIP RAFTERS
- HR1 & HR2 .............. 170 x 45 LVL CONTINUOUS OVER TWO SPANS

ROOF BEAMS
- RB1 .............. 2/170 x 63 LVL -SUPPORTS HIP RAFTER
- RB2 .............. 200 x 45 LVL RIDGE BEAM
- RB3 & RB4 .............. 170 x 63 LVL
- RB5 & RB6 .............. 170 x 45 LVL
- RB7 & RB8 .............. 2/300 x 45 LVL
- RB9 & RB10 .............. 200 x 45 LVL

VERTICAL WALL BRACING
- VB1 .............. GALV STRAP CROSS BRACING or 20 x 20 ANGLE BRACE WITH STRAP LOOPED OVER TOP & BTM PLATES & NAILED TO STUDS AT ENDS OF BRACING PANEL.
- VB2 .............. 4mm STRUCTURAL HARDWOOD PLY BRACING. NAIL TOP & BTM OF SHEETS @ 50mm CTS - VERTICAL EDGES @ 150mm CTS & INTERNAL STUDS @ 300mm CTS. PROVIDE M12 TIE DOWN TO FLOOR AT EACH END OF BRACING PANEL & AT 1200mm MAX CTS.

## MEMBER SCHEDULE (continued)

THIRD FLOOR LINTELS UNDER
- 3L1 .............. 140 x 45 F7
- 3L2 .............. 2/300 x 45 LVL
- 3L3 & 3L4 .............. 200 x 63 LVL
- 3L5 & 3L6 .............. 150 x 100 x 10 UA HD GALV ANGLE EACH SKIN
- 3L7 & 3L8 .............. 140 x 45 F7
- 3L9 .............. 2/90 x 45 MGP10



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PROJECT:
PROPOSED ALTERATIONS & ADDITIONS
at: 19-21 THE CORSO, MANLY
for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:
ROOF FRAMING PLAN

| | | | |
|---|---|---|---|
| DESIGN: S.W. | DATE: OCT 2019 | | |
| DRAWN: J.C. | SCALE: 1:100 | | |
| FILENAME: 11401-S1.00.DWG | | | |
| SIGNED: | | SIZE | A3 |
| DRAWING No: 11401-S5.00 | | REV | B |

**Project Name: 19-23 The Corso**
**Project Number: 11401**
**Frame Description: Ground floor footing - GB1**
**Designer: SW**
**C:\Users\Simon\Documents\11401-FTG BEAM GB1.rpf**

**RAPT - Version: 6.5.4.0**
**Reinforced And Post-Tensioned Concrete Analysis & Design Package**


**Licensee**
**Simon Waddington**
**37 Innes Road**
**Manly Vale NSW 2093**
**57966240407UPP**

# Input

## General

| | | |
|---|---|---|
| Design Code | List | Australia - AS3600-2009*SAVED* |
| Material | List | Australia - Australian Materials - 2009*SAVED* |
| Reinforcement Type | List | Reinforced |
| Member Type | List | Beam |
| Panel Type | List | Internal |
| Strip Type | List | One way - Nominal Width |
| Column Stiffness | List | Equivalent Column |
| Concrete Type | List | Standard Concrete |
| Concrete - Spanning Members | List | 32MPa |
| Concrete - Columns | List | 40MPa |
| Top Reinforcement Cover | mm | 40 |
| Bottom Reinforcement Cover | mm | 40 |
| Top Reinforcement Axis Depth Limit | mm | 30 |
| Bottom Reinforcement Axis Depth Limit | mm | 50 |
| Concrete Unit Weight | kn/m3 | 25 |
| Self Weight Definition | List | Program Calculated |
| Pattern Live Load | Y/N | Y |
| Earthquake Design | List | None |
| Moment Redistribution | % | 0 |
| Design Surface Levels | List | Extreme Surfaces |

## Span

| Span | Span Length | Slab Depth | Panel Width Left | Panel Width Right |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| LC | 600 | 200 | 600 | 600 |
| 1 | 7800 | 200 | 600 | 600 |
| RC | 600 | 200 | 600 | 600 |

## Columns

| Column | Column Grid Reference | Support Type | Transverse Column spacing | Transverse prestress (P/A) |
|---|---|---|---|---|
| | A | List | mm | MPa |
| 1 | 1 | Knife-Edge | 600 | |
| 2 | 2 | Knife-Edge | 600 | |

## Beams

| Beam Number | Beam Depth | Beam Width at Slab | Beam Width | Effective Flange Width |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| LC | 750 | 600 | 600 | 600 |
| 1 | 750 | 600 | 600 | 600 |
| RC | 750 | 600 | 600 | 600 |

## Load Cases

| Load Case | Load Type | Load Definition | Live Load Deflection Case | Description |
|---|---|---|---|---|
| | List | List | Y/N | A |
| 1 | Self Weight | Applied Loads | | |
| 2 | Live Load | Applied Loads | Y | |
| 3 | Extra Dead Load | Applied Loads | | |

## 1. Self Weight - Line

| Load | Left End Reference Column | Left end of load from reference column | Load at left end | Right End reference column | Right end of load from reference column | Load at right end | Description |
|---|---|---|---|---|---|---|---|
| | # | mm | kN/m | # | mm | kN/m | A |
| 1 | 0 | 0 | 11.25 | 2 | 600 | 11.25 | |

## 2. Live Load - Line

| Load | Left End Reference Column | Left end of load from reference column | Load at left end | Right End reference column | Right end of load from reference column | Load at right end | Live Load reduction | Description |
|---|---|---|---|---|---|---|---|---|
| | # | mm | kN/m | # | mm | kN/m | #.# | A |
| 1 | 1 | 6600 | 20 | 3 | 0 | 20 | 1 | |

## 2. Live Load - Panel

| Load | Left End reference column | Left end of load from reference column | Load at left end | Right End reference column | Right end of load from reference column | Load at right end | Live Load reduction | Description |
|---|---|---|---|---|---|---|---|---|
| | # | mm | kN/m2 | # | mm | kN/m2 | #.# | A |
| 1 | 0 | 0 | 10 | 2 | 600 | 10 | 1 | |

## 3. Extra Dead Load - Line

| Load | Left End Reference Column | Left end of load from reference column | Load at left end | Right End reference column | Right end of load from reference column | Load at right end | Description |
|---|---|---|---|---|---|---|---|
| | # | mm | kN/m | # | mm | kN/m | A |
| 1 | 1 | 6600 | 113 | 3 | 0 | 113 | |

## 3. Extra Dead Load - Point

| Load | Reference column | Distance to Load from reference column | Load | Load Length | Description |
|---|---|---|---|---|---|
| | # | mm | kN | mm | A |
| 1 | 1 | 1200 | 95 | 0.2 | |

## Load Combinations : Ultimate

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Live Load | 1.2 | 1.5 | 1.2 |
| 2 | Live Load | 0.9 | 1.5 | 0.9 |
| 3 | Dead Load | 1.35 | 0 | 1.35 |

## Load Combinations : Short Term Service

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Live Load | 1 | 0.7 | 1 |

## Load Combinations : Permanent Service

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Live Load | 1 | 0.4 | 1 |

## Load Combinations : Deflection

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Short Term - Deflection | 1 | 0.7 | 1 |
| 2 | Permanent - Deflection | 1 | 0.4 | 1 |
| 3 | Initial - Deflection | 1 | 0 | 0 |

## Load Combinations : Transfer Prestress

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Transfer | 1 | 0 | 0 |

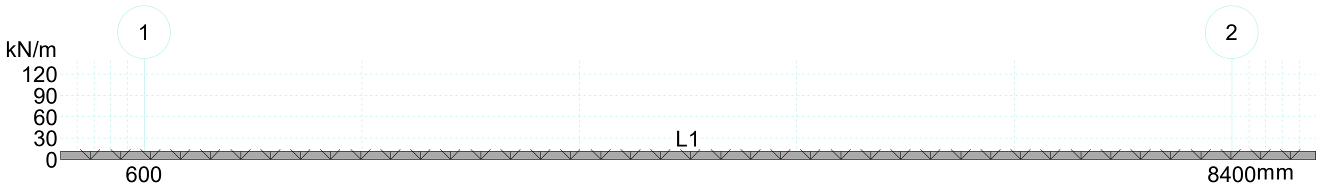
## Load Combinations : Pre Existing

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Pre Existing | 1 | 0 | 0 |

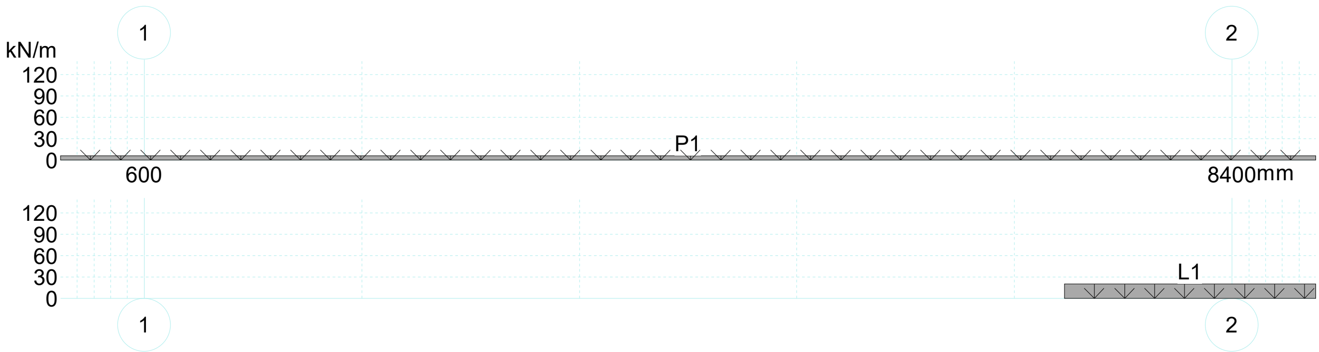
## Load Combinations : Construction

| Load Combination | Description | 1. Self Weight | 2. Live Load | 3. Extra Dead Load |
|---|---|---|---|---|
| | A | #.# | #.# | #.# |
| 1 | Construction | 1 | 0 | 0 |

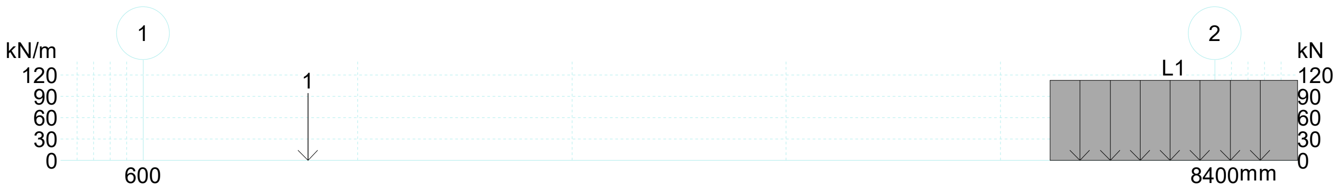
## Load Case 1 : 1. Self Weight




## Load Case 2 : 2. Live Load




## Load Case 3 : 3. Extra Dead Load



## Reinforcement

| Reinforcement Use | Reinforcement Type | Preferred Bar Size | Number of Legs |
|---|---|---|---|
| | List | List | # |
| Flexural Bar | N 500MPa | | |
| Flexural Mesh | F 450MPa | | |
| Shear Option 1 | N 500MPa | 10 | 2 |
| Shear Option 2 | N 500MPa | 12 | 2 |
| Shear Option 3 | N 500MPa | 16 | 2 |
| Punching Shear | N 500MPa | 10 | 1 |

## Reinforcement

| | Maximum Bar Spacing | Minimum Bar Spacing | Minimum Continuous Reinforcement | Minimum Span Reinforcement into End Support | Minimum Span Reinforcement into Internal Support | Infill Bars | Stagger Bars |
|---|---|---|---|---|---|---|---|
| | mm | mm | #.# | #.# | #.# | Y/N | Y/N |
| Support Reinforcement | 300 | 60 | 0 | | | N | N |
| Span Reinforcement | 300 | 60 | | 0 | 0 | N | N |

## Design Zones : Top

| Layer Number | Steel type | Left End Reference Column | Distance to left end of bar | Bar stagger length at left end | Top Cover at left end | Right End Reference Column | Distance to right end of bar | Bar stagger length at right end | Top Cover at Right end | Maximum Bar Size | Minimum Bar Size | Preferred bar size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | List | # | mm | mm | mm | # | mm | mm | mm | List | List | List |
| 1 | Bar | 1 | -600 | 0 | 40 | 2 | 600 | 0 | 40 | 36 | 16 | 16 |

| Layer Number | Minimum Number of Bars | Maximum Spacing of Bars | Minimum Steel area as % | % in Flange |
|---|---|---|---|---|
| | # | mm | % | % |
| 1 | 0 | 0 | 0 | 0 |

## Design Zones : Bottom

| Layer Number | Steel type | Left End Reference Column | Distance to left end of bar | Bar stagger length at left end | Bottom Cover at left end | Right End Reference Column | Distance to right end of bar | Bar stagger length at right end | Bottom Cover at Right End | Maximum Bar Size | Minimum Bar Size |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | List | # | mm | mm | mm | # | mm | mm | mm | List | List |
| 1 | Bar | 1 | -600 | 0 | 40 | 2 | 600 | 0 | 40 | 36 | 16 |

| Layer Number | Preferred bar size | Minimum Number of Bars | Maximum Spacing of Bars | Minimum Steel area as % | % in Flange |
|---|---|---|---|---|---|
| | List | # | mm | % | % |
| 1 | 20 | 0 | 0 | 0 | 0 |

## User Defined : Top

| Layer Number | Steel type | Left End Reference Column | Distance to left end of bar | Bar stagger length at left end | Top Cover at left end | % Development of Left End of Bar in Tension | % Development of Left End of Bar in Compression | Right End Reference Column | Distance to right end of bar | Bar stagger length at right end | Top Cover at Right end |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | List | # | mm | mm | mm | % | % | # | mm | mm | mm |
| 1 | N 500MPa | 0 | 0 | 0 | 40 | 50 | 50 | 2 | 600 | 0 | 40 |

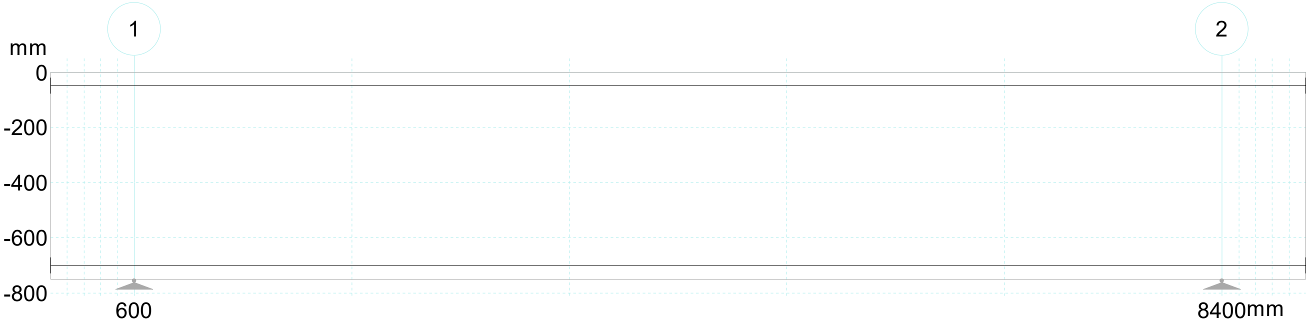
| Layer Number | % Development of Right End of Bar in Tension | % Development of Right End of Bar in Compression | Bar Size | Number of Bars | Spacing of Bars | % in Flange | Layer attached after the PreExisting Load Case |
|---|---|---|---|---|---|---|---|
| | % | % | List | # | mm | % | Y/N |
| 1 | 50 | 50 | 20 | 6 | 0 | 0 | N |

## User Defined : Bottom

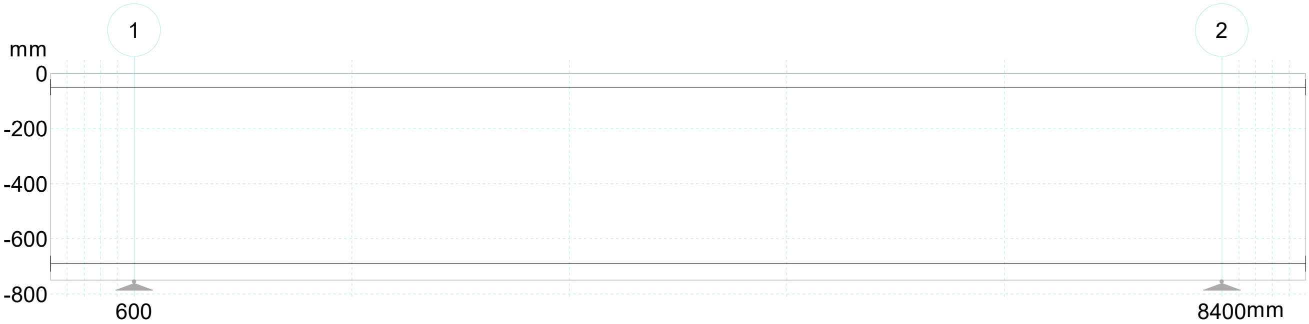
| Layer Number | Steel type | Left End Reference Column | Distance to left end of bar | Bar stagger length at left end | Bottom Cover at Left end | % Development of Left End of Bar in Tension | % Development of Left End of Bar in Compression | Right End Reference Column | Distance to right end of bar | Bar stagger length at right end | Bottom Cover at Right End |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | List | # | mm | mm | mm | % | % | # | mm | mm | mm |
| 1 | N 500MPa | 0 | 0 | 0 | 50 | 50 | 50 | 2 | 600 | 0 | 50 |

| Layer Number | % Development of Right End of Bar in Tension | % Development of Right End of Bar in Compression | Bar Size | Number of Bars | Spacing of Bars | % in Flange | Layer attached after the PreExisting Load Case |
|---|---|---|---|---|---|---|---|
| | % | % | List | # | mm | % | Y/N |
| 1 | 50 | 50 | 20 | 6 | 0 | 0 | N |

### Reinforcement Design Zones




### Reinforcement Design Zones User Defined




### Design Data

| | | |
|---|---|---|
| Capacity Reduction factor (phi) for Flexure | #.# | 0.8 |
| Capacity Reduction factor (phi) for Shear | #.# | 0.7 |
| Material Factor for Concrete in Flexure | #.# | 1 |
| Material Factor for Concrete in Shear | #.# | 1 |
| Material Factor for Reinforcement | #.# | 1 |
| Maximum Ratio of Neutral Axis Depth for Ductility | #.# | 0.4 |
| Ductility Limit - Strain | #.# | 0 |
| Ductility Check at Left End Column | Y/N | Y |
| Ductility Check at Right End Column | Y/N | Y |
| Minimum Reinforcement Strength Limit - #.## x M* | #.# | 0 |
| Flexural Critical Section - Consider Transverse Beams | Y/N | Y |
| Flexural Critical Section - Distance from centre of Support | #.# | -1 |
| Beam Left Sideface Cover (Internal) | mm | 25 |
| Beam Right Sideface cover | mm | 40 |
| Prestress Minimum Reinforcement Basis | List | Program Default |
| Shear Enhancement at Supports | Y/N | N |
| Ast Value in Shear Calculations | List | Calculated |
| Limit Reinforcement Strain | Y/N | Y |
| Include Strain Hardening of Reinforcement | Y/N | N |
| Beam Shear Critical Section Location | List | Code Critical Section |

| | | |
|---|---|---|
| Maximum Service Stress Change - Prestressed Sections | MPa | 0 |
| Maximum Service Stress Change - Reinforced Sections | MPa | 0 |
| Relative Humidity | % | 50 |
| Average Temperature | C. | 20 |
| Prestress Losses Calculations based on | List | Program Default |
| Crack Width Calculations | List | Code default |
| AS3600 Shrinkage and Temperature Reinforcement | List | Moderate |
| Degree of Restraint in Primary Direction | % | 0 |
| Degree of Restraint in Secondary Direction | % | 0 |
| Concrete Strength Gain Rate | List | N |

| | | |
|---|---|---|
| Concrete Tensile Strength for Deflection Calculations- #.## x (Fc)n | #.# | -1 |
| Maximum Value of Ieff/Igross for Deflection Calculations | #.# | 0.6 |
| Total Deflection Warning Limit - Maximum Span/Deflection | #.# | 250 |
| Total Deflection Warning Limit - Maximum Deflection | mm | 25 |

| | | |
|---|---|---|
| Incremental Deflection Warning Limit - Maximum Span/Deflection | #.# | 500 |
| Incremental Deflection Warning Limit - Maximum Deflection | mm | 25 |
| Time of Loading in days | #.# | 10 |
| Age Adjustment Factor | #.# | 0.76 |
| Concrete Strength at Time of Loading | MPa | 27.04 |
| Loaded Period in years | #.# | 30 |
| Tension stiffening Approach | List | Modified Concrete Tensile Modulus Method |

| | | |
|---|---|---|
| Live Load Pattern Factor | #.# | 1 |
| Pattern Live Load for Ultimate Strength | Y/N | Y |
| Pattern Live Load for Crack Control | Y/N | Y |
| Pattern Live Load For Deflections | Y/N | Y |
| Pattern Live Load for Deflection Permanent Load Combination | Y/N | N |

## Material Properties

### Concrete

| Designation | Shrinkage - Creep Model | Description | Set as Default |
|---|---|---|---|

### Reinforcement Bar

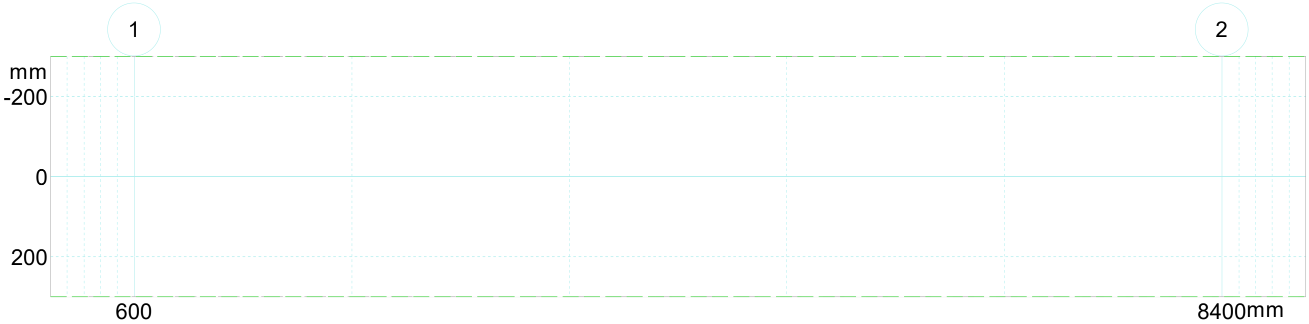
| Designation | Type | Yield Stress | Elastic Modulus | Ductility | Peak Strain | Peak Stress | Design Strain Limit | Material Factor Flexure | Material Factor Shear | Material Capacity Reduction Factor - Flexure | Material Capacity Reduction Factor - Shear | Include as Flexural Reinforcement for Shear |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | Deformed | 500 | 2e5 | N | 0.05 | 540 | 90 | -1 | -1 | -1 | -1 | Y |

| Description |
|---|
| |

| Nominal Bar Size | Bar Diameter | Bar Area | Bar Inertia | Bar Weight | Stock Length |
|---|---|---|---|---|---|
| A | mm | mm2 | mm4 | kg/m | mm |
| 10 | 10 | 78.5 | 491.07 | 0.62 | 12000 |
| 12 | 12 | 113 | 1018.29 | 0.89 | 12000 |
| 16 | 16 | 201 | 3218.29 | 1.58 | 12000 |
| 20 | 20 | 314 | 7857.14 | 2.47 | 12000 |
| 24 | 24 | 452 | 16292.6 | 3.55 | 12000 |
| 28 | 28 | 616 | 30184 | 4.83 | 12000 |
| 32 | 32 | 804 | 51492.6 | 6.31 | 12000 |
| 36 | 36 | 1020 | 82481.1 | 7.99 | 12000 |
| 40 | 40 | 1260 | 1.257e5 | 9.86 | 12000 |

### Elevation view

## Plan view




## Warnings

### Input

No errors or warnings were found.

