Applications

The Cellcore HX S range is designed to protect reinforced concrete floor slabs from the upward forces associated with the effects of ground heave.

Not sure this product is right? Compare ground heave products

Suitability

Firstly the depth of the Cellcore HX S panel should be determined by the heave potential of the soil, as detailed in table one below:

Table One:

Results of Soil Analysis	NHBC Category	Predicted Ground Movement or BRE/NHBC requirement	Depth of Cellcore HX required to achieve 'Equivilant Void'
Plasticity Index	Shrinkage Category	Void Dimension (mm)	HX S (mm)
10-20	Low	50	90
20-40	Medium	100	160
40-60*	High	150	225

Table two:

Grade *	Safe Load (kN/m2)	Fail Load (kN/m2)	Maximum Concrete Depth ** (mm)
7/10	7	10	220
9/13	9	13	300
13/18	13	18	460
18/24	18	24	660
24/32	24	32	900

CHECK TOTAL DEAD LOAD OF STRUCTURE TO RESIST TOTAL UPLIFT

SELF-WEIGHT OF BASEMENT WALLS = 25 × 0.25 × 3.41
= 21.3 kN/m

350mm THICK

SELF-WEIGHT OF BASEMENT SLAB = 25 × 0.35
= 8.75 kN/m²

DEAD LOAD FROM COLUMNS SAT ON NEW BASEMENT WALLS (kN) (FROM TERLA MODEL - SEE OVER)

483
531
746
616
599
639
1241
1180

TOTAL = 6035

TOTAL DEAD LOAD RESISTING UPLIFT (TO BE FACTORED BY 0.9) =
(21.3 × 40.5 + 8.75 × 7.4 × 20.1 + 6035) × 0.9 = 7379.2 kN

TOTAL DEAD LOAD ON BASEMENT < UPLIFT

∴ CONTIG PILES TO BE DESIGNED FOR TENSION

LOAD FROM UPLIFT PER PILE = 328.6 × 0.6 = 197.2

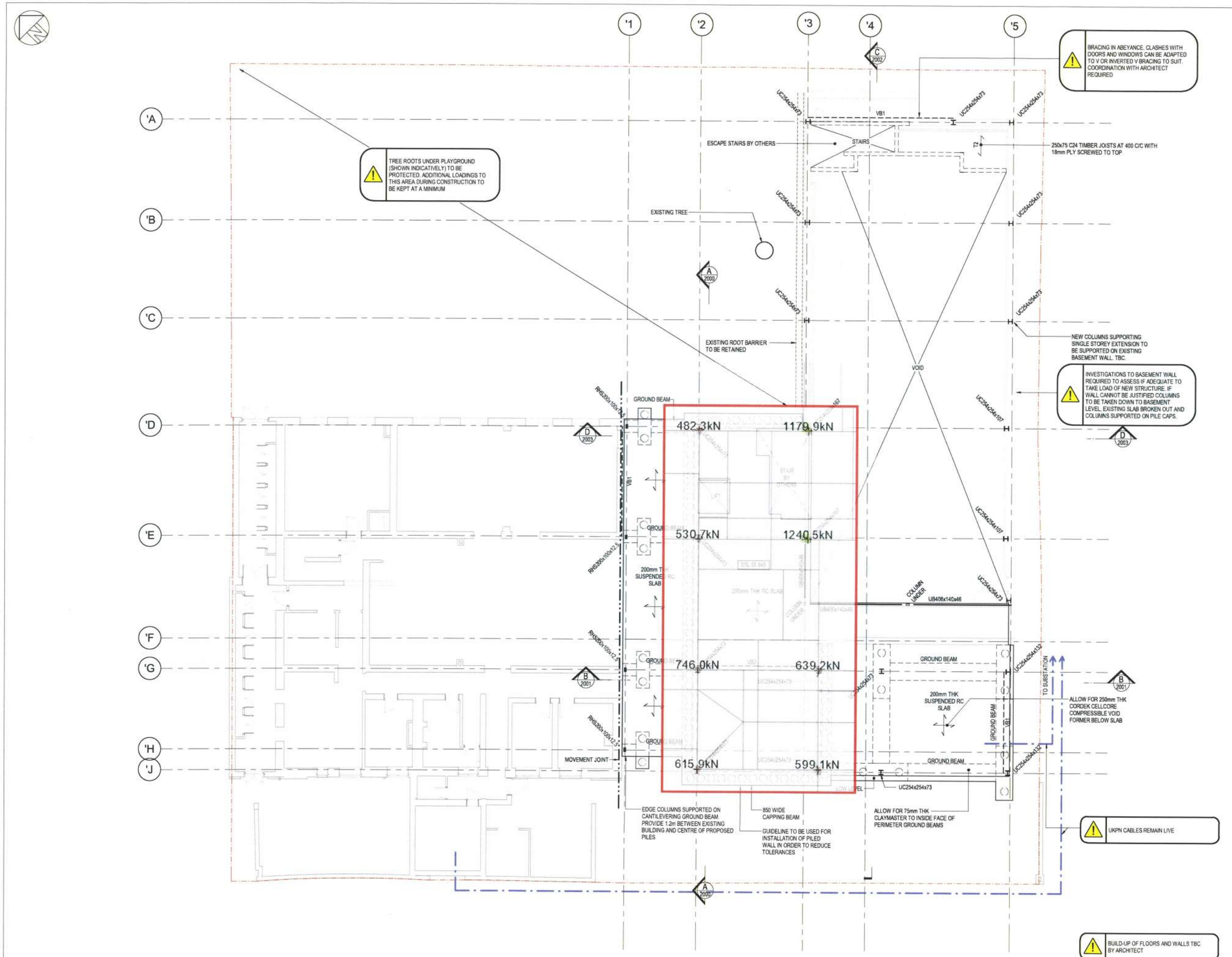
SKIN FRICTION FROM CLAY UP TO 4m DP = 50 kN/m²

∴ RESISTANCE OF PILE TO 4m DEEP