### Output

No errors or warnings were found.

## Bending Moments

## Load Cases

## Column Actions

| Col No. 1 | | Self Weight | Live Load | Extra Dead Load |
|---|---|---|---|---|
| Moment Above | kNm | -0 | -0 | -0 |
| Moment Below | kNm | -0 | -0 | -0 |
| Reaction | kN | 50.63 | 28.38 | 88.17 |
| Elastic Rotation | #.# | 3.29e-4 | 1.96e-4 | 4.75e-4 |
| Elastic Axial Shortening | mm | 0 | 0 | 0 |

| Col No. 2 | | Self Weight | Live Load | Extra Dead Load |
|---|---|---|---|---|
| Moment Above | kNm | -0 | -0 | -0 |
| Moment Below | kNm | -0 | -0 | -0 |
| Reaction | kN | 50.63 | 61.62 | 210.19 |
| Elastic Rotation | #.# | -3.29e-4 | -2.1e-4 | -4.21e-4 |
| Elastic Axial Shortening | mm | 0 | 0 | 0 |

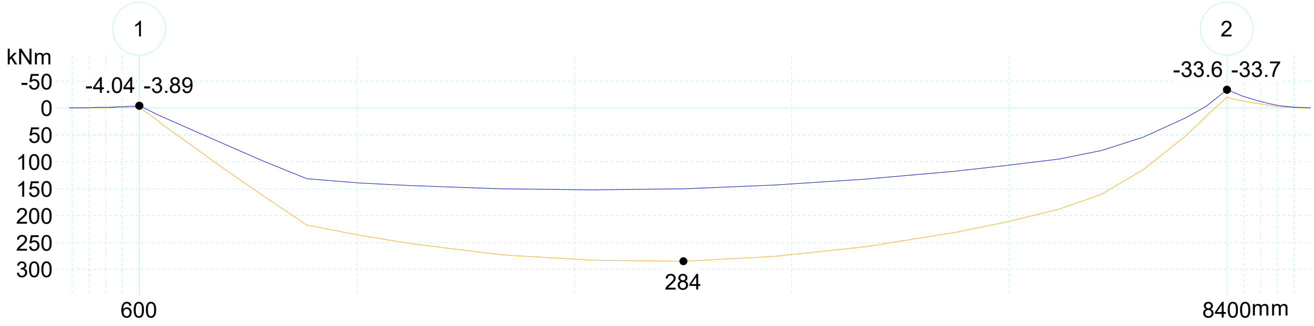
## Load Combinations

## Column Actions

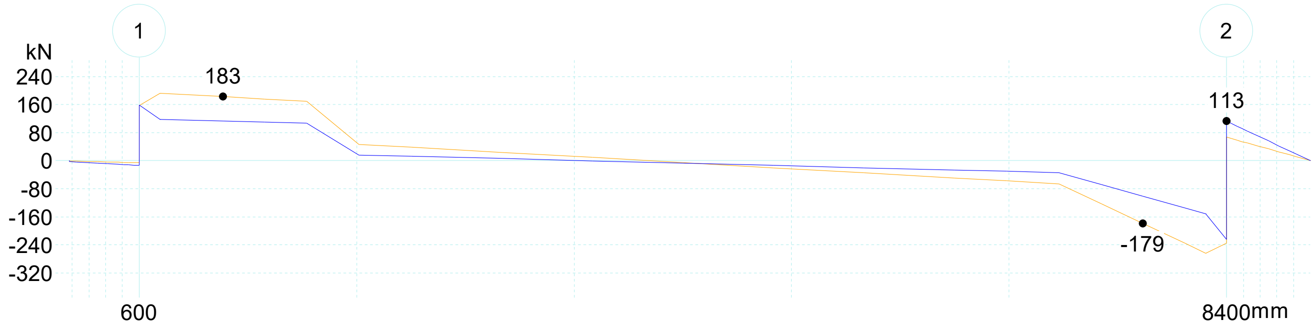
| Col No. 1 | | Service | Service (Reversal) | Ultimate Flexure | Ultimate Flexure (Reversal) | Ultimate Shear | Ultimate Shear (Reversal) |
|---|---|---|---|---|---|---|---|
| Moment Above | kNm | 0 | 0 | 0 | 0 | 0 | 0 |
| Moment Below | kNm | 0 | 0 | 0 | 0 | 0 | 0 |
| Reaction | kN | 158.67 | 158.67 | 209.13 | 209.13 | 126.26 | 210.03 |
| Elastic Rotation | #.# | 9.41e-4 | 9.41e-4 | 1.26e-3 | 1.26e-3 | 7.07e-4 | 1.27e-3 |
| Elastic Axial Shortening | mm | 0 | 0 | 0 | 0 | 0 | 0 |

| Col No. 2 | | Service | Service (Reversal) | Ultimate Flexure | Ultimate Flexure (Reversal) | Ultimate Shear | Ultimate Shear (Reversal) |
|---|---|---|---|---|---|---|---|
| Moment Above | kNm | 0 | 0 | 0 | 0 | 0 | 0 |
| Moment Below | kNm | 0 | 0 | 0 | 0 | 0 | 0 |
| Reaction | kN | 303.94 | 303.94 | 405.4 | 405.4 | 244.24 | 405.6 |
| Elastic Rotation | #.# | -8.96e-4 | -8.96e-4 | -1.21e-3 | -1.21e-3 | -6.6e-4 | -1.22e-3 |
| Elastic Axial Shortening | mm | 0 | 0 | 0 | 0 | 0 | 0 |

## Ultimate Flexure

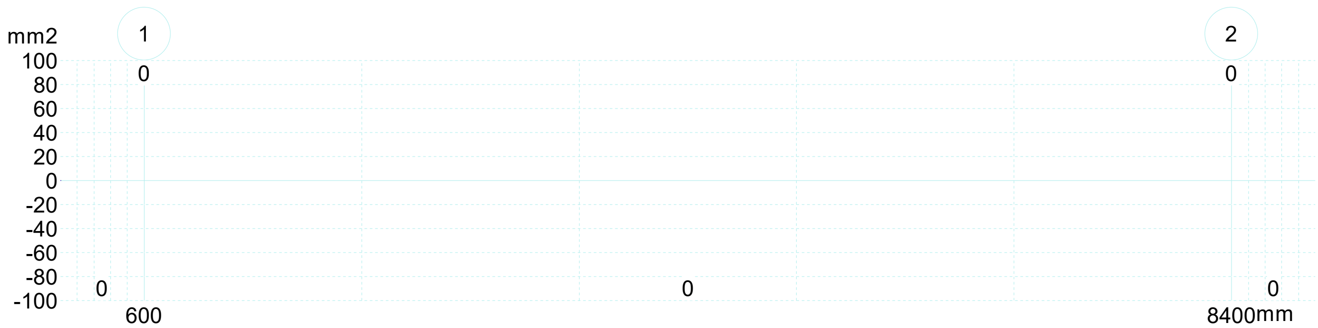



**Moment** Moment 1 Moment 2

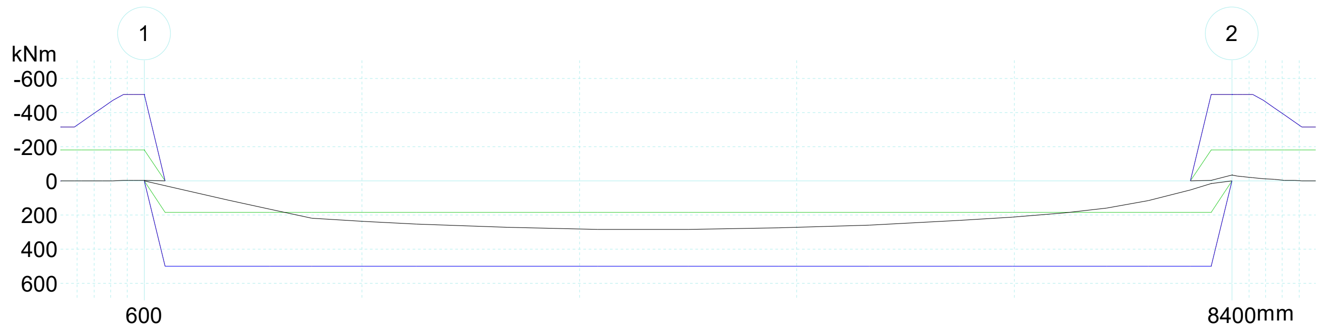



**Shear** Shear 1 Shear 2

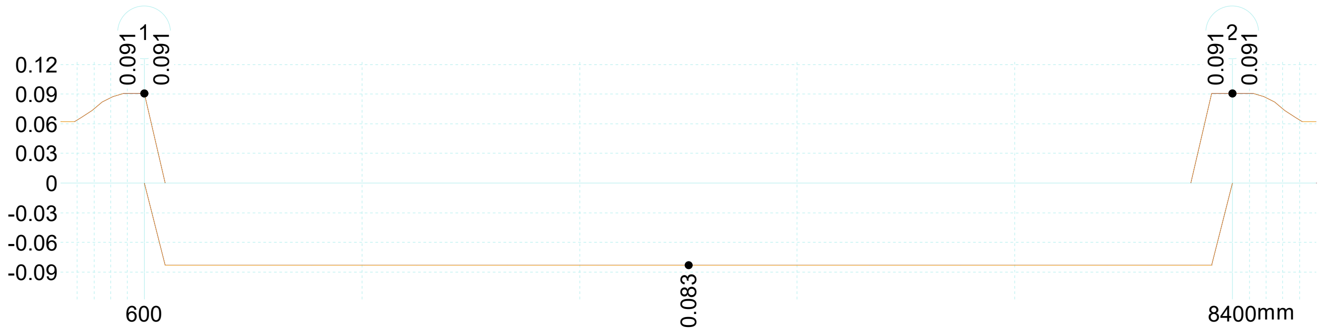
## Flexural Design
## Ultimate




**Reinforcement** Top Total Bottom Total Top Ultimate Bottom Ultimate Min Top Min Bot



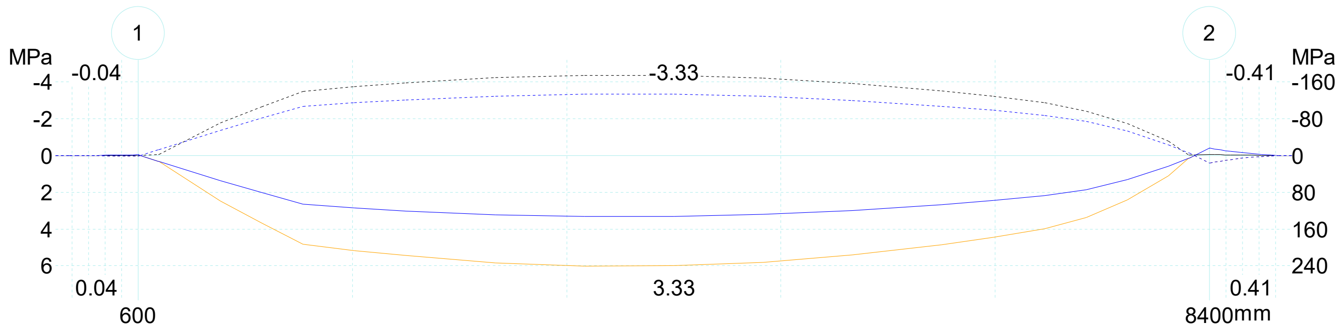

**Capacity** Minimum Ultimate Design Initial Final




**Neutral Axis Depth** Initial Final

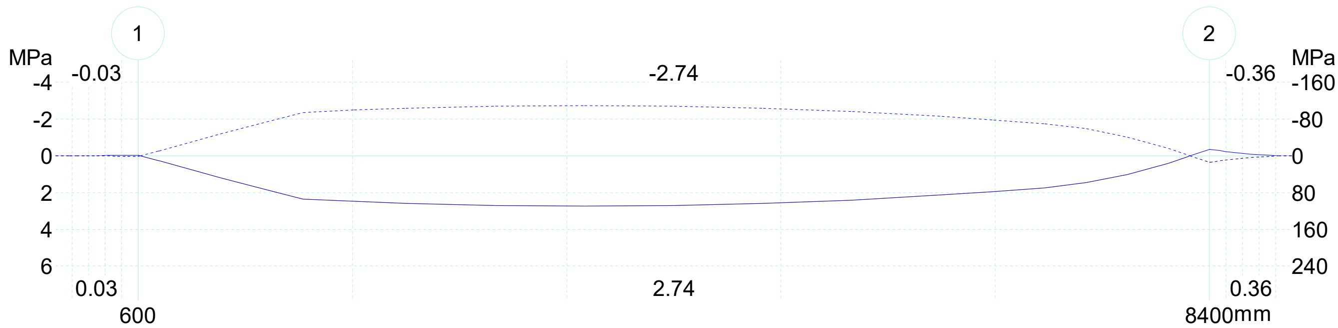
## Service

### Maximum Moment Condition




Gross Stress Top | Gross Stress Bottom | Cracked Compression | Reinforcement Tension

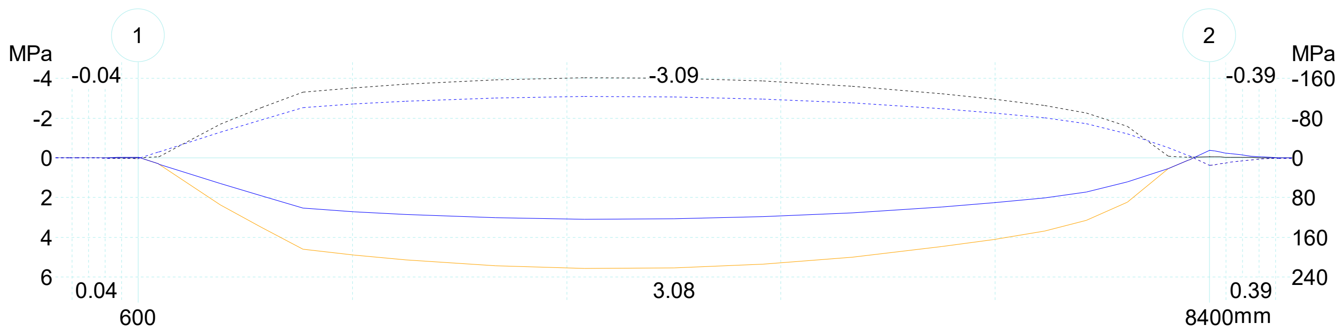
### Reversal Moment Condition




Gross Stress Top | Gross Stress Bottom | Cracked Compression | Reinforcement Tension

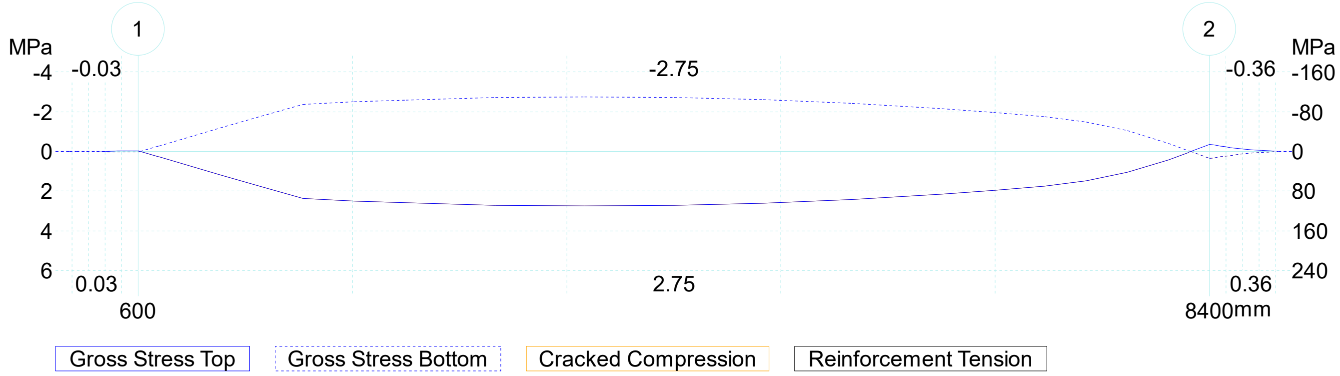
## Permanent

### Maximum Moment Condition




Gross Stress Top | Gross Stress Bottom | Cracked Compression | Reinforcement Tension

## Reversal Moment Condition




## Shear Design

## Beam

### Span 0

| Locat | V* | Mv* | Mdec | d | Ast | bv | phi Vuc | phi Vut | phi Vu | Phi Vumax | Asv/s | Spacing of Sets | | | Minimum Legs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2 legs N10 | 2 legs N12 | 2 legs N16 | |
| mm | kN | kNm | kNm | mm | mm2 | mm | kN | kN | kN | kN | mm2/mm | mm | mm | mm | # |
| 100 | -2.25 | -0.11 | 0 | 700 | 0 | 600 | 129.58 | 99999 | 129.58 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 599 | -13.48 | -4.04 | 0 | 700 | 0 | 600 | 0 | 0 | 0 | 1881.6 | 0 | 0 | 0 | 0 | 0 |

| Shear Comments |
|---|
| |
| A |
| No shear steel |
| |

### Span 1

| Locat | V* | Mv* | Mdec | d | Ast | bv | phi Vuc | phi Vut | phi Vu | Phi Vumax | Asv/s | Spacing of Sets | | | Minimum Legs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2 legs N10 | 2 legs N12 | 2 legs N16 | |
| mm | kN | kNm | kNm | mm | mm2 | mm | kN | kN | kN | kN | mm2/mm | mm | mm | mm | # |
| 1 | 196.51 | -3.85 | 0 | 700 | 0 | 600 | 0 | 0 | 0 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 600 | 183.03 | 109.82 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0.42 | 373.8 | 500 | 500 | 2 |
| 899 | 176.31 | 163.54 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0.42 | 373.8 | 500 | 500 | 2 |
| 1199.9 | 170.09 | 211.95 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0.42 | 373.8 | 500 | 500 | 2 |
| 1574.9 | 47.7 | 231.43 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 1950 | 40.9 | 238.12 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 2600 | 26.28 | 259.95 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 3250 | 14.39 | 259.8 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 3900 | -17.82 | 235.93 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 4550 | -28.6 | 237.07 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 5200 | -40.49 | 227.98 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 5850 | -55.11 | 196.91 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 6225 | -60.96 | 190.76 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 6599 | -69.38 | 166.39 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0 | 0 | 0 | 0 | 0 |
| 6900 | -123.45 | 153.43 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0.42 | 373.8 | 500 | 500 | 2 |
| 7200 | -179.88 | 107.93 | 0 | 690 | 0 | 600 | 152.62 | 99999 | 152.62 | 1854.72 | 0.42 | 373.8 | 500 | 500 | 2 |
| 7799 | -292.56 | -33.57 | 0 | 700 | 0 | 600 | 0 | 0 | 0 | 1881.6 | 0 | 0 | 0 | 0 | 0 |

| Shear Comments |
|---|
| |
| A |
| |
| Minimum Steel |
| Minimum Steel |
| Minimum Steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |

| Shear Comments |
|---|
| |
| A |
| No shear steel |
| No shear steel |
| Minimum Steel |
| Minimum Steel |
| |

## Span 2

| Locat | V* | Mv* | Mdec | d | Ast | bv | phi Vuc | phi Vut | phi Vu | Phi Vumax | Asv/s | Spacing of Sets | | | Minimum Legs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2 legs N10 | 2 legs N12 | 2 legs N16 | |
| mm | kN | kNm | kNm | mm | mm2 | mm | kN | kN | kN | kN | mm2/mm | mm | mm | mm | # |
| 1 | 112.67 | -33.75 | 0 | 700 | 0 | 600 | 152.4 | 99999 | 152.4 | 1881.6 | 0.42 | 373.8 | 500 | 500 | 2 |
| 38 | 105.71 | -29.71 | 0 | 700 | 0 | 600 | 152.4 | 99999 | 152.4 | 1881.6 | 0.42 | 373.8 | 500 | 500 | 2 |
| 75 | 98.75 | -25.92 | 0 | 700 | 0 | 600 | 152.4 | 99999 | 152.4 | 1881.6 | 0.42 | 373.8 | 500 | 500 | 2 |
| 112 | 91.79 | -22.4 | 0 | 700 | 0 | 600 | 152.4 | 99999 | 152.4 | 1881.6 | 0.42 | 373.8 | 500 | 500 | 2 |
| 150 | 84.65 | -19.05 | 0 | 700 | 0 | 600 | 152.4 | 99999 | 152.4 | 1881.6 | 0.42 | 373.8 | 500 | 500 | 2 |
| 225 | 70.54 | -13.23 | 0 | 700 | 0 | 600 | 148.76 | 99999 | 148.76 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 300 | 56.43 | -8.46 | 0 | 700 | 0 | 600 | 144.02 | 99999 | 144.02 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 375 | 42.32 | -4.76 | 0 | 700 | 0 | 600 | 138.95 | 99999 | 138.95 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 450 | 28.22 | -2.12 | 0 | 700 | 0 | 600 | 133.49 | 99999 | 133.49 | 1881.6 | 0 | 0 | 0 | 0 | 0 |
| 500 | 18.81 | -0.94 | 0 | 700 | 0 | 600 | 129.58 | 99999 | 129.58 | 1881.6 | 0 | 0 | 0 | 0 | 0 |

| Shear Comments |
|---|
| |
| A |
| Minimum Steel |
| Minimum Steel |
| Minimum Steel |
| Minimum Steel |
| Minimum Steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |
| No shear steel |

# Punching

## Column Head Critical Section

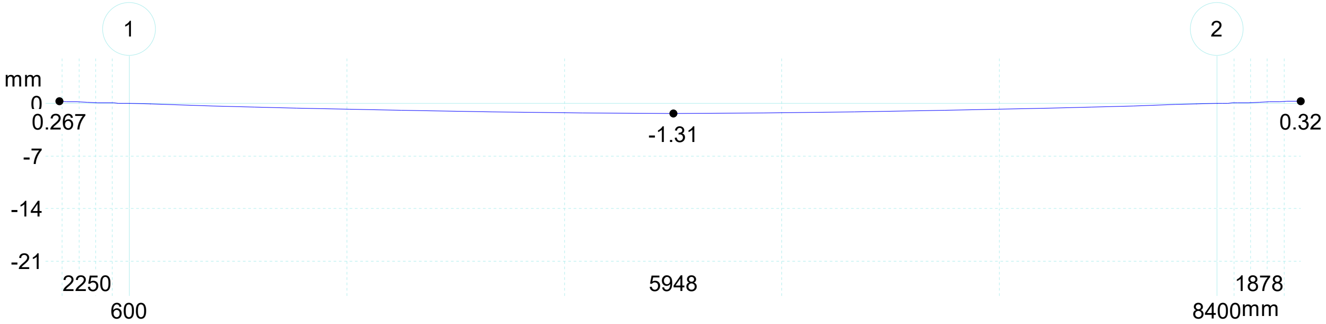
| Column No. | Bh | a | at | u | d | fcv | P/A | Asw/s min | V* | Mv* | phi Vuo | phi Vu | phi Vumin | phi Vumax | side beam | Moment Transfer | Asw/s reqd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | #.# | mm | mm | mm | mm | MPa | MPa | mm2/mm | kN | kNm | kN | kN | kN | kN | A | A | mm2/mm |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |

| result |
|---|
| |
| A |
| Check Not Carried Out! |
| Check Not Carried Out! |

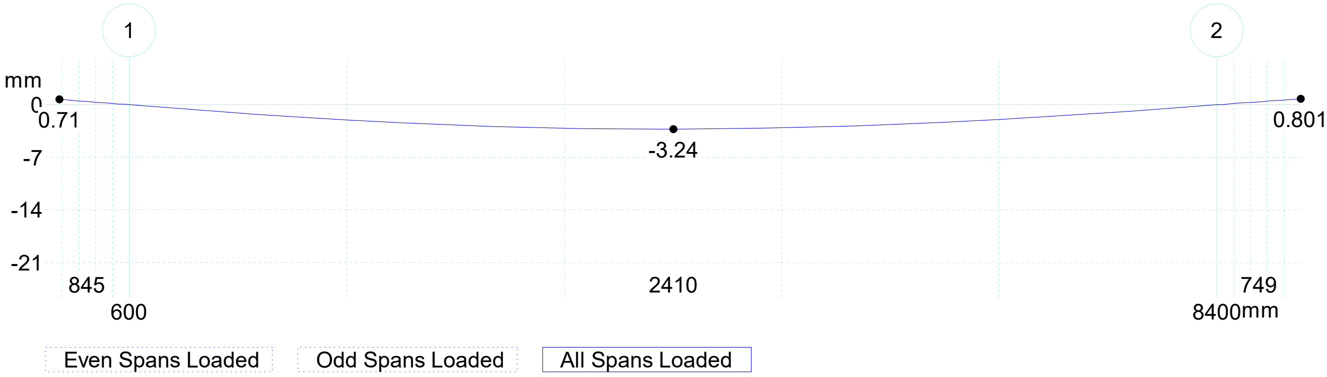
## Deflections

### All Spans Loaded

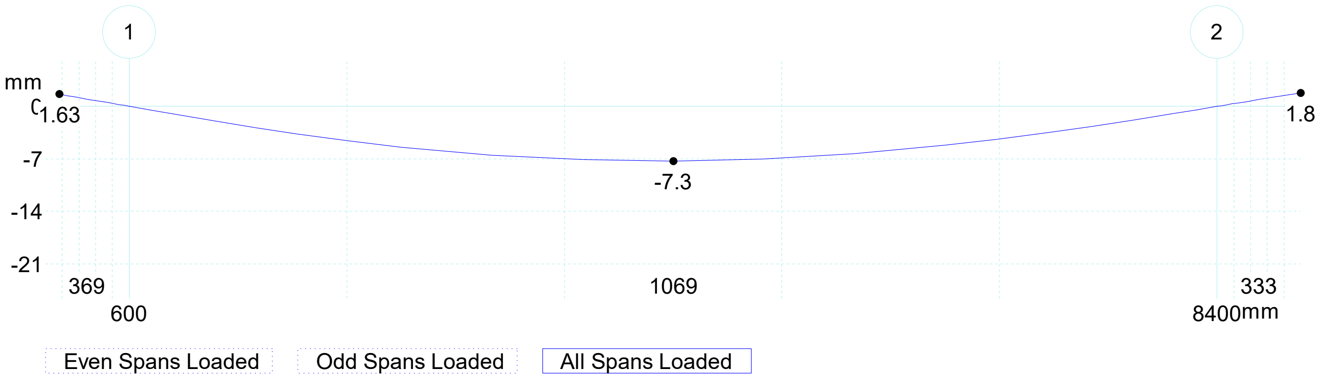
#### Transfer



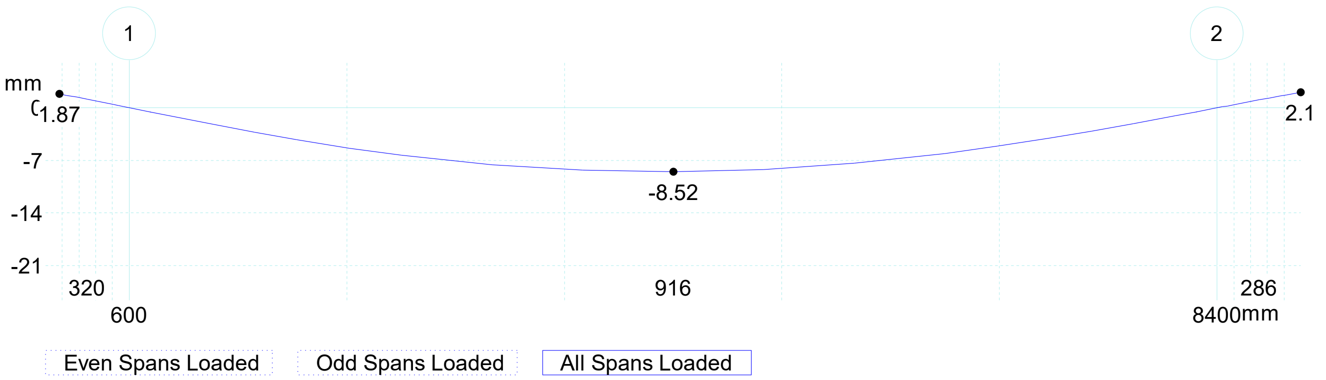

#### Short Term




#### Incremental

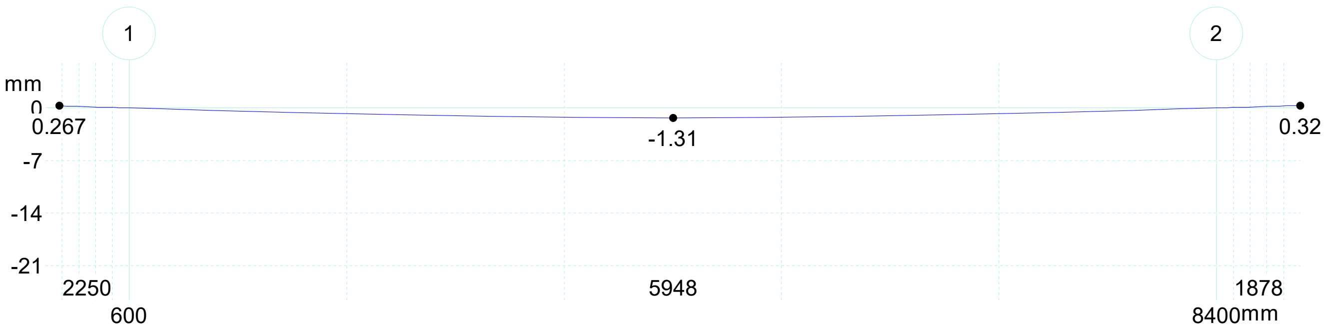



#### Total Long Term

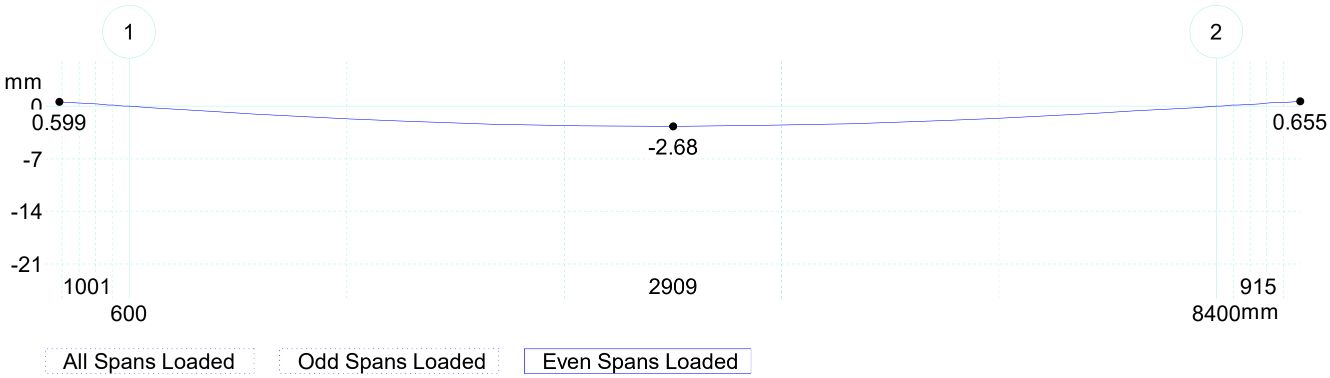


## Even Spans Loaded

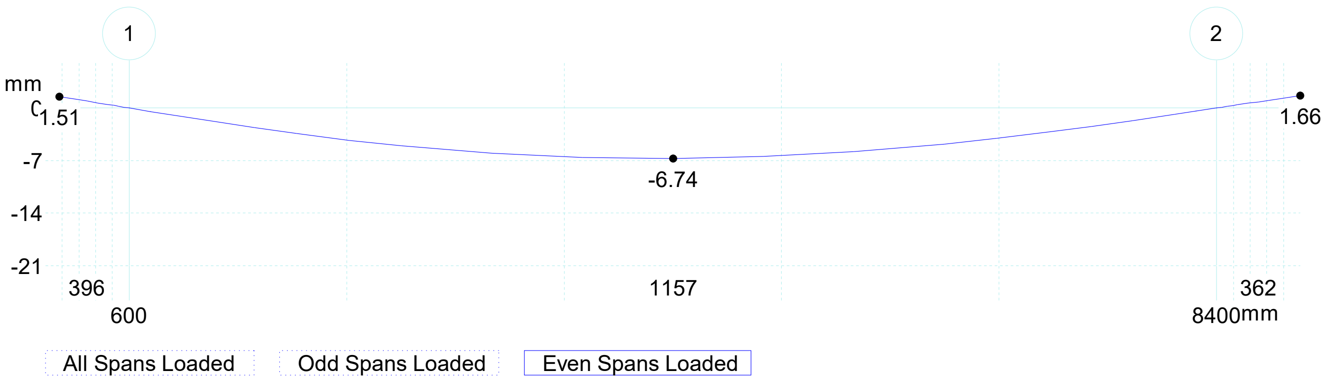
### Transfer



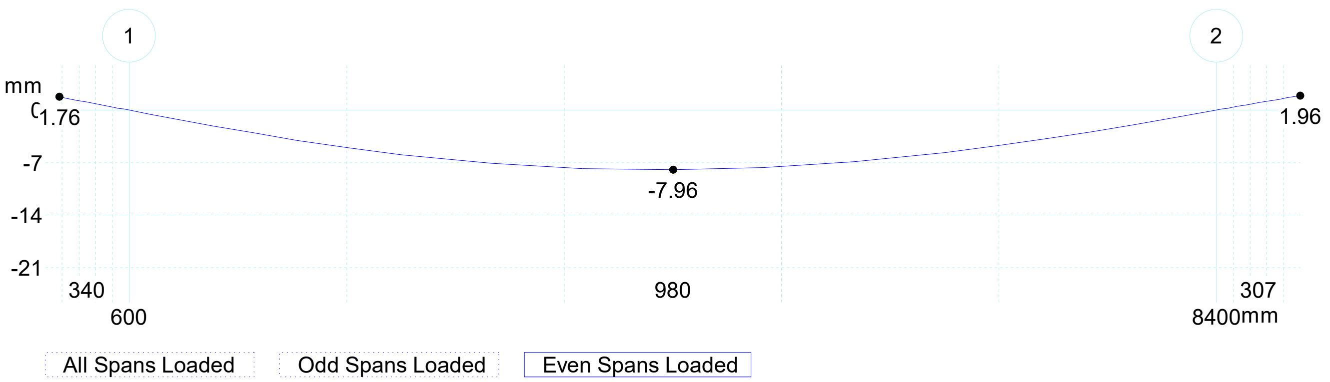

### Short Term




### Incremental

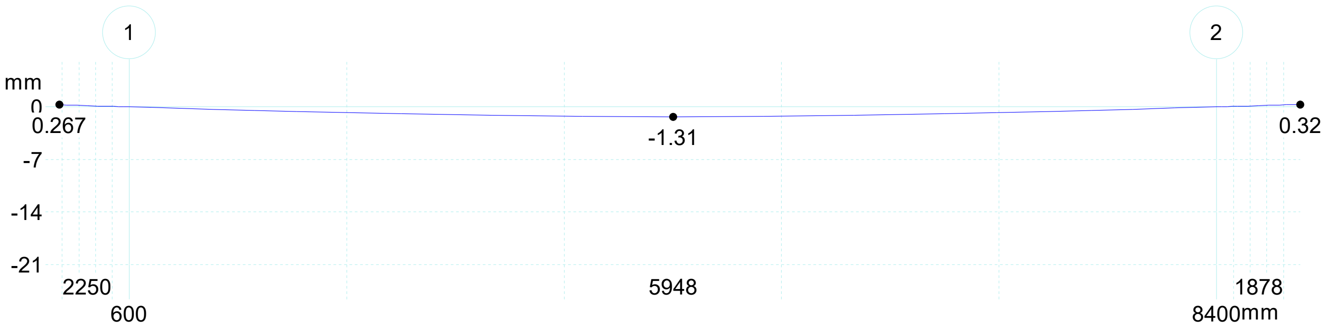



### Total Long Term

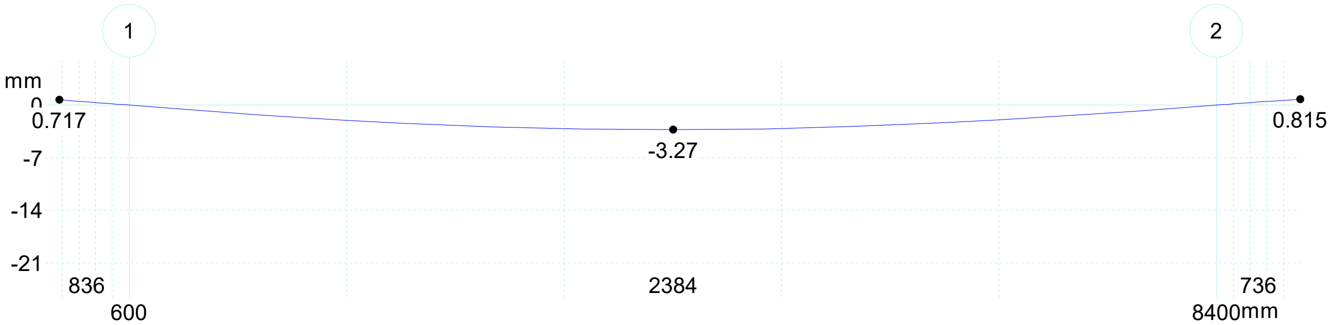


## Odd Spans Loaded

### Transfer

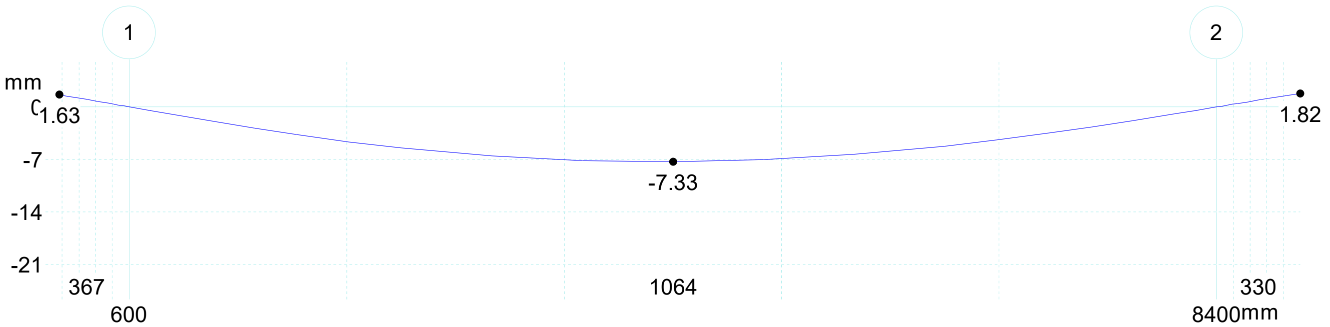



### Short Term



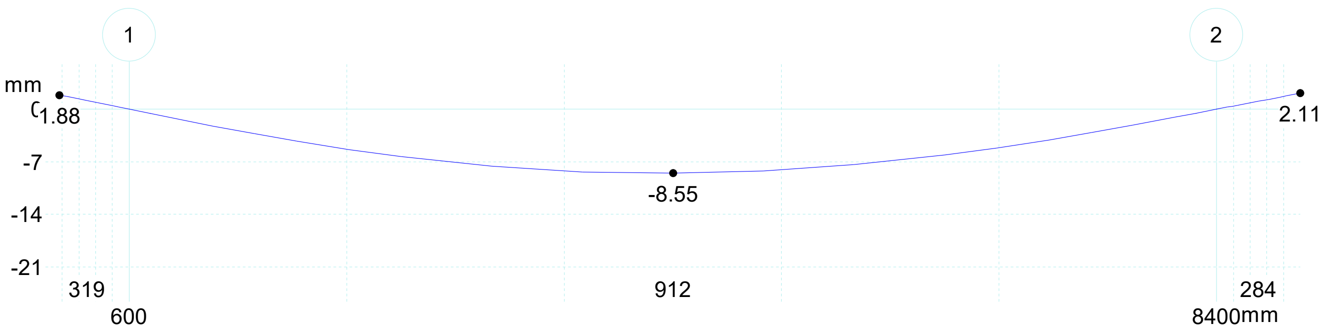

All Spans Loaded | Even Spans Loaded | Odd Spans Loaded

### Incremental




All Spans Loaded | Even Spans Loaded | Odd Spans Loaded

### Total Long Term




All Spans Loaded | Even Spans Loaded | Odd Spans Loaded

## Detailed Reinforcement

### Span 0

| | Top Reinforcement | | | | | | Bottom Reinforcement | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat mm | Max Size mm | Max Space mm | Area mm2 | Depth mm | Section Width mm | Rebar Reqd A | Max Size mm | Max Space mm | Area mm2 | Depth mm | Section Width mm | Rebar Reqd A |
| 100 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 150 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 225 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 300 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |

| | Top Reinforcement | | | | | | Bottom Reinforcement | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd |
| mm | mm | mm | mm2 | mm | mm | A | mm | mm | mm2 | mm | mm | A |
| 375 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 450 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 488 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 525 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 562 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 599 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |

| Shear Reinforcement | | | | |
|---|---|---|---|---|
| | Spacing of Sets | | | |
| Area | 2 legs N10 | 2 legs N12 | 2 legs N16 | Shear Comments |
| mm2/mm | mm | mm | mm | A |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |

Design Comments:-
- - Span 0 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

## Span 1

| | Top Reinforcement | | | | | | Bottom Reinforcement | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd |
| mm | mm | mm | mm2 | mm | mm | A | mm | mm | mm2 | mm | mm | A |
| 1 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 149 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 151 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 600 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 899 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 1199.9 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 36 | 300 | 0 | 700 | 600 | No Steel Added |
| 1574.9 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 32 | 300 | 0 | 700 | 600 | No Steel Added |
| 1950 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 32 | 300 | 0 | 700 | 600 | No Steel Added |
| 2600 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 28 | 288.3 | 0 | 700 | 600 | No Steel Added |
| 3250 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 28 | 281.7 | 0 | 700 | 600 | No Steel Added |
| 3900 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 28 | 282 | 0 | 700 | 600 | No Steel Added |
| 4550 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 28 | 289.3 | 0 | 700 | 600 | No Steel Added |
| 5200 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 32 | 300 | 0 | 700 | 600 | No Steel Added |
| 5850 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 32 | 300 | 0 | 700 | 600 | No Steel Added |
| 6225 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 36 | 300 | 0 | 700 | 600 | No Steel Added |
| 6599 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 6900 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 7200 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 7500 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 7649 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 7651 | 0 | 0 | 0 | 48 | 600 | No Steel Added | 40 | 300 | 0 | 700 | 600 | No Steel Added |
| 7799 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |

| Shear Reinforcement | | | | |
|---|---|---|---|---|
| | Spacing of Sets | | | |
| Area | 2 legs N10 | 2 legs N12 | 2 legs N16 | Shear Comments |
| mm2/mm | mm | mm | mm | A |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |

| Shear Reinforcement | | | | |
|---|---|---|---|---|
| | Spacing of Sets | | | |
| Area | 2 legs N10 | 2 legs N12 | 2 legs N16 | Shear Comments |
| mm2/mm | mm | mm | mm | A |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | |

Design Comments:-
- - Span 1 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

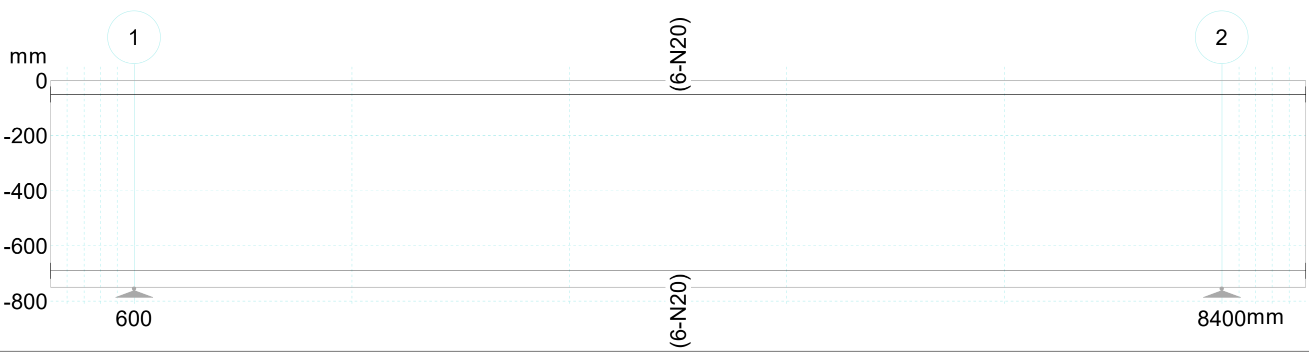
## Span 2

| | Top Reinforcement | | | | | | Bottom Reinforcement | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd | Max Size | Max Space | Area | Depth | Section Width | Rebar Reqd |
| mm | mm | mm | mm2 | mm | mm | A | mm | mm | mm2 | mm | mm | A |
| 1 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 38 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 75 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 112 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 150 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 225 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 300 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 375 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 450 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |
| 500 | 40 | 300 | 0 | 48 | 600 | No Steel Added | 0 | 0 | 0 | 700 | 600 | No Steel Added |

| Shear Reinforcement | | | | |
|---|---|---|---|---|
| | Spacing of Sets | | | |
| Area | 2 legs N10 | 2 legs N12 | 2 legs N16 | Shear Comments |
| mm2/mm | mm | mm | mm | A |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0.42 | 373.8 | 500 | 500 | Minimum Steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |
| 0 | 0 | 0 | 0 | No shear steel |

Design Comments:-
- - Span 2 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

## Reinforcement Layout



- \- Span 0 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

- \- Span 1 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

- \- Span 2 - Required Bar Size is smaller than the Preferred Bar Size. Maintaining the same cover will require slightly less reinforcement than calculated.

**INPUT/ANALYSIS REPORT**

```
Job:    11401- raft slab GB2

Title:  19-21 The Corso Manly
        Raft slab edge beam lift to stair lobby
Type:   Plane frame
Date:   27 Feb 2020
Time:    5:12 PM

Nodes ............................     6
Members ..........................     5
Spring supports ..................     0
Sections .........................     1
Materials ........................     1
Primary load cases ...............     1
Combination load cases ...........     0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working loads |

Analysis Types:
- S - Skipped (not analysed)
- L - Linear
- N - Non-linear

Analysis Flag:
- CNV - Converged
- XSD - Excessive displacements
- DNC - Did not converge in iteration limit
- UNS - Unstable or local instability

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 1.000 | 0.000 | 0.000 | 111000 |
| 3 | 8.500 | 0.000 | 0.000 | 010000 |
| 4 | 10.000 | 0.000 | 0.000 | 010000 |
| 5 | 11.500 | 0.000 | 0.000 | 010000 |
| 6 | 11.800 | 0.000 | 0.000 | 000000 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 1.000 |
| 2 | 2 | 3 | Y | 1 | 1 | 000000 | 000000 | 7.500 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.300 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | LRT | RCEdgebeam | 800D x 600W | 0.800 | 0.600 | 1.300 |
| | | | | 0.200 | | |

Dimension codes:
TEE/LL/LR - D1=D   D2=Tw   D3=Bf   D4=Tf

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 6.200E-01 | 0.000E+00 | 0.000E+00 | 3.251E-02 | 6.591E-02 | 3.582E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 3.230E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC32 |

**CONDITION NUMBER**

Maximum condition number: 3.600E+01 at node: 6 DOFN: 1

**APPLIED LOADING**

CASE 1: Full working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | CONC | FY | GL | LE | -334.000 | 0.100 | | |
| 2 | CONC | FY | GL | LE | -161.000 | 1.000 | | |
| 2 | CONC | FY | GL | LE | -48.000 | 3.000 | | |
| 2 | TRAP | FY | GL | LE | -114.200 | 3.000 | -114.200 | 7.500 |
| 3 | CONC | FY | GL | LE | -65.000 | 1.000 | | |
| 3 | TRAP | FY | GL | LE | -114.200 | 0.000 | -114.200 | 1.000 |
| 3 | TRAP | FY | GL | LE | -91.300 | 1.000 | -91.300 | 1.500 |
| 4 | UNIF | FY | GL | | -91.300 | | | |
| 5 | CONC | FY | GL | LE | -84.000 | 0.200 | | |
| 5 | UNIF | FY | GL | | -91.300 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1530.090 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -8623.769

**NODE DISPLACEMENTS**

CASE 1: Full working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0002 | 0.0000 | 0.00000 | 0.00000 | -0.00017 |
| 2 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | -0.00029 |
| 3 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00017 |
| 4 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | -0.00004 |
| 5 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00002 |
| 6 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00002 |

**MEMBER FORCES**

CASE 1: Full working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 334.00 | 0.00 | 0.00 | 0.00 | -300.60 |
| 2 | 2 | 0.00 | -298.84 | 0.00 | 0.00 | 0.00 | -300.60 |
| | 3 | 0.00 | 424.06 | 0.00 | 0.00 | 0.00 | -478.04 |
| 3 | 3 | 0.00 | -482.64 | 0.00 | 0.00 | 0.00 | -478.04 |
| | 4 | 0.00 | -257.79 | 0.00 | 0.00 | 0.00 | 87.80 |
| 4 | 4 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 | 87.80 |
| | 5 | 0.00 | 140.95 | 0.00 | 0.00 | 0.00 | -20.91 |
| 5 | 5 | 0.00 | -111.39 | 0.00 | 0.00 | 0.00 | -20.91 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension Shear - End A sagging
Torque - Right-hand twist Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 632.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 906.69 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | -261.79 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 252.34 | 0.00 | 0.00 | 0.00 | 0.00 |

SUM: 0.00 1530.09 0.00 (all nodes)

Max. residual: 3.979E-13 at DOFN: 2

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401- raft slab GB2-spring

Title:  19-21 The Corso Manly
        Raft slab edge beam lift to stair lobby
Type:   Plane frame
Date:   27 Feb 2020
Time:    5:12 PM

Nodes ............................      6
Members ..........................      5
Spring supports ..................      4
Sections .........................      1
Materials ........................      1
Primary load cases ...............      1
Combination load cases ...........      0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 1.000 | 0.000 | 0.000 | 100000 |
| 3 | 8.500 | 0.000 | 0.000 | 000000 |
| 4 | 10.000 | 0.000 | 0.000 | 000000 |
| 5 | 11.500 | 0.000 | 0.000 | 000000 |
| 6 | 11.800 | 0.000 | 0.000 | 000000 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 2 | 0.000E+00 | 1.000E+05 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 6.250E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 6.250E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 6.250E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 1.000 |
| 2 | 2 | 3 | Y | 1 | 1 | 000000 | 000000 | 7.500 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.300 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | LRT | RCEdgebeam | 800D x 600W | 0.800 | 0.600 | 1.300 |
| | | | | 0.200 | | |

```
Dimension codes:
TEE/LL/LR - D1=D   D2=Tw  D3=Bf  D4=Tf
```

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 6.200E-01 | 0.000E+00 | 0.000E+00 | 3.251E-02 | 6.591E-02 | 3.582E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 3.230E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC32 |

**CONDITION NUMBER**

Maximum condition number: 3.504E+03 at node: 6 DOFN: 2

**APPLIED LOADING**

CASE 1: Full working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | CONC | FY | GL | LE | -334.000 | 0.100 | | |
| 2 | CONC | FY | GL | LE | -161.000 | 1.000 | | |
| 2 | CONC | FY | GL | LE | -48.000 | 3.000 | | |
| 2 | TRAP | FY | GL | LE | -114.200 | 3.000 | -114.200 | 7.500 |
| 3 | CONC | FY | GL | LE | -65.000 | 1.000 | | |
| 3 | TRAP | FY | GL | LE | -114.200 | 0.000 | -114.200 | 1.000 |
| 3 | TRAP | FY | GL | LE | -91.300 | 1.000 | -91.300 | 1.500 |
| 4 | UNIF | FY | GL | | -91.300 | | | |
| 5 | CONC | FY | GL | LE | -84.000 | 0.200 | | |
| 5 | UNIF | FY | GL | | -91.300 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1530.090 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -8623.769

**NODE DISPLACEMENTS**

CASE 1: Full working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0063 | 0.0000 | 0.00000 | 0.00000 | -0.00064 |
| 2 | 0.0000 | -0.0070 | 0.0000 | 0.00000 | 0.00000 | -0.00076 |
| 3 | 0.0000 | -0.0064 | 0.0000 | 0.00000 | 0.00000 | 0.00133 |
| 4 | 0.0000 | -0.0044 | 0.0000 | 0.00000 | 0.00000 | 0.00135 |
| 5 | 0.0000 | -0.0024 | 0.0000 | 0.00000 | 0.00000 | 0.00132 |
| 6 | 0.0000 | -0.0020 | 0.0000 | 0.00000 | 0.00000 | 0.00131 |

**MEMBER FORCES**

CASE 1: Full working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 334.00 | 0.00 | 0.00 | 0.00 | -300.60 |
| 2 | 2 | 0.00 | -366.07 | 0.00 | 0.00 | 0.00 | -300.60 |
| | 3 | 0.00 | 356.83 | 0.00 | 0.00 | 0.00 | 26.17 |
| 3 | 3 | 0.00 | -45.68 | 0.00 | 0.00 | 0.00 | 26.17 |
| | 4 | 0.00 | 179.17 | 0.00 | 0.00 | 0.00 | -63.43 |
| 4 | 4 | 0.00 | -96.82 | 0.00 | 0.00 | 0.00 | -63.43 |
| | 5 | 0.00 | 40.13 | 0.00 | 0.00 | 0.00 | -20.91 |
| 5 | 5 | 0.00 | -111.39 | 0.00 | 0.00 | 0.00 | -20.91 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension Shear - End A sagging
Torque - Right-hand twist Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 700.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 402.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 275.99 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 151.52 | 0.00 | 0.00 | 0.00 | 0.00 |

SUM: 0.00 1530.09 0.00 (all nodes)

Max. residual: 2.622E-10 at DOFN: 16

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401- raft slab GB3

Title:  19-21 The Corso Manly
        Raft slab edge beam lift to stair lobby
Type:   Plane frame
Date:   27 Feb 2020
Time:    5:11 PM

Nodes ............................      6
Members ..........................      5
Spring supports ..................      0
Sections .........................      1
Materials ........................      1
Primary load cases ...............      1
Combination load cases ...........      0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 1.000 | 0.000 | 0.000 | 111000 |
| 3 | 8.500 | 0.000 | 0.000 | 010000 |
| 4 | 10.000 | 0.000 | 0.000 | 010000 |
| 5 | 11.500 | 0.000 | 0.000 | 010000 |
| 6 | 11.800 | 0.000 | 0.000 | 000000 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 1.000 |
| 2 | 2 | 3 | Y | 1 | 1 | 000000 | 000000 | 7.500 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.300 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | LRT | RCEdgebeam | 800D x 600W | 0.800 | 0.600 | 1.300 |
| | | | | 0.200 | | |

```
Dimension codes:
TEE/LL/LR - D1=D   D2=Tw   D3=Bf   D4=Tf
```

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 6.200E-01 | 0.000E+00 | 0.000E+00 | 3.251E-02 | 6.591E-02 | 3.582E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 3.230E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC32 |

**CONDITION NUMBER**

Maximum condition number: 3.600E+01 at node: 6 DOFN: 1

**APPLIED LOADING**

CASE 1: Full working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | CONC | FY | GL | LE | -343.000 | 0.100 | | |
| 2 | CONC | FY | GL | LE | -151.000 | 3.000 | | |
| 2 | CONC | FY | GL | LE | -90.700 | 6.000 | | |
| 2 | TRAP | FY | GL | LE | -64.400 | 3.000 | -64.400 | 6.000 |
| 3 | CONC | FY | GL | LE | -100.000 | 0.500 | | |
| 3 | TRAP | FY | GL | LE | -77.000 | 0.500 | -77.000 | 1.500 |
| 4 | UNIF | FY | GL | | -77.000 | | | |
| 5 | CONC | FY | GL | LE | -64.700 | 0.200 | | |
| 5 | UNIF | FY | GL | | -77.000 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1158.200 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -6235.030

**NODE DISPLACEMENTS**

CASE 1: Full working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00004 |
| 2 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | -0.00008 |
| 3 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00012 |
| 4 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | -0.00003 |
| 5 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00001 |
| 6 | 0.0000 | 0.0000 | 0.0000 | 0.00000 | 0.00000 | 0.00001 |

**MEMBER FORCES**

CASE 1: Full working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 343.00 | 0.00 | 0.00 | 0.00 | -308.70 |
| 2 | 2 | 0.00 | -181.72 | 0.00 | 0.00 | 0.00 | -308.70 |
| | 3 | 0.00 | 253.18 | 0.00 | 0.00 | 0.00 | -340.93 |
| 3 | 3 | 0.00 | -358.85 | 0.00 | 0.00 | 0.00 | -340.93 |
| | 4 | 0.00 | -181.85 | 0.00 | 0.00 | 0.00 | 58.84 |
| 4 | 4 | 0.00 | -7.59 | 0.00 | 0.00 | 0.00 | 58.84 |
| | 5 | 0.00 | 107.91 | 0.00 | 0.00 | 0.00 | -16.41 |
| 5 | 5 | 0.00 | -87.80 | 0.00 | 0.00 | 0.00 | -16.41 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension    Shear - End A sagging
Torque - Right-hand twist    Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 524.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 612.03 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | -174.26 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 195.71 | 0.00 | 0.00 | 0.00 | 0.00 |

SUM: 0.00 1158.20 0.00 (all nodes)

Max. residual: 5.684E-14 at DOFN: 12

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401 - FTG BEAM - GB4-plus 1beam

Title:  19-21 The Corso Manly
        Footing Beam GB4
Type:   Plane frame
Date:   27 Feb 2020
Time:    8:23 PM

Nodes ............................     14
Members ..........................     13
Spring supports ..................     13
Sections .........................      2
Materials ........................      2
Primary load cases ...............      1
Combination load cases ...........      0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working Loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 0.200 | 0.000 | 0.000 | 000000 |
| 3 | 13.400 | 0.000 | 0.000 | 000000 |
| 4 | 14.600 | 0.000 | 0.000 | 101110 |
| 5 | 1.400 | 0.000 | 0.000 | 000000 |
| 6 | 2.600 | 0.000 | 0.000 | 000000 |
| 7 | 3.800 | 0.000 | 0.000 | 000000 |
| 8 | 5.000 | 0.000 | 0.000 | 000000 |
| 9 | 6.200 | 0.000 | 0.000 | 000000 |
| 10 | 7.400 | 0.000 | 0.000 | 000000 |
| 11 | 8.600 | 0.000 | 0.000 | 000000 |
| 12 | 9.800 | 0.000 | 0.000 | 000000 |
| 13 | 11.000 | 0.000 | 0.000 | 000000 |
| 14 | 12.200 | 0.000 | 0.000 | 000000 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 2 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 6 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 7 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 8 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 9 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 10 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 11 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 12 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 13 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 14 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 0.200 |
| 3 | 3 | 4 | Y | 2 | 1 | 000000 | 000000 | 1.200 |
| 4 | 2 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 6 | 6 | 7 | Y | 1 | 1 | 000000 | 000000 | 1.200 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | 7 | 8 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 8 | 8 | 9 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| -9 | 9 | 10 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| -10 | 10 | 11 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| -11 | 11 | 12 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| -12 | 12 | 13 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 13 | 13 | 14 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 14 | 14 | 3 | Y | 1 | 1 | 000000 | 000000 | 1.200 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | RECT | RCBlockwall | 4m x 200 thick | 4.000 | 0.200 | |
| 2 | RECT | Stripfooting | 1m x 800 deep | 0.800 | 1.000 | |

Dimension codes:
RECT - D1=D D2=B

**SECTION PROPERTIES**

| Section | Ax | Ay | Az | J | Iy | Iz | fact |
|---|---|---|---|---|---|---|---|
| | m2 | m2 | m2 | m4 | m4 | m4 | |
| 1 | 8.000E-01 | 0.000E+00 | 0.000E+00 | 9.984E-03 | 2.667E-03 | 1.067E+00 | 1.000 |
| 2 | 8.000E-01 | 0.000E+00 | 0.000E+00 | 8.755E-02 | 6.667E-02 | 4.267E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E | u | Density | Alpha | |
|---|---|---|---|---|---|
| | kN/m2 | | t/m3 | /deg C | |
| 1 | 2.550E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC20 |
| 2 | 2.550E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC20 |

**CONDITION NUMBER**

Maximum condition number: 2.170E+02 at node: 2 DOFN: 2

**APPLIED LOADING**

CASE 1: Full working Loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | UNIF | FY | GL | | -33.000 | | | |
| 3 | UNIF | FY | GL | | -68.600 | | | |
| 4 | UNIF | FY | GL | | -33.000 | | | |
| 5 | CONC | FY | GL | LE | -71.000 | 1.100 | | |
| 5 | UNIF | FY | GL | | -33.000 | | | |
| 6 | UNIF | FY | GL | | -33.000 | | | |
| 7 | UNIF | FY | GL | | -33.000 | | | |
| 8 | UNIF | FY | GL | | -33.000 | | | |
| 9 | UNIF | FY | GL | | -280.000 | | | |
| 10 | UNIF | FY | GL | | -280.000 | | | |
| 11 | UNIF | FY | GL | | -68.600 | | | |
| 11 | UNIF | FY | GL | | -156.000 | | | |
| 12 | UNIF | FY | GL | | -68.600 | | | |
| 12 | UNIF | FY | GL | | -156.000 | | | |
| 13 | UNIF | FY | GL | | -68.600 | | | |
| 14 | UNIF | FY | GL | | -68.600 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1733.600 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -14228.241

**NODE DISPLACEMENTS**

CASE 1: Full working Loads

| Node | X-Disp | Y-Disp | Z-Disp | X-Rotn | Y-Rotn | Z-Rotn |
|---|---|---|---|---|---|---|
| | m | m | m | rad | rad | rad |
| 1 | 0.0000 | -0.0033 | 0.0000 | 0.00000 | 0.00000 | -0.00035 |
| 2 | 0.0000 | -0.0034 | 0.0000 | 0.00000 | 0.00000 | -0.00035 |
| 3 | 0.0000 | -0.0064 | 0.0000 | 0.00000 | 0.00000 | -0.00005 |
| 4 | 0.0000 | -0.0064 | 0.0000 | 0.00000 | 0.00000 | 0.00003 |
| 5 | 0.0000 | -0.0038 | 0.0000 | 0.00000 | 0.00000 | -0.00035 |
| 6 | 0.0000 | -0.0042 | 0.0000 | 0.00000 | 0.00000 | -0.00034 |
| 7 | 0.0000 | -0.0046 | 0.0000 | 0.00000 | 0.00000 | -0.00033 |
| 8 | 0.0000 | -0.0050 | 0.0000 | 0.00000 | 0.00000 | -0.00031 |
| 9 | 0.0000 | -0.0054 | 0.0000 | 0.00000 | 0.00000 | -0.00028 |
| 10 | 0.0000 | -0.0057 | 0.0000 | 0.00000 | 0.00000 | -0.00023 |
| 11 | 0.0000 | -0.0059 | 0.0000 | 0.00000 | 0.00000 | -0.00018 |
| 12 | 0.0000 | -0.0061 | 0.0000 | 0.00000 | 0.00000 | -0.00013 |
| 13 | 0.0000 | -0.0062 | 0.0000 | 0.00000 | 0.00000 | -0.00009 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 0.0000 | -0.0063 | 0.0000 | 0.00000 | 0.00000 | -0.00007 |

**MEMBER FORCES**

CASE 1: Full working Loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 6.60 | 0.00 | 0.00 | 0.00 | -0.66 |
| 3 | 3 | 0.00 | 77.16 | 0.00 | 0.00 | 0.00 | 141.98 |
| | 4 | 0.00 | 159.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 2 | 0.00 | -78.23 | 0.00 | 0.00 | 0.00 | -0.66 |
| | 5 | 0.00 | -38.63 | 0.00 | 0.00 | 0.00 | 69.46 |
| 5 | 5 | 0.00 | -133.86 | 0.00 | 0.00 | 0.00 | 69.46 |
| | 6 | 0.00 | -23.26 | 0.00 | 0.00 | 0.00 | 199.23 |
| 6 | 6 | 0.00 | -128.77 | 0.00 | 0.00 | 0.00 | 199.23 |
| | 7 | 0.00 | -89.17 | 0.00 | 0.00 | 0.00 | 330.00 |
| 7 | 7 | 0.00 | -204.70 | 0.00 | 0.00 | 0.00 | 330.00 |
| | 8 | 0.00 | -165.10 | 0.00 | 0.00 | 0.00 | 551.88 |
| 8 | 8 | 0.00 | -290.17 | 0.00 | 0.00 | 0.00 | 551.88 |
| | 9 | 0.00 | -250.57 | 0.00 | 0.00 | 0.00 | 876.33 |
| -9 | 9 | 0.00 | -384.44 | 0.00 | 0.00 | 0.00 | 876.33 |
| | 10 | 0.00 | -48.44 | 0.00 | 0.00 | 0.00 | 1136.05 |
| -10 | 10 | 0.00 | -189.93 | 0.00 | 0.00 | 0.00 | 1136.05 |
| | 11 | 0.00 | 146.07 | 0.00 | 0.00 | 0.00 | 1162.36 |
| -11 | 11 | 0.00 | -1.54 | 0.00 | 0.00 | 0.00 | 1162.36 |
| | 12 | 0.00 | 267.98 | 0.00 | 0.00 | 0.00 | 1002.50 |
| -12 | 12 | 0.00 | 115.78 | 0.00 | 0.00 | 0.00 | 1002.50 |
| | 13 | 0.00 | 385.30 | 0.00 | 0.00 | 0.00 | 701.85 |
| 13 | 13 | 0.00 | 229.84 | 0.00 | 0.00 | 0.00 | 701.85 |
| | 14 | 0.00 | 312.16 | 0.00 | 0.00 | 0.00 | 376.65 |
| 14 | 14 | 0.00 | 154.39 | 0.00 | 0.00 | 0.00 | 376.65 |
| | 3 | 0.00 | 236.71 | 0.00 | 0.00 | 0.00 | 141.98 |

Positive Forces (Member Axes):
Axial - Tension    Shear - End A sagging
Torque - Right-hand twist    Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working Loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 84.83 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 159.55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 159.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 95.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 105.51 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 115.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | 0.00 | 125.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | 0.00 | 133.87 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 141.49 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | 0.00 | 147.61 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.00 | 152.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | 0.00 | 155.46 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | 0.00 | 157.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM: | 0.00 | 1733.60 | 0.00 (all nodes) | | | |

Max. residual: 4.191E-09 at DOFN: 2

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401 - FTG BEAM - GB4-1B3 LOADS

Title:  19-21 The Corso Manly
        Footing Beam GB4
Type:   Plane frame
Date:   28 Feb 2020
Time:   11:12 AM

Nodes ............................    16
Members ..........................    15
Spring supports ..................    15
Sections .........................     2
Materials ........................     2
Primary load cases ...............     1
Combination load cases ...........     0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working Loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 0.200 | 0.000 | 0.000 | 000000 |
| 3 | 13.400 | 0.000 | 0.000 | 000000 |
| 4 | 14.600 | 0.000 | 0.000 | 101110 |
| 5 | 1.400 | 0.000 | 0.000 | 000000 |
| 6 | 2.600 | 0.000 | 0.000 | 000000 |
| 7 | 3.800 | 0.000 | 0.000 | 000000 |
| 8 | 5.000 | 0.000 | 0.000 | 000000 |
| 9 | 6.200 | 0.000 | 0.000 | 000000 |
| 10 | 7.400 | 0.000 | 0.000 | 000000 |
| 11 | 8.600 | 0.000 | 0.000 | 000000 |
| 12 | 9.800 | 0.000 | 0.000 | 000000 |
| -13 | 11.000 | 0.000 | 0.000 | 000000 |
| 14 | 12.200 | 0.000 | 0.000 | 000000 |
| 16 | 15.800 | 0.000 | 0.000 | 101110 |
| 29 | 17.000 | 0.000 | 0.000 | 101110 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 2 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 6 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 7 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 8 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 9 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 10 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 11 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 12 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| -13 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 14 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 16 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 29 | 0.000E+00 | 2.500E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 0.200 |
| 3 | 3 | 4 | Y | 2 | 1 | 000000 | 000000 | 1.200 |
| 4 | 2 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 6 | 6 | 7 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 7 | 7 | 8 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 8 | 8 | 9 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 9 | 9 | 10 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 10 | 10 | 11 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 11 | 11 | 12 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 12 | 12 | -13 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 13 | -13 | 14 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 14 | 14 | 3 | Y | 1 | 1 | 000000 | 000000 | 1.200 |
| 15 | 4 | 16 | Y | 2 | 1 | 000000 | 000000 | 1.200 |
| 16 | 16 | 29 | Y | 2 | 1 | 000000 | 000000 | 1.200 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | RECT | RCblockwall | 4m x 0.2 | 4.000 | 0.200 | |
| 2 | RECT | Stripfooting | 1m x 800 deep | 0.800 | 1.000 | |

Dimension codes:
RECT - D1=D D2=B

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 8.000E-01 | 0.000E+00 | 0.000E+00 | 9.984E-03 | 2.667E-03 | 1.067E+00 | 1.000 |
| 2 | 8.000E-01 | 0.000E+00 | 0.000E+00 | 8.755E-02 | 6.667E-02 | 4.267E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 2.550E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC20 |
| 2 | 2.550E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC20 |

**CONDITION NUMBER**

Maximum condition number: 2.170E+02 at node: 2 DOFN: 2

**APPLIED LOADING**

CASE 1: Full working Loads

**Node Loads**

| Node | X Force kN | Y Force kN | Z Force kN | X Moment kNm | Y Moment kNm | Z Moment kNm |
|---|---|---|---|---|---|---|
| 14 | 0.000 | -192.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | UNIF | FY | GL | | -33.000 | | | |
| 3 | UNIF | FY | GL | | -68.600 | | | |
| 4 | UNIF | FY | GL | | -33.000 | | | |
| 5 | CONC | FY | GL | LE | -71.000 | 1.100 | | |
| 5 | UNIF | FY | GL | | -33.000 | | | |
| 6 | UNIF | FY | GL | | -33.000 | | | |
| 7 | UNIF | FY | GL | | -33.000 | | | |
| 8 | UNIF | FY | GL | | -33.000 | | | |
| 9 | UNIF | FY | GL | | -280.000 | | | |
| 10 | UNIF | FY | GL | | -280.000 | | | |
| 11 | UNIF | FY | GL | | -68.600 | | | |
| 11 | UNIF | FY | GL | | -156.000 | | | |
| 12 | UNIF | FY | GL | | -68.600 | | | |
| 12 | UNIF | FY | GL | | -156.000 | | | |
| 13 | UNIF | FY | GL | | -68.600 | | | |
| 14 | UNIF | FY | GL | | -68.600 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1925.600 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -16570.641

**NODE DISPLACEMENTS**

CASE 1: Full working Loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0040 | 0.0000 | 0.00000 | 0.00000 | -0.00029 |
| 2 | 0.0000 | -0.0040 | 0.0000 | 0.00000 | 0.00000 | -0.00029 |
| 3 | 0.0000 | -0.0057 | 0.0000 | 0.00000 | 0.00000 | 0.00015 |
| 4 | 0.0000 | -0.0052 | 0.0000 | 0.00000 | 0.00000 | 0.00068 |
| 5 | 0.0000 | -0.0044 | 0.0000 | 0.00000 | 0.00000 | -0.00029 |
| 6 | 0.0000 | -0.0047 | 0.0000 | 0.00000 | 0.00000 | -0.00028 |
| 7 | 0.0000 | -0.0050 | 0.0000 | 0.00000 | 0.00000 | -0.00027 |
| 8 | 0.0000 | -0.0054 | 0.0000 | 0.00000 | 0.00000 | -0.00024 |
| 9 | 0.0000 | -0.0056 | 0.0000 | 0.00000 | 0.00000 | -0.00020 |
| 10 | 0.0000 | -0.0058 | 0.0000 | 0.00000 | 0.00000 | -0.00014 |
| 11 | 0.0000 | -0.0060 | 0.0000 | 0.00000 | 0.00000 | -0.00008 |
| 12 | 0.0000 | -0.0060 | 0.0000 | 0.00000 | 0.00000 | -0.00001 |
| -13 | 0.0000 | -0.0060 | 0.0000 | 0.00000 | 0.00000 | 0.00006 |
| 14 | 0.0000 | -0.0059 | 0.0000 | 0.00000 | 0.00000 | 0.00011 |
| 16 | 0.0000 | -0.0042 | 0.0000 | 0.00000 | 0.00000 | 0.00090 |
| 29 | 0.0000 | -0.0031 | 0.0000 | 0.00000 | 0.00000 | 0.00095 |

**MEMBER FORCES**

CASE 1: Full working Loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 6.60 | 0.00 | 0.00 | 0.00 | -0.66 |
| 3 | 3 | 0.00 | 230.68 | 0.00 | 0.00 | 0.00 | 638.88 |
| | 4 | 0.00 | 313.00 | 0.00 | 0.00 | 0.00 | 312.68 |
| 4 | 2 | 0.00 | -93.80 | 0.00 | 0.00 | 0.00 | -0.66 |
| | 5 | 0.00 | -54.20 | 0.00 | 0.00 | 0.00 | 88.14 |
| 5 | 5 | 0.00 | -163.39 | 0.00 | 0.00 | 0.00 | 88.14 |
| | 6 | 0.00 | -52.79 | 0.00 | 0.00 | 0.00 | 253.35 |
| 6 | 6 | 0.00 | -170.61 | 0.00 | 0.00 | 0.00 | 253.35 |
| | 7 | 0.00 | -131.01 | 0.00 | 0.00 | 0.00 | 434.32 |
| 7 | 7 | 0.00 | -257.14 | 0.00 | 0.00 | 0.00 | 434.32 |
| | 8 | 0.00 | -217.54 | 0.00 | 0.00 | 0.00 | 719.13 |
| 8 | 8 | 0.00 | -351.35 | 0.00 | 0.00 | 0.00 | 719.13 |
| | 9 | 0.00 | -311.75 | 0.00 | 0.00 | 0.00 | 1116.99 |
| 9 | 9 | 0.00 | -452.28 | 0.00 | 0.00 | 0.00 | 1116.99 |
| | 10 | 0.00 | -116.28 | 0.00 | 0.00 | 0.00 | 1458.12 |
| 10 | 10 | 0.00 | -262.02 | 0.00 | 0.00 | 0.00 | 1458.12 |
| | 11 | 0.00 | 73.98 | 0.00 | 0.00 | 0.00 | 1570.94 |
| 11 | 11 | 0.00 | -75.06 | 0.00 | 0.00 | 0.00 | 1570.94 |
| | 12 | 0.00 | 194.46 | 0.00 | 0.00 | 0.00 | 1499.31 |
| 12 | 12 | 0.00 | 44.19 | 0.00 | 0.00 | 0.00 | 1499.31 |
| | -13 | 0.00 | 313.71 | 0.00 | 0.00 | 0.00 | 1284.57 |
| 13 | -13 | 0.00 | 164.22 | 0.00 | 0.00 | 0.00 | 1284.57 |
| | 14 | 0.00 | 246.54 | 0.00 | 0.00 | 0.00 | 1038.11 |
| 14 | 14 | 0.00 | 291.53 | 0.00 | 0.00 | 0.00 | 1038.11 |
| | 3 | 0.00 | 373.85 | 0.00 | 0.00 | 0.00 | 638.88 |
| 15 | 4 | 0.00 | 183.08 | 0.00 | 0.00 | 0.00 | 312.68 |
| | 16 | 0.00 | 183.08 | 0.00 | 0.00 | 0.00 | 92.99 |
| 16 | 16 | 0.00 | 77.49 | 0.00 | 0.00 | 0.00 | 92.99 |
| | 29 | 0.00 | 77.49 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension    Shear - End A sagging
Torque - Right-hand twist    Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working Loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 100.40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 143.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 129.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 109.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 117.83 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 126.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | 0.00 | 133.81 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | 0.00 | 140.53 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 145.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | 0.00 | 149.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.00 | 150.26 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | 0.00 | 149.49 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 0.00 | 147.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16 | 0.00 | 105.59 | 0.00 | 0.00 | 0.00 | 0.00 |
| 29 | 0.00 | 77.49 | 0.00 | 0.00 | 0.00 | 0.00 |

SUM: 0.00 1925.60 0.00 (all nodes)

Max. residual: 7.175E-09 at DOFN: 5

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401- raft slab GB3-spring

Title:  19-21 The Corso Manly
        Raft slab edge beam lift to stair lobby
Type:   Plane frame
Date:   27 Feb 2020
Time:    5:13 PM

Nodes ............................     6
Members ..........................     5
Spring supports ..................     4
Sections .........................     1
Materials ........................     1
Primary load cases ...............     1
Combination load cases ...........     0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Full working loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 000000 |
| 2 | 1.000 | 0.000 | 0.000 | 100000 |
| 3 | 8.500 | 0.000 | 0.000 | 000000 |
| 4 | 10.000 | 0.000 | 0.000 | 000000 |
| 5 | 11.500 | 0.000 | 0.000 | 000000 |
| 6 | 11.800 | 0.000 | 0.000 | 000000 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 2 | 0.000E+00 | 1.000E+05 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 3.750E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 3.750E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 3.750E+04 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Y | 1 | 1 | 000000 | 000000 | 1.000 |
| 2 | 2 | 3 | Y | 1 | 1 | 000000 | 000000 | 7.500 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 1.500 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.300 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | LRT | RCEdgebeam | 800D x 600W | 0.800 | 0.600 | 1.300 |
| | | | | 0.200 | | |

```
Dimension codes:
TEE/LL/LR - D1=D   D2=Tw  D3=Bf  D4=Tf
```

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 6.200E-01 | 0.000E+00 | 0.000E+00 | 3.251E-02 | 6.591E-02 | 3.582E-02 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 3.230E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC32 |

**CONDITION NUMBER**

Maximum condition number: 5.475E+03 at node: 6 DOFN: 2

**APPLIED LOADING**

CASE 1: Full working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 1 | CONC | FY | GL | LE | -343.000 | 0.100 | | |
| 2 | CONC | FY | GL | LE | -151.000 | 3.000 | | |
| 2 | CONC | FY | GL | LE | -90.700 | 6.000 | | |
| 2 | TRAP | FY | GL | LE | -64.400 | 3.000 | -64.400 | 6.000 |
| 3 | CONC | FY | GL | LE | -100.000 | 0.500 | | |
| 3 | TRAP | FY | GL | LE | -77.000 | 0.500 | -77.000 | 1.500 |
| 4 | UNIF | FY | GL | | -77.000 | | | |
| 5 | CONC | FY | GL | LE | -64.700 | 0.200 | | |
| 5 | UNIF | FY | GL | | -77.000 | | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -1158.200 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -6235.030

**NODE DISPLACEMENTS**

CASE 1: Full working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0053 | 0.0000 | 0.00000 | 0.00000 | -0.00048 |
| 2 | 0.0000 | -0.0058 | 0.0000 | 0.00000 | 0.00000 | -0.00060 |
| 3 | 0.0000 | -0.0065 | 0.0000 | 0.00000 | 0.00000 | 0.00086 |
| 4 | 0.0000 | -0.0052 | 0.0000 | 0.00000 | 0.00000 | 0.00092 |
| 5 | 0.0000 | -0.0038 | 0.0000 | 0.00000 | 0.00000 | 0.00091 |
| 6 | 0.0000 | -0.0035 | 0.0000 | 0.00000 | 0.00000 | 0.00091 |

**MEMBER FORCES**

CASE 1: Full working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 343.00 | 0.00 | 0.00 | 0.00 | -308.70 |
| 2 | 2 | 0.00 | -234.08 | 0.00 | 0.00 | 0.00 | -308.70 |
| | 3 | 0.00 | 200.82 | 0.00 | 0.00 | 0.00 | 51.72 |
| 3 | 3 | 0.00 | -43.83 | 0.00 | 0.00 | 0.00 | 51.72 |
| | 4 | 0.00 | 133.17 | 0.00 | 0.00 | 0.00 | -21.03 |
| 4 | 4 | 0.00 | -60.83 | 0.00 | 0.00 | 0.00 | -21.03 |
| | 5 | 0.00 | 54.67 | 0.00 | 0.00 | 0.00 | -16.41 |
| 5 | 5 | 0.00 | -87.80 | 0.00 | 0.00 | 0.00 | -16.41 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension Shear - End A sagging
Torque - Right-hand twist Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Full working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 2 | 0.00 | 577.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 244.65 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 194.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 142.47 | 0.00 | 0.00 | 0.00 | 0.00 |

SUM: 0.00 1158.20 0.00 (all nodes)

Max. residual: 7.841E-11 at DOFN: 17

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

Job: 11401-EXFTG-1

Title: 19-21 The Corso Manly
Existing Footing Beam on soil
Type: Plane frame
Date: 26 Feb 2020
Time: 12:27 PM

| | |
|---|---|
| Nodes ............................ | 15 |
| Members .......................... | 14 |
| Spring supports .................. | 15 |
| Sections ......................... | 1 |
| Materials ........................ | 1 |
| Primary load cases ............... | 2 |
| Combination load cases ........... | 0 |

Analysis: Linear elastic

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Existing working loads |

Analysis Types:
- S - Skipped (not analysed)
- L - Linear
- N - Non-linear

Analysis Flag:
- CNV - Converged
- XSD - Excessive displacements
- DNC - Did not converge in iteration limit
- UNS - Unstable or local instability

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 100000 |
| 2 | 5.600 | 0.000 | 0.000 | 000000 |
| 3 | 0.400 | 0.000 | 0.000 | 000000 |
| 4 | 0.800 | 0.000 | 0.000 | 000000 |
| 5 | 1.200 | 0.000 | 0.000 | 000000 |
| 6 | 1.600 | 0.000 | 0.000 | 000000 |
| 7 | 2.000 | 0.000 | 0.000 | 000000 |
| 8 | 2.400 | 0.000 | 0.000 | 000000 |
| 9 | 2.800 | 0.000 | 0.000 | 000000 |
| 10 | 3.200 | 0.000 | 0.000 | 000000 |
| 11 | 3.600 | 0.000 | 0.000 | 000000 |
| 12 | 4.000 | 0.000 | 0.000 | 000000 |
| 13 | 4.400 | 0.000 | 0.000 | 000000 |
| 14 | 4.800 | 0.000 | 0.000 | 000000 |
| 15 | 5.200 | 0.000 | 0.000 | 000000 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 1 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 2 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 6 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 7 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 8 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 9 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 10 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 11 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 12 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 13 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 14 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 15 | 0.000E+00 | 7.500E+02 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 3 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 6 | 6 | 7 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 7 | 7 | 8 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 8 | 8 | 9 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 9 | 9 | 10 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 10 | 10 | 11 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 11 | 11 | 12 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 12 | 12 | 13 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 13 | 13 | 14 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 14 | 14 | 15 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 15 | 15 | 2 | Y | 1 | 1 | 000000 | 000000 | 0.400 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | RECT | StripFooting | 400x400 RC | 0.400 | 0.400 | |

Dimension codes:
RECT - D1=D D2=B

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 1.600E-01 | 0.000E+00 | 0.000E+00 | 3.610E-03 | 2.133E-03 | 2.133E-03 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 2.860E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC25 |

**CONDITION NUMBER**

Maximum condition number: 1.849E+03 at node: 2 DOFN: 2

**APPLIED LOADING**

CASE 1: Existing working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 2 | CONC | FY | GL | LE | -95.500 | 0.350 | | |
| 5 | TRAP | FY | GL | LE | -93.600 | 0.350 | -93.600 | 0.400 |
| 6 | UNIF | FY | GL | | -93.600 | | | |
| 7 | UNIF | FY | GL | | -93.600 | | | |
| 8 | UNIF | FY | GL | | -93.600 | | | |
| 9 | UNIF | FY | GL | | -93.600 | | | |
| 10 | UNIF | FY | GL | | -93.600 | | | |
| 11 | UNIF | FY | GL | | -93.600 | | | |
| 12 | TRAP | FY | GL | LE | -93.600 | 0.000 | -93.600 | 0.050 |
| 15 | CONC | FY | GL | LE | -95.500 | 0.050 | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -425.000 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -1190.000

**NODE DISPLACEMENTS**

CASE 1: Existing working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | 0.00004 |
| 4 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | 0.00003 |
| 5 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | -0.00005 |
| 6 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | -0.00011 |
| 7 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | -0.00011 |
| 8 | 0.0000 | -0.0379 | 0.0000 | 0.00000 | 0.00000 | -0.00007 |
| 9 | 0.0000 | -0.0379 | 0.0000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.0000 | -0.0379 | 0.0000 | 0.00000 | 0.00000 | 0.00007 |
| 11 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | 0.00011 |
| 12 | 0.0000 | -0.0378 | 0.0000 | 0.00000 | 0.00000 | 0.00011 |
| 13 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | 0.00005 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | -0.00003 |
| 15 | 0.0000 | -0.0377 | 0.0000 | 0.00000 | 0.00000 | -0.00004 |

**MEMBER FORCES**

CASE 1: Existing working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 2 | 1 | 0.00 | -28.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | 0.00 | 67.19 | 0.00 | 0.00 | 0.00 | 6.55 |
| 3 | 3 | 0.00 | 38.87 | 0.00 | 0.00 | 0.00 | 6.55 |
| | 4 | 0.00 | 38.87 | 0.00 | 0.00 | 0.00 | -9.00 |
| 4 | 4 | 0.00 | 10.58 | 0.00 | 0.00 | 0.00 | -9.00 |
| | 5 | 0.00 | 10.58 | 0.00 | 0.00 | 0.00 | -13.23 |
| 5 | 5 | 0.00 | -17.73 | 0.00 | 0.00 | 0.00 | -13.23 |
| | 6 | 0.00 | -13.05 | 0.00 | 0.00 | 0.00 | -6.26 |
| 6 | 6 | 0.00 | -41.37 | 0.00 | 0.00 | 0.00 | -6.26 |
| | 7 | 0.00 | -3.93 | 0.00 | 0.00 | 0.00 | 2.81 |
| 7 | 7 | 0.00 | -32.29 | 0.00 | 0.00 | 0.00 | 2.81 |
| | 8 | 0.00 | 5.15 | 0.00 | 0.00 | 0.00 | 8.23 |
| 8 | 8 | 0.00 | -23.24 | 0.00 | 0.00 | 0.00 | 8.23 |
| | 9 | 0.00 | 14.20 | 0.00 | 0.00 | 0.00 | 10.04 |
| 9 | 9 | 0.00 | -14.20 | 0.00 | 0.00 | 0.00 | 10.04 |
| | 10 | 0.00 | 23.24 | 0.00 | 0.00 | 0.00 | 8.23 |
| 10 | 10 | 0.00 | -5.15 | 0.00 | 0.00 | 0.00 | 8.23 |
| | 11 | 0.00 | 32.29 | 0.00 | 0.00 | 0.00 | 2.81 |
| 11 | 11 | 0.00 | 3.93 | 0.00 | 0.00 | 0.00 | 2.81 |
| | 12 | 0.00 | 41.37 | 0.00 | 0.00 | 0.00 | -6.26 |
| 12 | 12 | 0.00 | 13.05 | 0.00 | 0.00 | 0.00 | -6.26 |
| | 13 | 0.00 | 17.73 | 0.00 | 0.00 | 0.00 | -13.23 |
| 13 | 13 | 0.00 | -10.58 | 0.00 | 0.00 | 0.00 | -13.23 |
| | 14 | 0.00 | -10.58 | 0.00 | 0.00 | 0.00 | -9.00 |
| 14 | 14 | 0.00 | -38.87 | 0.00 | 0.00 | 0.00 | -9.00 |
| | 15 | 0.00 | -38.87 | 0.00 | 0.00 | 0.00 | 6.55 |
| 15 | 15 | 0.00 | -67.19 | 0.00 | 0.00 | 0.00 | 6.55 |
| | 2 | 0.00 | 28.31 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension    Shear - End A sagging
Torque - Right-hand twist    Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Existing working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 1 | 0.00 | 28.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 28.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 28.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 28.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 28.36 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | 0.00 | 28.39 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | 0.00 | 28.40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 28.39 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | 0.00 | 28.36 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.00 | 28.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 28.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM: | 0.00 | 425.00 | 0.00 (all nodes) | | | |

Max. residual: 1.741E-10 at DOFN: 40

(Reactions act on structure in positive global axis directions.)

**INPUT/ANALYSIS REPORT**

```
Job:    11401-EXFTG-1

Title:  19-21 The Corso Manly
        Existing Footing Beam on soil
Type:   Plane frame
Date:   26 Feb 2020
Time:    1:34 PM

Nodes ............................     15
Members ..........................     14
Spring supports ..................     15
Sections .........................      1
Materials ........................      1
Primary load cases ...............      2
Combination load cases ...........      0

Analysis:  Linear elastic
```

**LOAD CASES**

| Case | Type | Analysis Type | Flag | Title |
|---|---|---|---|---|
| 1 | P | L | - | Existing working loads |

```
Analysis Types:
  S - Skipped (not analysed)
  L - Linear
  N - Non-linear

Analysis Flag:
  CNV - Converged
  XSD - Excessive displacements
  DNC - Did not converge in iteration limit
  UNS - Unstable or local instability
```

**NODE COORDINATES**

| Node | X m | Y m | Z m | Restraint |
|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 100000 |
| 2 | 5.600 | 0.000 | 0.000 | 000000 |
| 3 | 0.400 | 0.000 | 0.000 | 000000 |
| 4 | 0.800 | 0.000 | 0.000 | 000000 |
| 5 | 1.200 | 0.000 | 0.000 | 000000 |
| 6 | 1.600 | 0.000 | 0.000 | 000000 |
| 7 | 2.000 | 0.000 | 0.000 | 000000 |
| 8 | 2.400 | 0.000 | 0.000 | 000000 |
| 9 | 2.800 | 0.000 | 0.000 | 000000 |
| 10 | 3.200 | 0.000 | 0.000 | 000000 |
| 11 | 3.600 | 0.000 | 0.000 | 000000 |
| 12 | 4.000 | 0.000 | 0.000 | 000000 |
| 13 | 4.400 | 0.000 | 0.000 | 000000 |
| 14 | 4.800 | 0.000 | 0.000 | 000000 |
| 15 | 5.200 | 0.000 | 0.000 | 000000 |

**SPRING SUPPORTS**

| Node | KX kN/m | KY kN/m | KZ kN/m | KRX kNm/r | KRY kNm/r | KRZ kNm/r |
|---|---|---|---|---|---|---|
| 1 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 2 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 3 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 4 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 5 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 6 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 7 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 8 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 9 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 10 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 11 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 12 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 13 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 14 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 15 | 0.000E+00 | 2.500E+03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

**MEMBER DEFINITION**

| Member | A | B | C | Prop | Matl | Rel-A | Rel-B | Length m |
|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 3 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 3 | 3 | 4 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 4 | 4 | 5 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 5 | 5 | 6 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 6 | 6 | 7 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 7 | 7 | 8 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 8 | 8 | 9 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 9 | 9 | 10 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 10 | 10 | 11 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 11 | 11 | 12 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 12 | 12 | 13 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 13 | 13 | 14 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 14 | 14 | 15 | Y | 1 | 1 | 000000 | 000000 | 0.400 |
| 15 | 15 | 2 | Y | 1 | 1 | 000000 | 000000 | 0.400 |

**STANDARD SHAPES**

| Section | Shape | Name | Comment | D1/D4 | D2/D5 | D3/D6 |
|---|---|---|---|---|---|---|
| 1 | RECT | StripFooting | 400x400 RC | 0.400 | 0.400 | |

Dimension codes:
RECT - D1=D D2=B

**SECTION PROPERTIES**

| Section | Ax m2 | Ay m2 | Az m2 | J m4 | Iy m4 | Iz m4 | fact |
|---|---|---|---|---|---|---|---|
| 1 | 1.600E-01 | 0.000E+00 | 0.000E+00 | 3.610E-03 | 2.133E-03 | 2.133E-03 | 1.000 |

**MATERIAL PROPERTIES**

| Material | E kN/m2 | u | Density t/m3 | Alpha /deg C | |
|---|---|---|---|---|---|
| 1 | 2.860E+07 | 0.2000 | 2.450E+00 | 1.170E-05 | CONC25 |

**CONDITION NUMBER**

Maximum condition number: 7.144E+02 at node: 2 DOFN: 2

**APPLIED LOADING**

CASE 1: Existing working loads

**Member Loads**

| Member | Form | T | A | S | F1 | X1 | F2 | X2 |
|---|---|---|---|---|---|---|---|---|
| 2 | CONC | FY | GL | LE | -95.500 | 0.350 | | |
| 5 | TRAP | FY | GL | LE | -93.600 | 0.350 | -93.600 | 0.400 |
| 6 | UNIF | FY | GL | | -93.600 | | | |
| 7 | UNIF | FY | GL | | -93.600 | | | |
| 8 | UNIF | FY | GL | | -93.600 | | | |
| 9 | UNIF | FY | GL | | -93.600 | | | |
| 10 | UNIF | FY | GL | | -93.600 | | | |
| 11 | UNIF | FY | GL | | -93.600 | | | |
| 12 | TRAP | FY | GL | LE | -93.600 | 0.000 | -93.600 | 0.050 |
| 15 | CONC | FY | GL | LE | -95.500 | 0.050 | | |

**Sum of Applied Loads (Global Axes):**
FX: 0.000 FY: -425.000 FZ: 0.000
Moments about the global origin:
MX: 0.000 MY: 0.000 MZ: -1190.000

**NODE DISPLACEMENTS**

CASE 1: Existing working loads

| Node | X-Disp m | Y-Disp m | Z-Disp m | X-Rotn rad | Y-Rotn rad | Z-Rotn rad |
|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | 0.00001 |
| 2 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | -0.00001 |
| 3 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | 0.00004 |
| 4 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | 0.00003 |
| 5 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | -0.00004 |
| 6 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | -0.00010 |
| 7 | 0.0000 | -0.0114 | 0.0000 | 0.00000 | 0.00000 | -0.00011 |
| 8 | 0.0000 | -0.0114 | 0.0000 | 0.00000 | 0.00000 | -0.00007 |
| 9 | 0.0000 | -0.0114 | 0.0000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.0000 | -0.0114 | 0.0000 | 0.00000 | 0.00000 | 0.00007 |
| 11 | 0.0000 | -0.0114 | 0.0000 | 0.00000 | 0.00000 | 0.00011 |
| 12 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | 0.00010 |
| 13 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | 0.00004 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | -0.00003 |
| 15 | 0.0000 | -0.0113 | 0.0000 | 0.00000 | 0.00000 | -0.00004 |

**MEMBER FORCES**

CASE 1: Existing working loads

| Member | Node | Axial kN | Shear-y kN | Shear-z kN | Torque kNm | Moment-y kNm | Moment-z kNm |
|---|---|---|---|---|---|---|---|
| 2 | 1 | 0.00 | -28.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | 0.00 | 67.21 | 0.00 | 0.00 | 0.00 | 6.54 |
| 3 | 3 | 0.00 | 38.94 | 0.00 | 0.00 | 0.00 | 6.54 |
| | 4 | 0.00 | 38.94 | 0.00 | 0.00 | 0.00 | -9.03 |
| 4 | 4 | 0.00 | 10.71 | 0.00 | 0.00 | 0.00 | -9.03 |
| | 5 | 0.00 | 10.71 | 0.00 | 0.00 | 0.00 | -13.32 |
| 5 | 5 | 0.00 | -17.52 | 0.00 | 0.00 | 0.00 | -13.32 |
| | 6 | 0.00 | -12.84 | 0.00 | 0.00 | 0.00 | -6.43 |
| 6 | 6 | 0.00 | -41.14 | 0.00 | 0.00 | 0.00 | -6.43 |
| | 7 | 0.00 | -3.70 | 0.00 | 0.00 | 0.00 | 2.54 |
| 7 | 7 | 0.00 | -32.11 | 0.00 | 0.00 | 0.00 | 2.54 |
| | 8 | 0.00 | 5.33 | 0.00 | 0.00 | 0.00 | 7.90 |
| 8 | 8 | 0.00 | -23.17 | 0.00 | 0.00 | 0.00 | 7.90 |
| | 9 | 0.00 | 14.27 | 0.00 | 0.00 | 0.00 | 9.68 |
| 9 | 9 | 0.00 | -14.27 | 0.00 | 0.00 | 0.00 | 9.68 |
| | 10 | 0.00 | 23.17 | 0.00 | 0.00 | 0.00 | 7.90 |
| 10 | 10 | 0.00 | -5.33 | 0.00 | 0.00 | 0.00 | 7.90 |
| | 11 | 0.00 | 32.11 | 0.00 | 0.00 | 0.00 | 2.54 |
| 11 | 11 | 0.00 | 3.70 | 0.00 | 0.00 | 0.00 | 2.54 |
| | 12 | 0.00 | 41.14 | 0.00 | 0.00 | 0.00 | -6.43 |
| 12 | 12 | 0.00 | 12.84 | 0.00 | 0.00 | 0.00 | -6.43 |
| | 13 | 0.00 | 17.52 | 0.00 | 0.00 | 0.00 | -13.32 |
| 13 | 13 | 0.00 | -10.71 | 0.00 | 0.00 | 0.00 | -13.32 |
| | 14 | 0.00 | -10.71 | 0.00 | 0.00 | 0.00 | -9.03 |
| 14 | 14 | 0.00 | -38.94 | 0.00 | 0.00 | 0.00 | -9.03 |
| | 15 | 0.00 | -38.94 | 0.00 | 0.00 | 0.00 | 6.54 |
| 15 | 15 | 0.00 | -67.21 | 0.00 | 0.00 | 0.00 | 6.54 |
| | 2 | 0.00 | 28.29 | 0.00 | 0.00 | 0.00 | 0.00 |

Positive Forces (Member Axes):
Axial - Tension    Shear - End A sagging
Torque - Right-hand twist    Moment - Sagging

**SUPPORT REACTIONS**

CASE 1: Existing working loads

| Node | Force-X kN | Force-Y kN | Force-Z kN | Moment-X kNm | Moment-Y kNm | Moment-Z kNm |
|---|---|---|---|---|---|---|
| 1 | 0.00 | 28.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 28.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 28.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 28.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 28.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 28.41 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | 0.00 | 28.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | 0.00 | 28.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 28.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | 0.00 | 28.41 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.00 | 28.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | 0.00 | 28.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | 0.00 | 28.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 28.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM: | 0.00 | 425.00 | 0.00 (all nodes) | | | |

Max. residual: 3.912E-11 at DOFN: 22

(Reactions act on structure in positive global axis directions.)

19-21 THE CORSO MANLY

DESIGN CALCULATIONS

SECTION 1.0

- REVIEW OF EXISTING DESIGN LOADS

- REVIEW OF DESIGN LOADS DURING CONSTRUCTION

- COMPARE OVERALL PRESSURES ON SOIL OVER SEWER CULVERT

- SEE ADDITIONAL ATTACHMENTS WITH PRINTOUT OF REPORT FROM MICROSTRAN

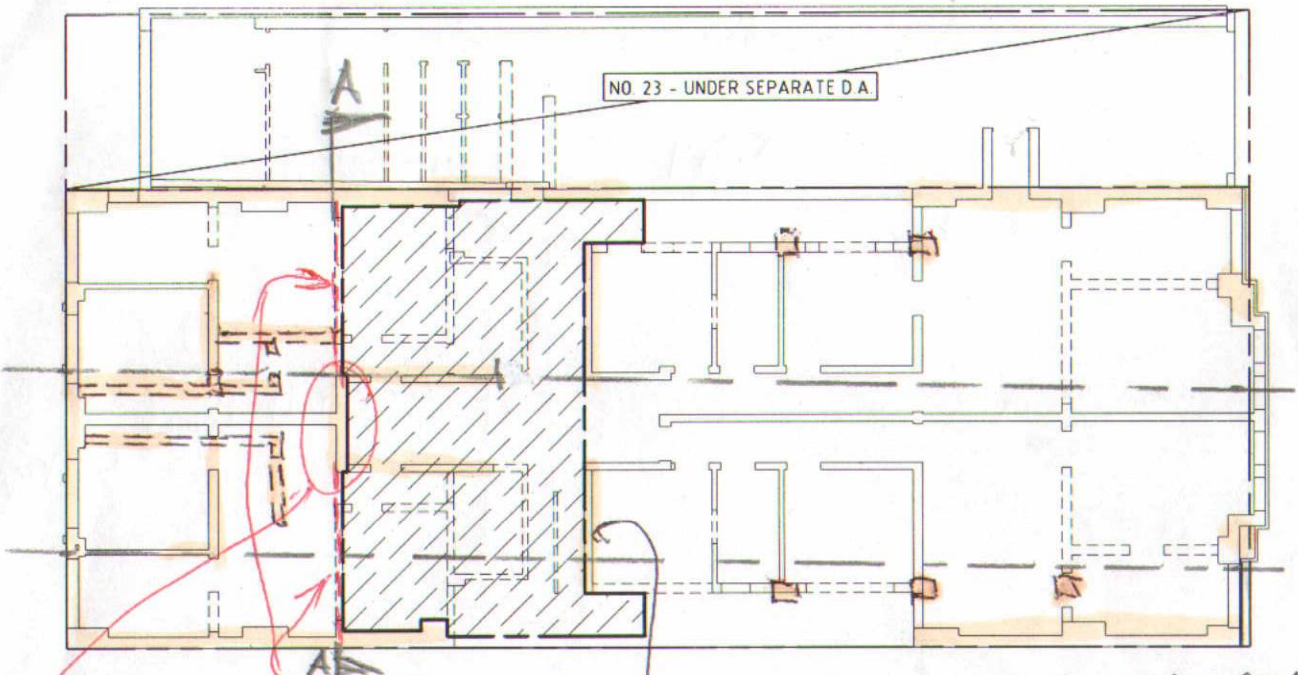
SECTION 2.0

ANALYSIS & DESIGN OF FOOTINGS & LOADS ON PILES.

BY SIMON WADDINGTON
WADDINGTON CONSULTING PTY LTD

28/02/2020

Swaddington.

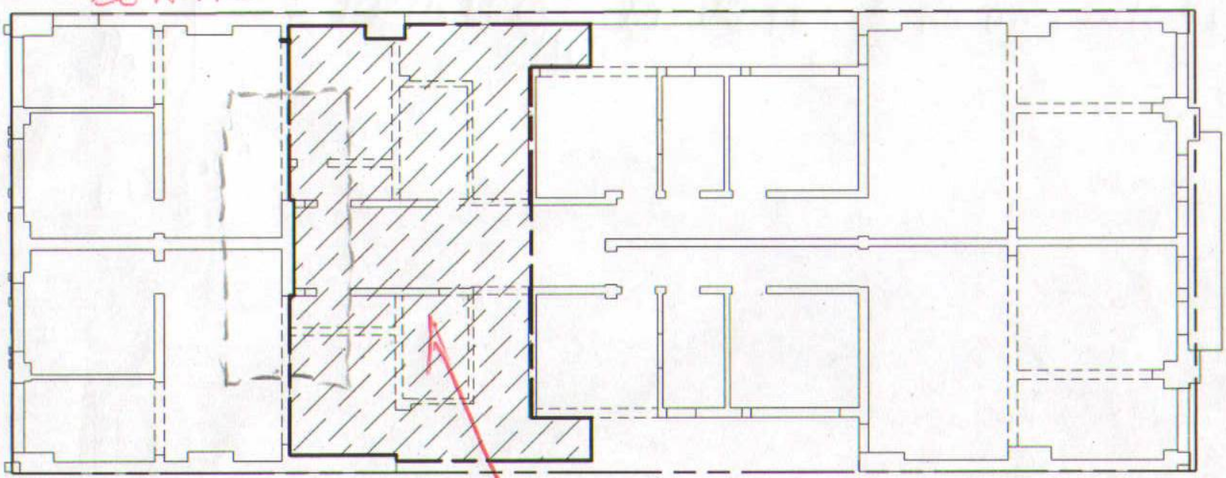



ORANGE SHADING DENOTES GROUND FLOOR WALLS & COLUMNS TO REMAIN

**FIRST FLOOR PLAN**
SCALE 1:200

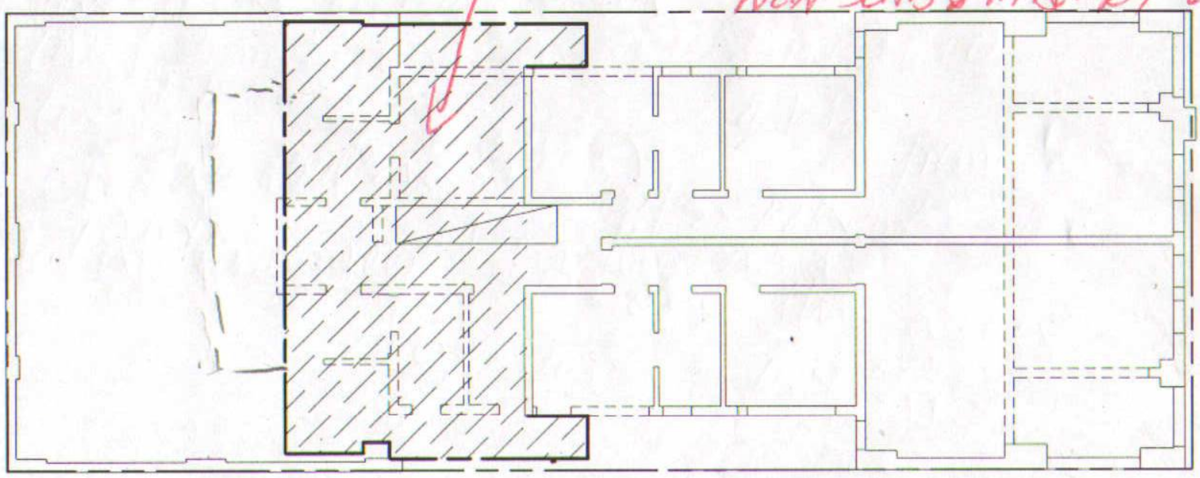
CRITICAL WALL OVER SEWER WITH NEW BEAMS

NEW BEAMS



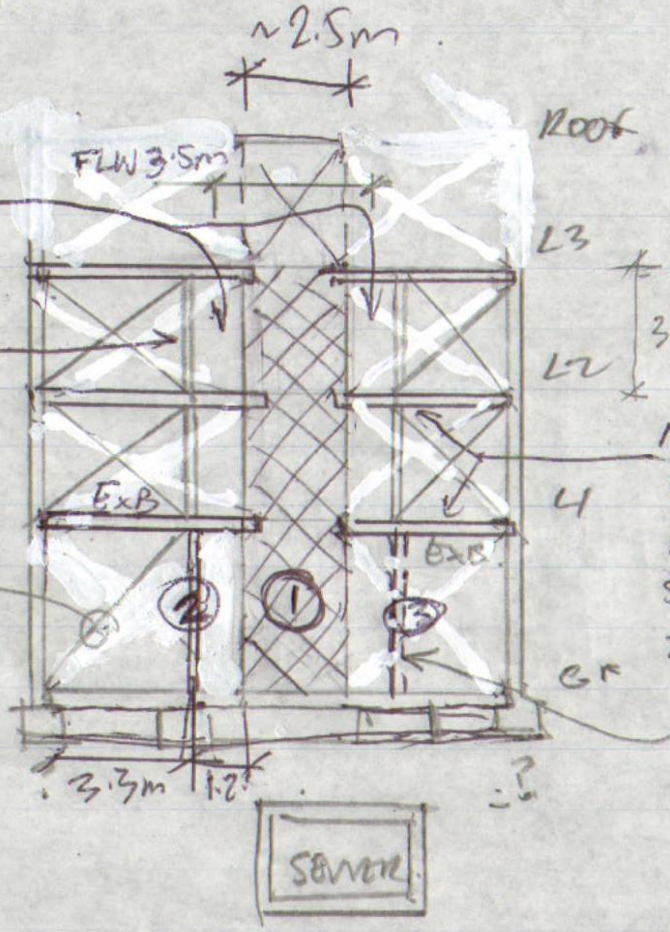
**SECOND FLOOR PLAN**
SCALE 1:200

SHADED AREAS GENERALLY ALL MASONRY WALLS & SLABS REMOVED & REPLACED WITH TIMBER FRAMING NEW SLAB & MASONRY ON NEW PILED FTGS



**THIRD FLOOR PLAN**
SCALE 1:200

SECTION A-A




SECTION A-A - NORTH END WALL OF MAIN INTERNAL STAIR

(1) Determine design loads over the 2.5m length of wall that remains at north end of stair well/landing

ROOF - 0.4kPa × 1m × 2.5m = 1.5kN
WALL OVER L3 - 0.23m × 22kN/m³ × 2.5m × 3.5m = 44.3kN
L3 - Trafficable roof, timber frame, pebbles
= 1.2kPa × 1.8m(FLW) × 3.5m = 7.6kN
L3 - Ignore roof live loads as negligible
L2-L3 - walls - brick 230 thick
= 0.23m × 22kN/m³ × 2.5m × 3.5m = 38kN
L2 Floor = 0.6kPa × 3.5m × 1.8m FLW = 3.8kN
" " Live = 1.5kPa × 3.5m × 1.8m = 9.4kN
L1-L2 walls - as above = 38kN
L1 floor - as L2 - dead = 3.8kN
live = 9.4kN
GF to L1 wall - 0.23m × 22kN/m³ × 2.5 × 4.2m = 53kN

= 208.8kN

Total load on footing carried over = 208.8kN.

Plus party wall load that separates the units L1 to u/s L3

= 0.7m × 0.23m thk × 7m × 22kN/m³ = 24.8kN

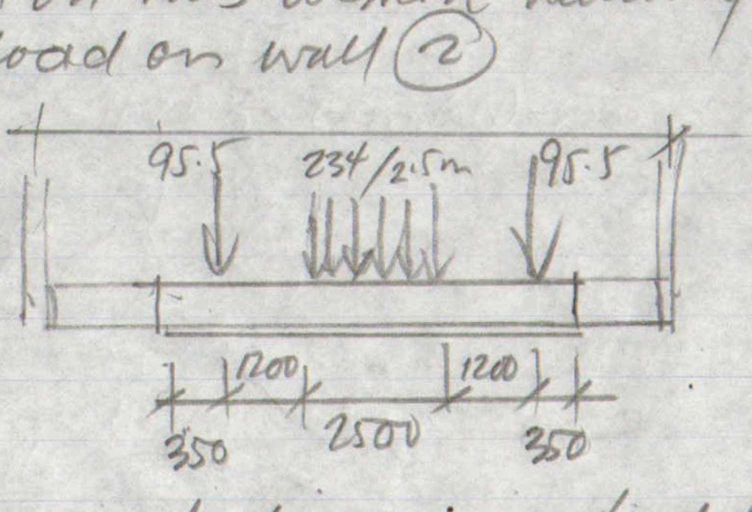
234kN

(2) Determine load on ground floor hallway wall that will remain

Floor load width above existing beam B×B = 3m (L1, L2, L3)

| | | |
|---|---|---|
| level 3 roof | 3m × 1.2kPa × 4.5m | = 8.1kN |
| L2 to L3 wall | 2.25m × .11 × 22kN/m² × 3.5m | = 19 kN |
| L2 floor dead | 0.6kPa × 3m × 2.25m | = 4 kN |
| " " live | 1.5kPa × 3m × 2.25m | = 10.1kN |
| L1 to L2 wall - as L2-L3 | | = 19kN |
| L1 floor dead | | = 4kN |
| " " live | | = 10.1kN |
| Ground to L1 wall | 4.2m × 1m × .23 × 22kN/m³ | = 21.2kN |
| | | 95.5kN |

(3) Load on this western hallway wall same as load on wall (2) = 95.5kN




Conservatively assume boundary walls independent to internal strip.

Beam on elastic springs to determine bearing pressures

Assume existing strip footing 400x400 RC.
loose sand modulus of subgrade reaction

4800 to 16000 kPa per mm deflection
(from J.E.Bowles, Foundation Analysis & Design Table 9.1)

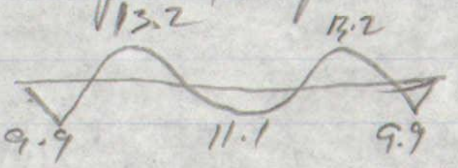
For modelling purposes try springs supports @ 400 cts.

Spring restraints 0.4x0.4x4800 = 768 kN/m
Say 750 kN/m lower bound

& 0.4x0.4x16000 = 2560
Say 2500 kN/m upper bound.

Use Microstran model.
FILE → 11401 – EXFTG – 1.msw

Lower bound spring → uniform deflection ≈ 38mm
k = 750 kN/m →

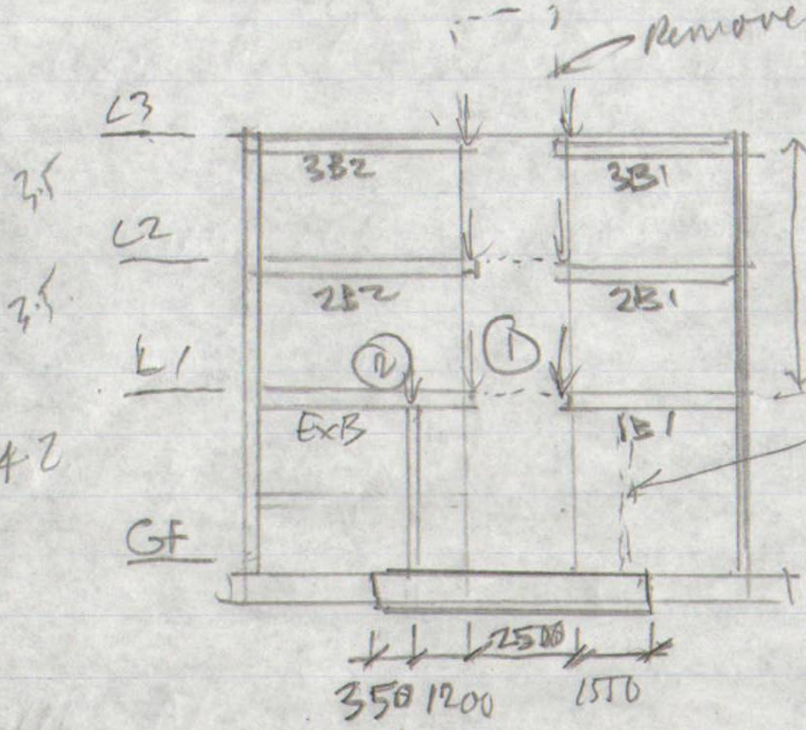



→ Support reactions fairly uniform 28.3 & 28.4 kN

→ Equivalent to 28.4/0.4x0.4 ≈ 178 kPa

Upper bound soil spring k = 2500 kN/m

Deflection fairly uniform ≈ 11mm.
Bending moment fairly similar to above.
Support reactions very slight change 28.29 to 28.53 kN
178.3 kPa → negligible change




Using full design working loads.

① TOTAL LOAD ON 2.5m WALL

Level 2 & Level 3 loads entirely on centre 230x2500 wall

Floor removed south of this wall.

Use full residential live load although likely less.

L3 floor - 1.8m x 7m x 1.2kPa (pebbles) = 15.1kN
- " " x 1.5kPa. live) = 18.9kN

L2 floor - 1.8 x 7m x 0.6kPa (dead) = 7.6kN
- 1.8 x 7m x 1.5 kPa (live) = 18.9kN

L1 floor - 1.8 x 5.3 x 0.6 (dead) = 5.7 kN
" " 1.5 (live) = 14.3 kN

Wall GF to L3 - 0.23m x 22kN/m³ x 2.5 x 11.2m = 142kN

222kN

TOTAL UDL UNDER WALL /2.5m 89kN/m.

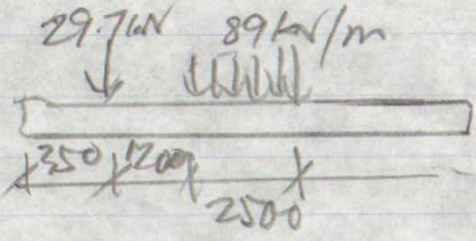
②

L1 floor 2.25m x 1.8m x (0.6+1.5) kPa = 8.5kN
GF to L1 wall 0.23m x 22kN/m³ x 4.2 x 1m = 21.2kN

29.7kN

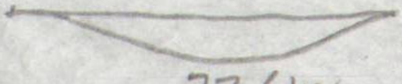
Microstran model footing on springs -

LOAD CASE 2 - Post demolition & beams installed.




→ Firstly with lower bound springs k=750kN/m

Deflection varies 27mm to 14mm. 

BMD 


400 x 400 cracking moment $M_{cr} \simeq 0.6 \times \sqrt{25MPa} \times .4 \times .4^2 / 6$
$\simeq 32kNm$.

Support reactions - more significant variation due to assymetric loading

Max. 19.7kN = 123kPa

Upper bound soil spring

Deflection varies 3mm to 8mm

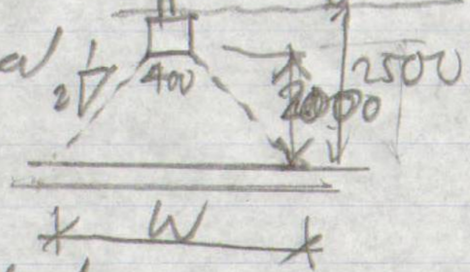
Max. bending moment 67.2kNm

Max reaction 20.4kN = 128 kPa bearing pressure

Therefore removal of upper walls & part of floor has reduction in bearing pressure ~ 50 kPa assume 400 wide footing.

At top of sewer culvert 2500mm below ground.

Conservatively distribute vertical load at 2V to 1H.
Width W at sewer = 2400

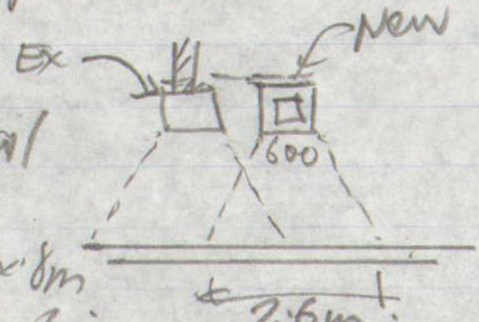



∴ Pressure on culvert estimated

| | | |
|---|---|---|
| Soil weight | $2.5m \times 15 kN/m^3$ | 37.5 kPa. |
| Footing existing | $178 kPa \times \frac{0.4}{2.4}$ | 29.7 kPa. |
| Footing after demo. | $128 \times \frac{0.4}{2.4}$ | 21.3 kPa. |

Dig out trench for new concrete footing beam adjacent to the footing for the stair end wall

Additional weight of concrete compared with soil

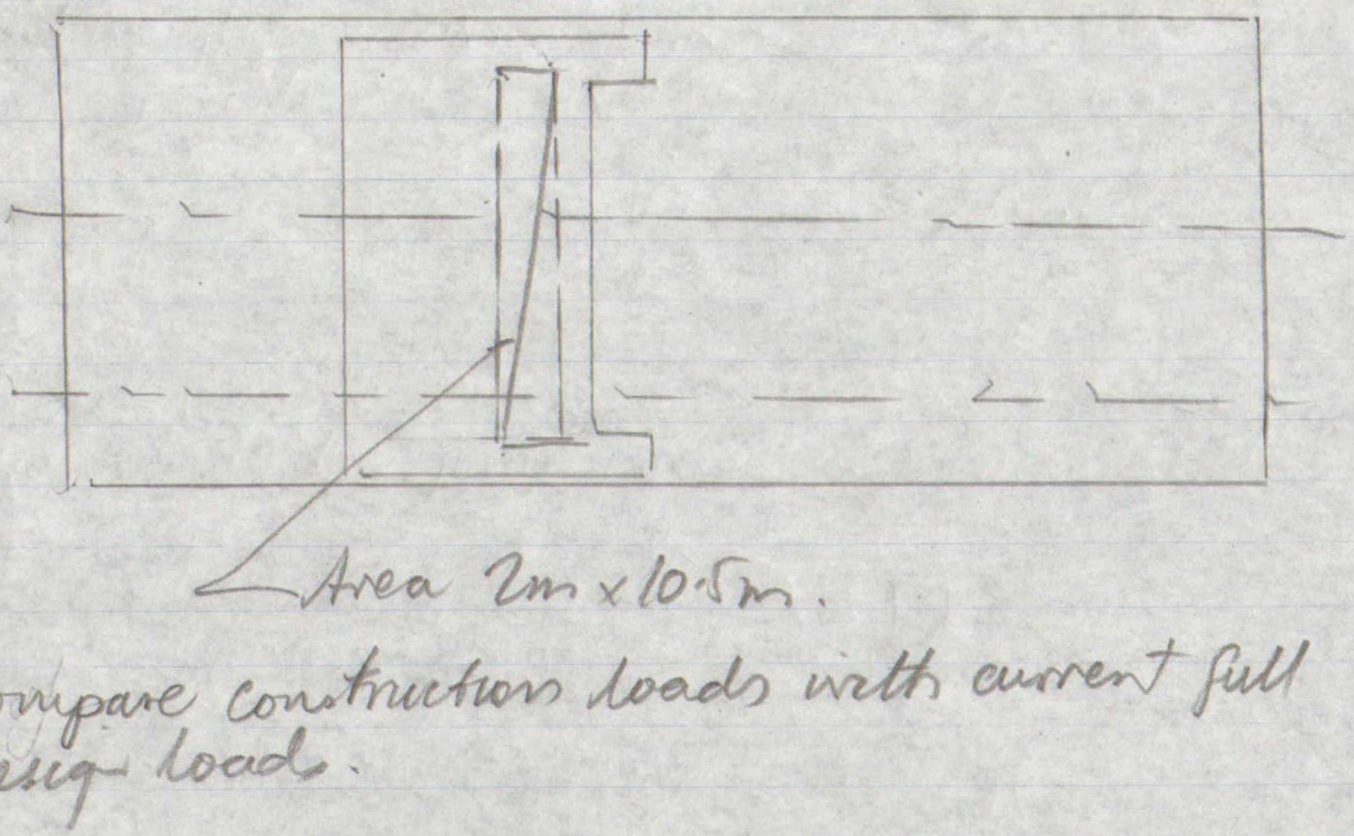



$P = (24.5 kN/m^3 - 15 kN/m^3) \times .6m \times .8m$
$= 4.6 kN/m$ length of footing

Additional pressure on sewer < 2kPa

- Consider area south of existing stair well.
- Demolish from top down & remove all walls & floor in level 1, 2, 3 & roof.

Consider total loads removed over floor area shown below that are above new concrete beam.
→



Area 2m x 10.5m.

Compare construction loads with current full design load.

| | | |
|---|---|---|
| Roof sheeting & frame | 0.4 kPa | |
| Level 3 floor frame + live | 2.1 kPa | 10.7 kPa |
| Level 2 " " " | 2.1 kPa | |
| Level 1 " " " | 2.1 kPa | |
| GF slab 100 thick + live | 4 kPa | |

Total walls removed in this area from level 1 to roof
$8m \times (3.5+3.5+3.5) \times 0.13 \times 22 kN/m^3 = 240 kN$
Equivalent pressure of walls over this area
$240/2 \times 10.5 = 11.4 kPa$.

Total equivalent pressure at ground level of existing structure to be removed.

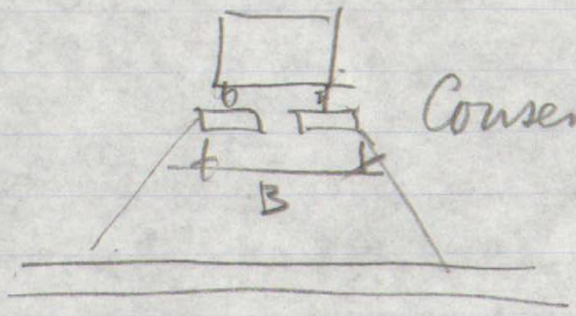
$10.7 + 11.4 = 22.1$ kPa

Cut out soil for new concrete footing

Additional load of wet concrete (24.5kN/m³) compared to soil (15kN/m³) 800mm deep.

$(24.5-15) \times 0.8m = 7.7$ kPa. << 22.1kPa.

Installation of screw piles - 5T excavator.
≙ 50kN



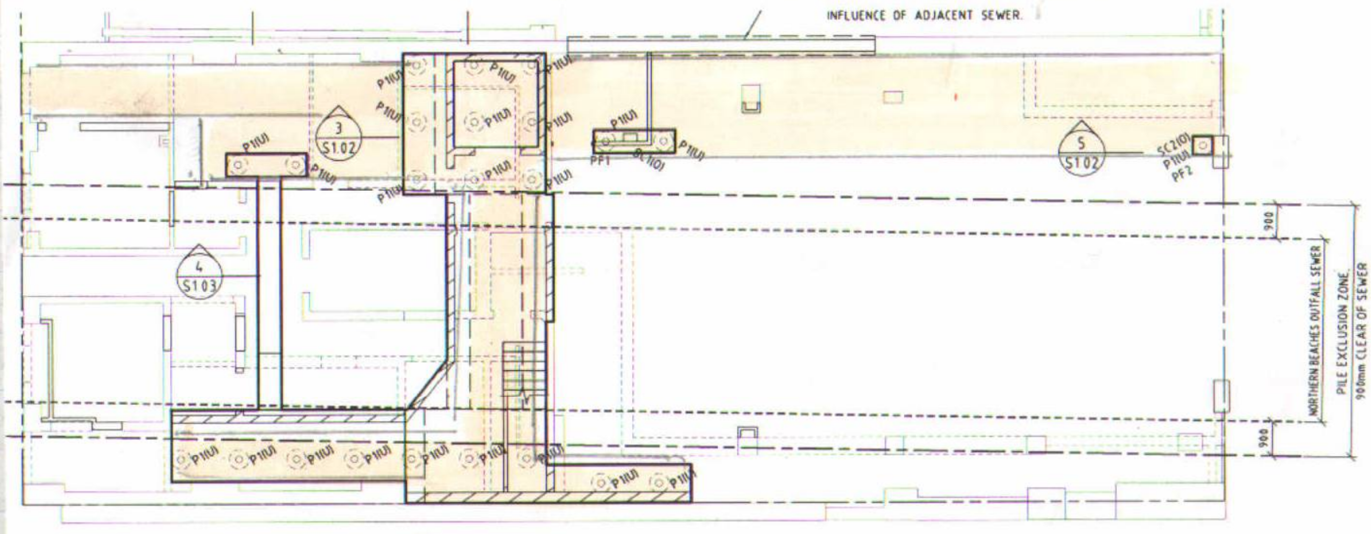

Conservatively 1.8m x 1.8m area.

$50/1.8^2 = 15.4$ kPa at ground level.
< 22.1kPa.

Limit area for screw pile installation as shown below, where upper floors & walls demolished or not over sewer.

After screw piles & concrete beams installed all new additional masonry walls & slab supported by piled footings below line of influence.

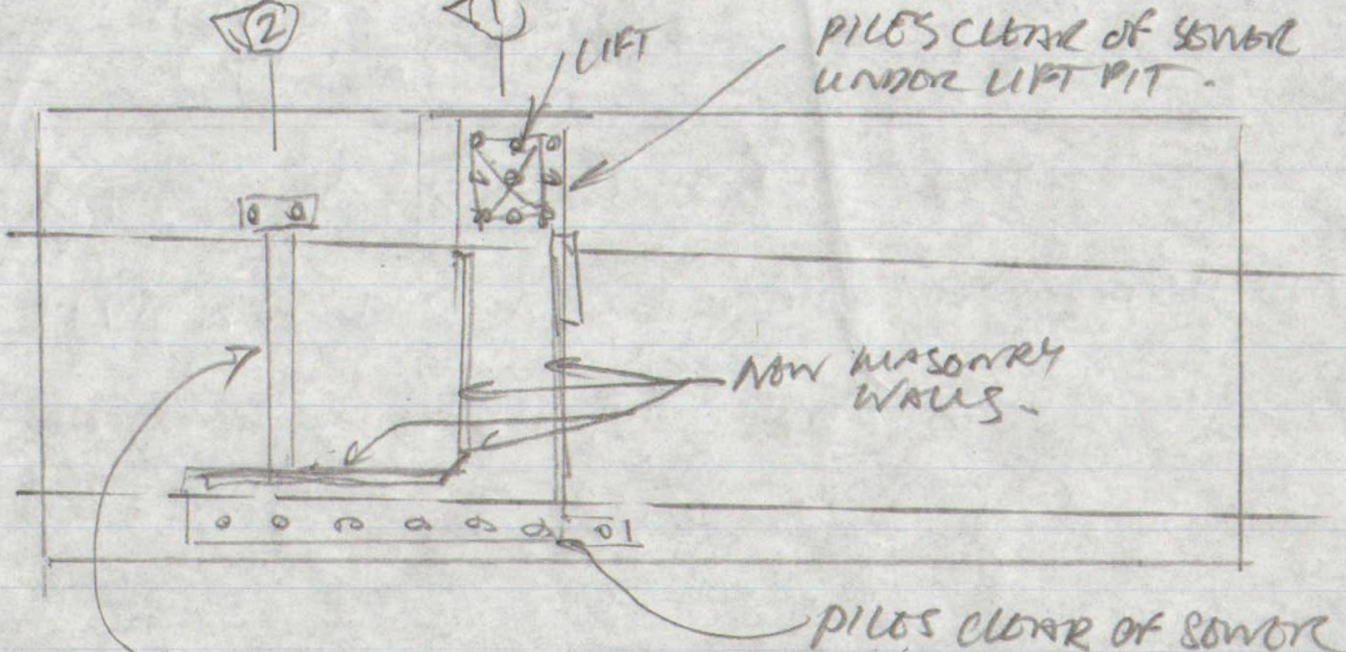
1.10




GROUND FLOOR & FOOTING PLAN
SCALE 1:100

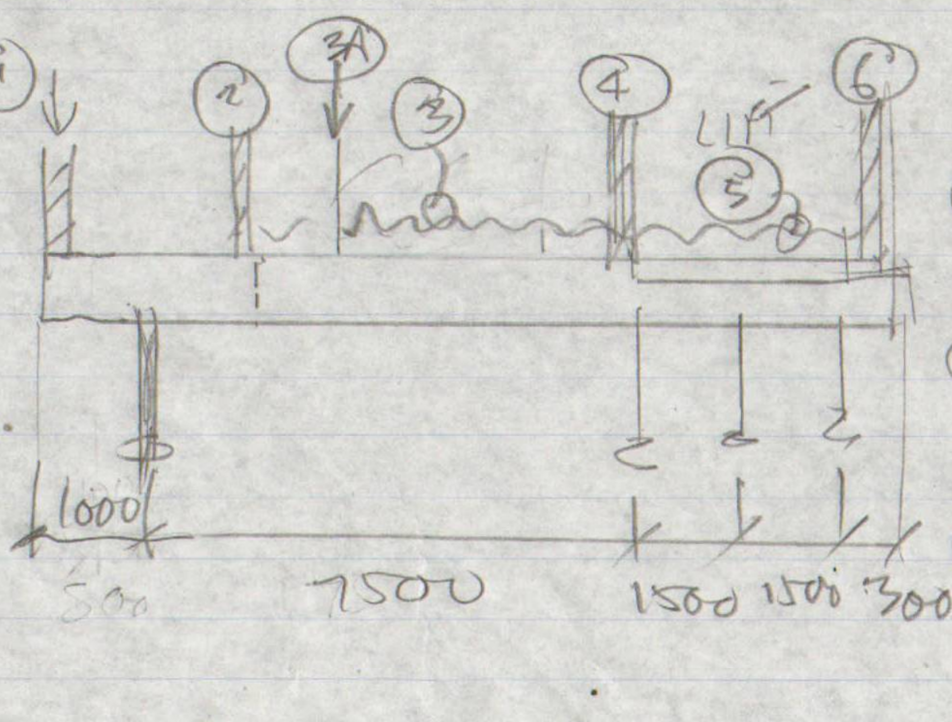
DENOTES AREAS TRAVELLED BY 5T EXCAVATOR

DESIGN NEW RC FOOTING ON PILES.

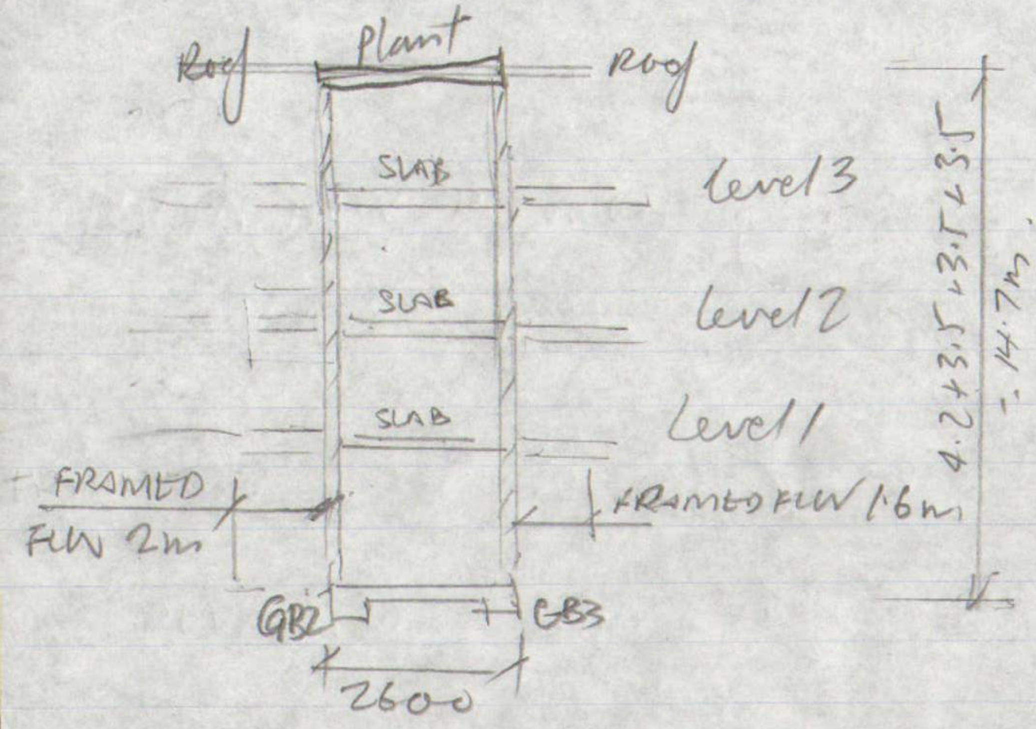



BEAM TO RECTIFY ECCENTRICITY OF NEW WALLS TO PILES UNDER THAT NEED TO BE CLEAR OF THE SEWER

SECTION (1) — LIFT & STAIR WELL BEAM.

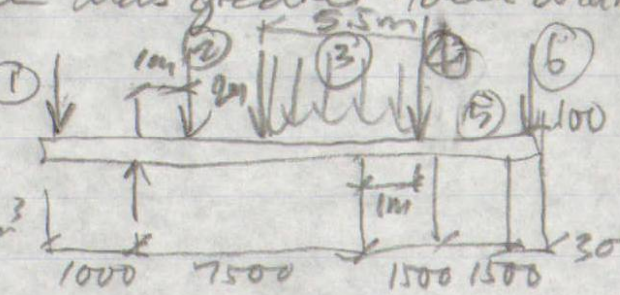



(1) Blockwall + stair
(2) Ground floor wall only
(3) Blockwall full height + landing slabs + timber floor
(3A) Concentrated load from stairs on edge of landing
(4) – (6) Lift walls
(5) Wall wt + timber floor




Design as a raft slab in two with two edge beams. Northern edge beam has greater load width

Determine loads.




(1) Blockwall 2.5m × 14.7 × .2 × 22 kN/m³
= 162 kN
Stair slab (3 levels)
3 × 2m × 1m × 6kPa. = 36kN
Stair live 3 × 2m × 1m × 2kPa = 12kN
Stair wth wall spanning over hallway on GF
3.4m/2 × 12.5 × .2 × 22 = 94 kN
Floor load over hallway
Dead. 3 floors × 0.6kPa × 1.7m × 2m = 6kN
Live " 1.5kPa × " × " = 15.3kN

(1) = 334 kN

(2). Wall over hallway 94kN
Floor load Dead 6kN
Live 15kN
GF hallway wall
2.5m × 4.2 × .2 × 22kN/m³ = 46kN

(2) 161kN

(3A) Stair slab load @ top landing over 3 floors
Dead 36kN
Live 12kN } 48kN

(3) UDL

Wall 14.7m × .2 × 22 kN/m³ × = 64.7kN/m
Floor dead (2m × .6 + 1.3 × 4kPa) × 3
" " + 1.3m × 5kPa. = 26.2kN
Floor live (2m × 1.5 + 1.3m × 2kPa) × 3 + 1.3 × 5 = 23.3kN/m } 114.2kN/m

(4) Lift wall 1m × 14.7 × .2 × 22kN/m³ 65kN

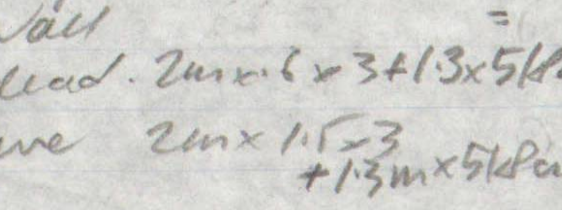
(5) Timber frame floor + wall.
UDL Wall = 64.7
Floor dead. 2m × .6 × 3 + 1.3 × 5kPa 11.1
" live 2m × 1.5 × 3 + 1.3m × 5kPa 15.5 } 91.3kN/m

(6) Wall only 64.7 kN/m × 1.3m 84.1 kN

→ Use microstran model to assess deflections and influence of pile deflection on pile loads and bending moments.

Pile spring 150 kN / 6mm deflection = 25000 kN/m per pile

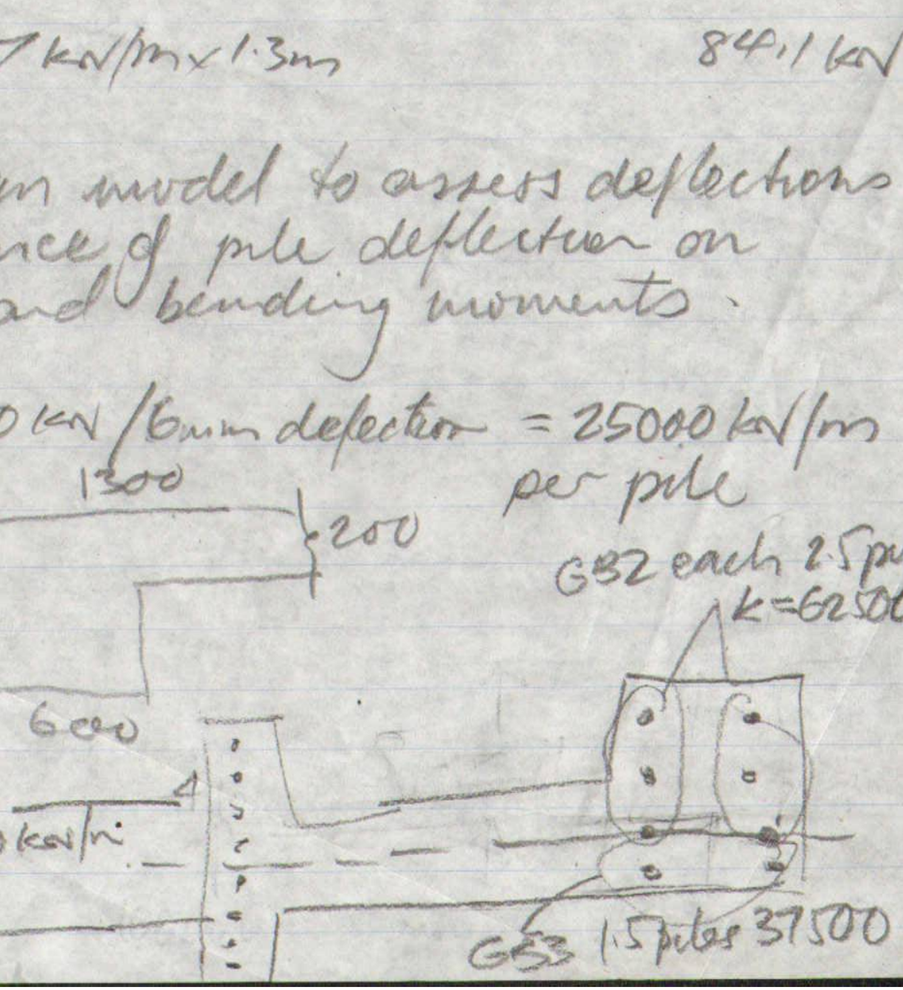
Try section




SPRINGS

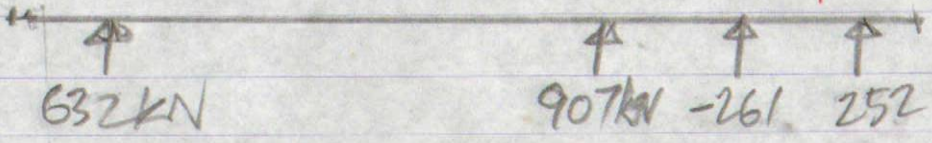
GB2 = 4 piles
k = 100000 kN/m

GB3 = 4 piles

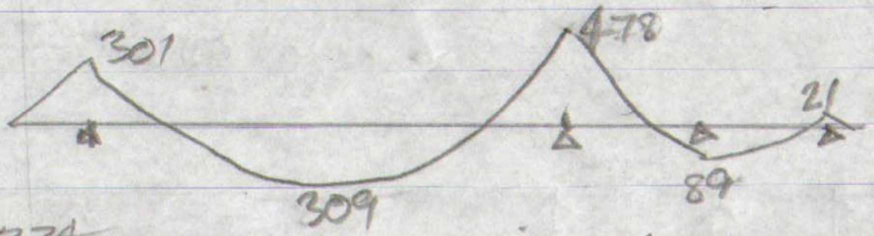


## Support reactions GB2

File 11401-raftslab GB2

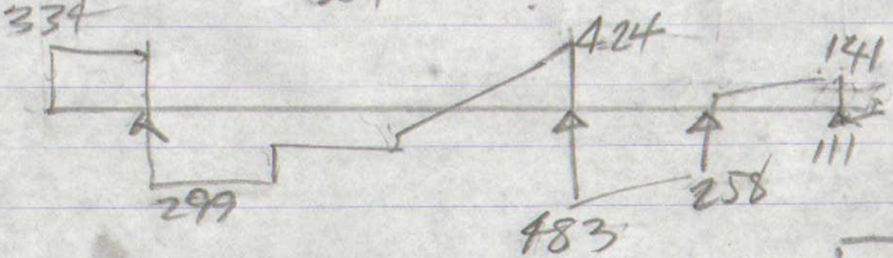



BMD*




kN/m.

SFD*



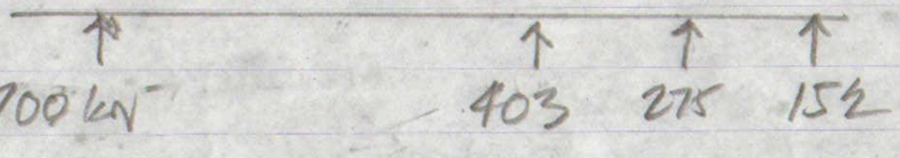

kN

*NOTE THESE ARE WORKING LOADS NOT ULTIMATE

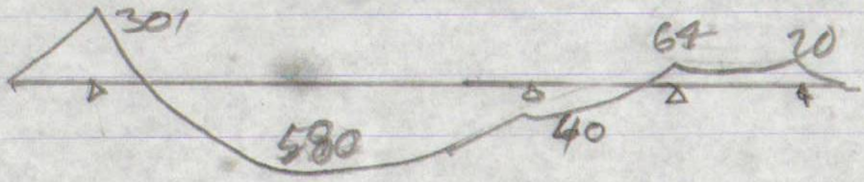
## SPRING SUPPORTS -GB2

File 11401-raftslab GB2-spring

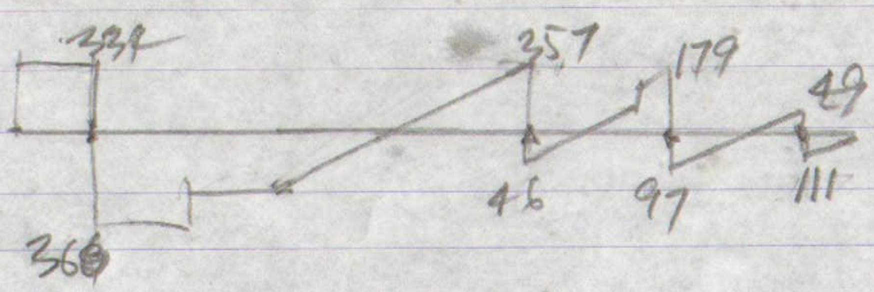
Reactions



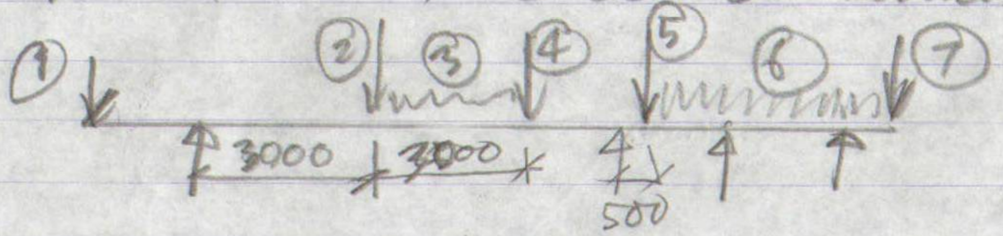

BMD*




SFD*



GB3 SOUTH EDGE BEAM OF STAIR/LIFT LOBBY RAFT SLAB
SAME GEOMETRY AS GB2 BUT REDUCED LOADS.




(1) RC Block wall + stair slab.
Wall (1.3m + 3.5m) x 14m x .2 x 22kN/m³ = 295kN
Stair slab 3 x 2.0m x 6kPa x 1m 36 kN
live 3 x 2.0m x 2kPa x 1m 12 kN
343kN

(2) Stair @ landing slab 36 kN
live 12 kN
Framed floor 1.8m x 0.6 kPa x 2m 2.2
1.8m x 1.5 kPa x 2m 5.4
RC column 0.6 x .2 x 24.5 x 14m 42
Existing brick wt
1m x .23 x 22kN/m x 3.5 x 3 53kN
151kN

(3) UDL Dead. (1.8m x 0.6) x 3 flrs + 1.3m x 4.5 kPa x 4/n
= 26.6kN/m
Live 1.8 x 1.5 x 3 + 1.3 x 2kPa x 3
+ 1.3 x 5kPa. = 22.4kN/m
GF wall 3.5m x .2 x 22kN/m = 15.4
64.4kN/m

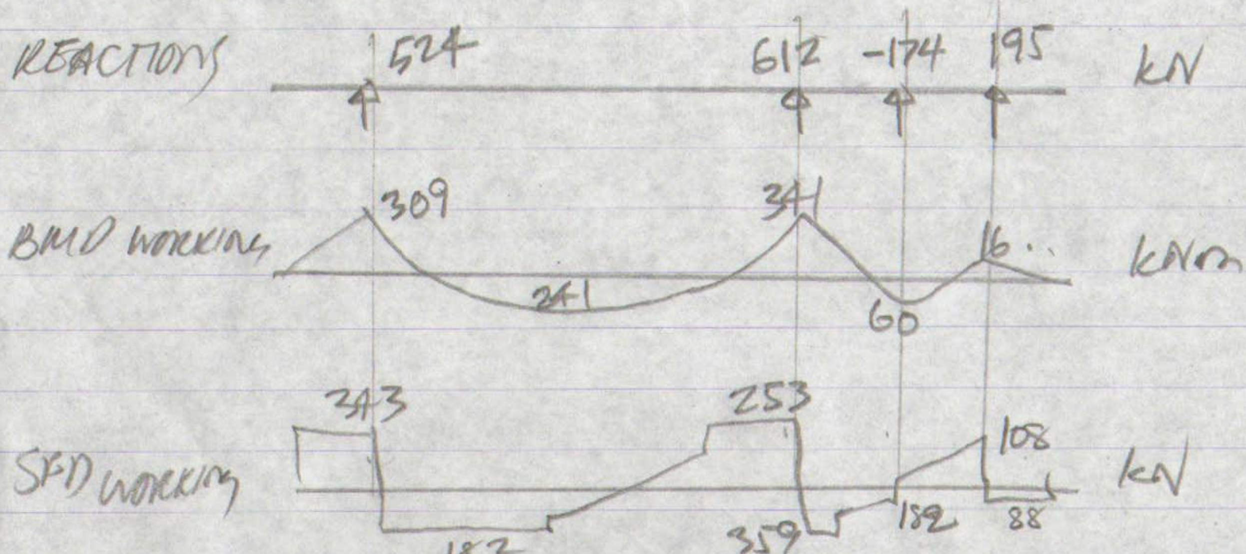
(4) Extg brick wall 53kN
Slab point load.
1m x 4.5 x 1.3m x 4 23.4kN
live 1m x 2kPa x 1.3m x 3 ] 14.3 kN
+ 1m x 1.3m x 5kPa ]
90.7kN

(5) Slab point load dead. 23.4 kN
live 14.3 kN
lift frontwall 1m × 1.2 × 22 × 14 62 kN } 100 kN

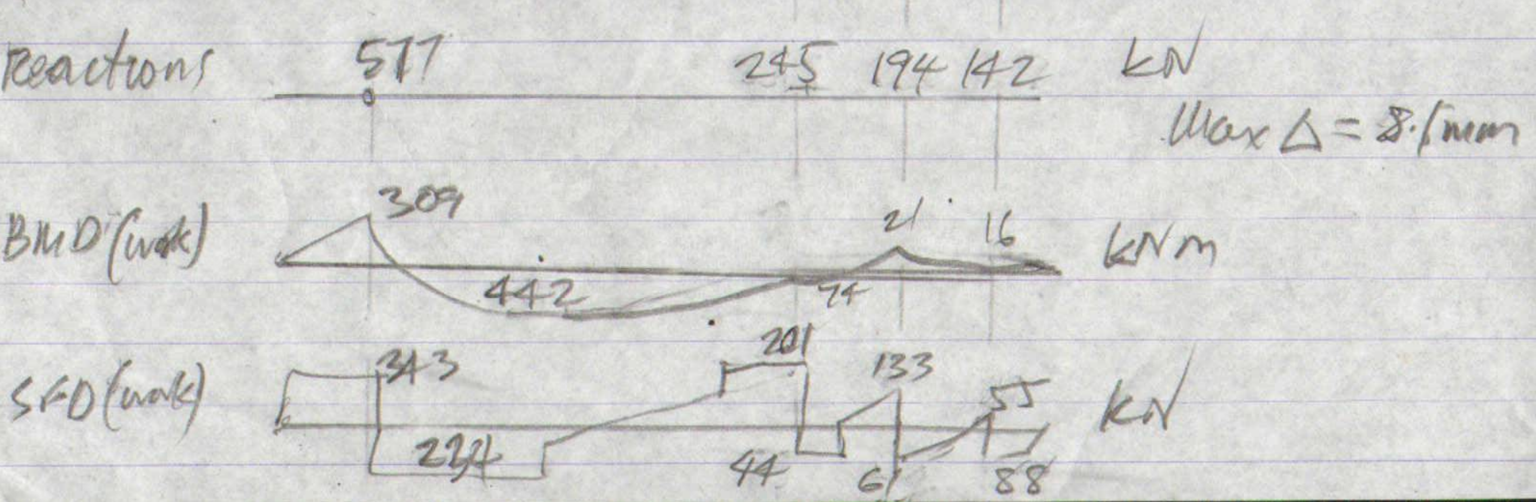
(6) lift wall UDL 64.7 kN/m.
Plant slab. 1.3 × 4.1 kPa 5.9 kN/m
" live 1.3 × 5 kPa 6.5 kN/m } 77 kN/m

(7) lift (eastern) wall 64.7 kN/m 64.7 kN/m

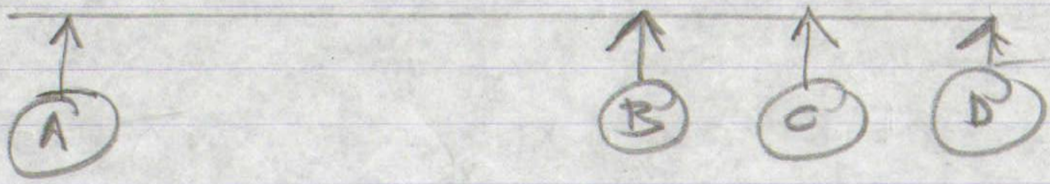
Fixed supports (GB3)




SPRING SUPPORTS



Add support reactions for GB2 & GB3




(A) = 700 + 577 = 1277 kN / 8 piles = 160 kN / pile

(B) = 403 + 245 = 648 / 4 = 162 kN / pile

(C) 275 + 194 = 469 / 4 = 118 kN / pile

(D) 152 + 142 = 294 / 4 = 74 kN / pile

Reducing number of piles on C & D would reduce spring stiffness & put more load on (B)

Wet self weight of concrete not included as poured on existing ground & allowed for in bearing pressures over sewer.

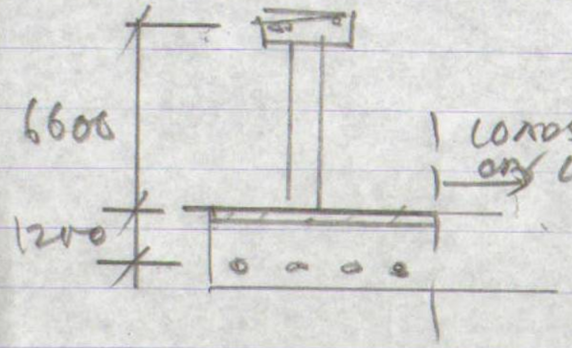
However, the raft slab self weight will be included in its ultimate limit state design if sand settles.

Note no short term live load reduction factor used here either.

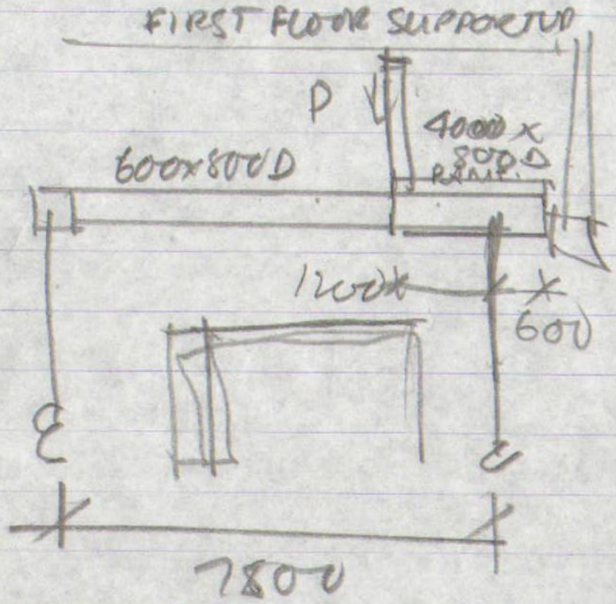
→ USE 160 kN SWL piles

## BEAM GB4

This beam is essentially to rectify the eccentricity of the RC block wall for the hallway running from Market Lane to the stair/lift lobby.




PLAN




$P = 4.2 \times 0.2 \times 22\,kN/m^3 = 18.5\,kN/m$
$\times 5m$ long $= 93\,kN$

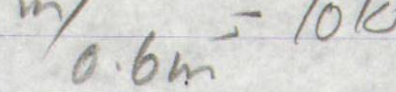
Extra deadload from GB4 + ramp
$(0.8 \times 24.5 + 3kPa) \times 5m = 113\,kN/m$
Live $5m \times 4kPa$ $= 20\,kN/m$.

Design using RAPT with self weight included.

Assume footing supports 1500 wide hallway floor

Ground floor $4kPa \times 1.5m / 0.6m = 10kPa$ on 600 wide

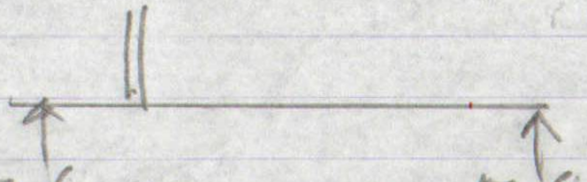
600 × 800 Deep. → Rapt -




→ $\Delta = 14mm$

Reduce Δ add bars.
→ Use 6N20 top & btm + N12 stirrups. $\Delta = 8.5mm$ OK.

**Beam GB1**



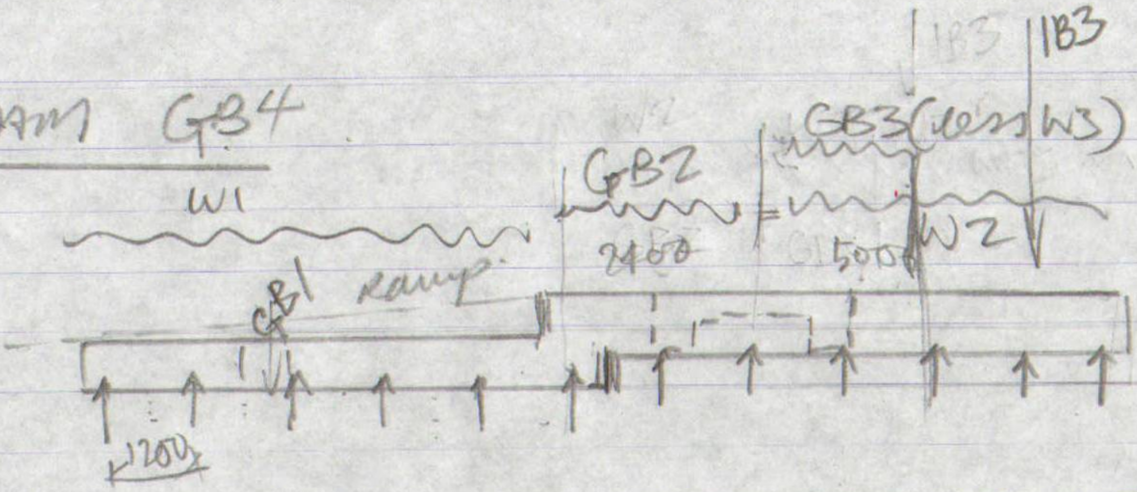
Reactions

| | |
|---|---|
| 50.6 | 50.6 |
| 61.6 | 28.4 |
| 210.2 | 88.2 |
| 322.4kN | 167.2kN + pilecap. |
| → 3 piles | 2 piles |

Refer RAFT Report 11401-FTG BEAM GB1-rapt.pdf.

2.10

BEAM GB4




Model without the step for simplicity

W1 = load from RC block wall = 18.5 kN/m

Additional dead load from ramp & finishes 3kPa × 2m 6 kN/m

+ live load 2m × 4kPa 8 kN/m

33 kN/m

Add GB1 self weight & live load.

Dead 12kN/m × 3.9m 47 kN

Live 4kPa × 1.5m × 3.9m 24 kN ] 71 kN

GB2 load from GB2 reaction over 2.5m. 700 kN/2.5 = 280 kN/m.

W2 = end wall load from GB3 distributed over 5m

343 kN (p. 2.05) / 5m = 68.6 kN/m

GB3 (less W3) (577 − 343) / 1.5m = 156 kN/m

Beam IB3 - reaction SCS — 192 kN

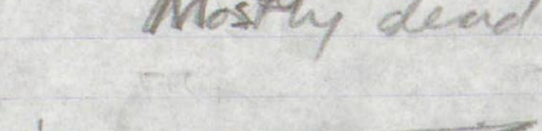
→ Footing beam generally 2000 wide × 800 deep.

→ High pile loads → no room to add extra piles except in south end

- Raft slab actually has integral RC block wall over.
- Input element as 4m high x 0.2m wall (ignore beam for now)
- Plus add extra pile
- Wall stiffness distributes load more evenly

Max reaction 150kN Use pile SWL = 160kN

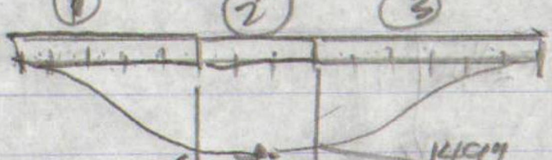
GB4 - Conservatively design ftg for forces from analyses with wall stiffness included. Mostly dead load but use factor 1.35 (ULS) conservatively




$M^* = 1583 \times 1.35 = 2137$ kNm.

$1.2 M_{cr} = 1.2 \times .6\sqrt{32} \times 800^2 \times 2000$

$= 869$ kNm




① 2000 x 800, d = 720

20N20 BTM = $\phi M_u$ = 1715 kNm

$V^*_{max}$ = 352kN

$\phi V_{uc}$ = 803 kN @ support.

$\phi V_{umax}$ = 9216 kN

② 2400 x 800

24N20 $\phi M_u$ = 2084 kNm

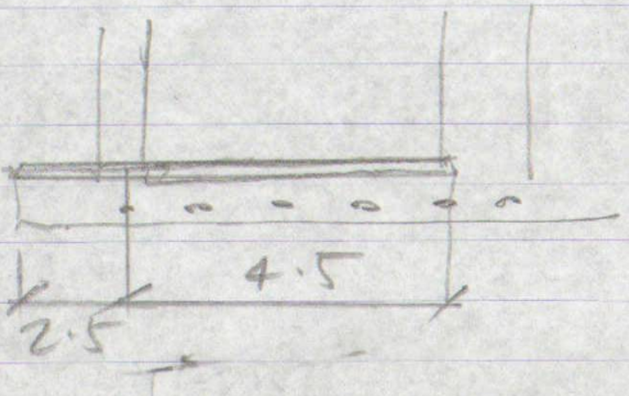
25N20 " = 2166 kNm

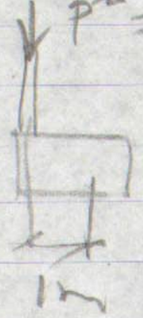
$V^*$ = 452kN

$\phi V_{uc}$ = 1231kN @ < d from support.

③ 1000 x 800 $M^*$ = 2024 kNm 14N28 $\phi M_u$ = 2100 kNm

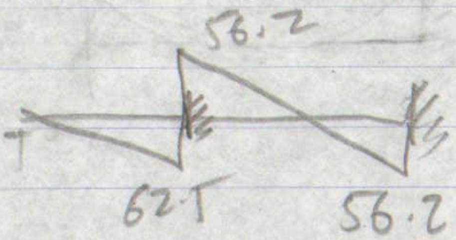
Check torsion of GB4 in between GB1 & GB2 & beyond GB1




$P^* = 1.35 \times 4.2 \times .2 \times 22$
$= 25 kN/m$.
$t = 1m \times P$
$= 25 kNm/m$

TMD




$T^* = 62.5 kNm$.

$\phi T_{umax} = 0.7 \times .2 \times 32 \times 2000 \times \frac{800^2}{3} E\text{-}6$
$= 2867 kNm$

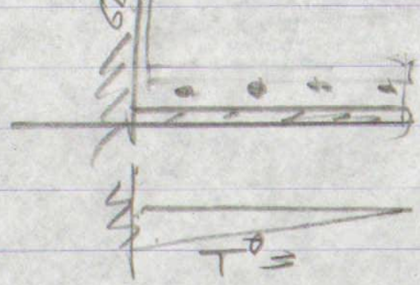
$\frac{62.5}{2867} + \frac{385}{9216} << 1$.

$\phi T_{uc} = 0.7 \times .3\sqrt{32} \times 2000 \times \frac{800^2}{3} E\text{-}6 = 507 kNm$

$0.25 \phi T_{uc} = 127 kNm \geq 62.5 kNm$ no torsion req.

**Beyond. GB3**

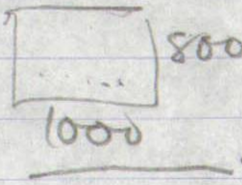
– Denote GB5




$t = 68.6 kN/m \times 0.35 m$
$= 24.0 kNm/m$

$T^* = 1.35 \times 27.0 \times 4m$
$= 130 kNm$

Footing




$\phi T_{uc} = 253 kNm$

At End of GB3

$V^* = 194 kN$

$\phi V_{uc} = 506 kN$

$\frac{130}{253} + \frac{194}{506} = 0.9 > 0.5$

Need torsional fitments for south end of beam

$\phi T_{us} \geq T^* = 130 kNm$.

$A_{sw}/s \rightarrow 130E6 / 0.7 \times 500 \times 2 \times 640 \times 840$
$= 0.345$
$= 86 mm^2 @ 250$ N12-250 closed ties

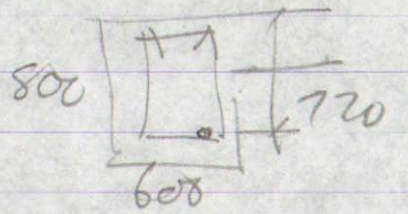
Longitudinal reo $0.5 \times 500 \times 0.345 \times ((640+840) \times 2)$
$= 255 mm^2$ each corner $= 570$ extra btm

→ Needed 14N28 bending → 15N28 total btm.

## Ultimate limit state design of GB2 & GB3.

From microstran $M^*_{+ve} = 1.35 \times 580$ kNm

$= 783$ kNm.




$1.2 M_{cr}$ (600x800) = 260 kNm

Try 5N28 btm  $\phi M_u = 893$ kNm

$> M^*$

Top $M^* = 1.35 \times 310 = 420$ kNm

4N20 + 2N16 top  $A_{st} = 1640 mm^2$  $\phi M_u = 472$ kNm

$> M^*$

Shear. $V^*_{max} = 360$ kN

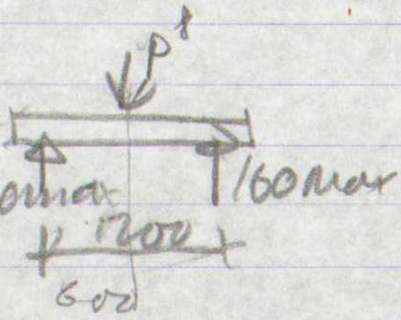
$\phi V_{uc} = 357$ kN

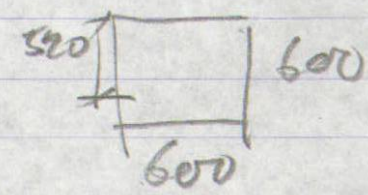
$\phi V_{u.min} = 539$ kN  provide min shear steel.

→ N12-250 stirrups

## Footing PF1

Simplistically




$P^*_{max}$

$= 320 \times 1.35 = 432kN$

$M^* = 432 \times 1.2m / 4 = 130kNm$

$1.2M_{cr} = 146kNm$.

4N20 Btm $\phi M_u = 251kNm$

$\phi V_{uc} = 227kN$

$V^* = 216kN$

$\phi V_{umin} = 358kN$

Provide min shear ties <u>N12-250</u> stirrups.

# TALL Engineers

RevB

# 19-21 The Corso, Manly

## Maximum Pile Deflection Under SWL

Vertical deflection is a function of flexing of the helix plate, the pressure variation across the helix plate, skin friction resistance down the shaft and deflection of the subgrade under the applied pressure

As screw piles are a proprietary item and the resistance of the founding strata can be nominated by specification of the minimum applied torque at refusal, measured pile deflections under static load test can be determined via empirical relationships from amassed pile static load test data.
As piles are in sand through out their entire depth, the pile acceptance deflection understatic load test will be the long term settlement of the piles under service.
As the bearing strata is sand, the static load test deflection limit can therefore be considered as the deflection limit under working loads.
Ps is the rated load of the proprietary pile, installed into granular material at the minimum nominated driving torque at refusal

| | | |
|---|---|---|
| | 114x6.0CHS | |
| | Corefilled | |
| Ps | 160,000 | N |
| L | 6,000 | mm |
| As | 2041 | mm^2 |
| Es | 205000 | N/mm^2 |
| Ac | 8219 | mm^2 |
| Ec | 32000 | N/mm^2 |
| Helix size | 400 | mm |
| Shape | Square | |
| Effective helix diameter | 451 | |
| PsL/AE | 1.41 | mm |
| 0.01d | 4.51 | mm |
| PsL/AE + 0.01d | 5.92 | mm |
| Actual working load | 160,000 | N |
| Actual pile deflection under service loads | 5.92 | mm |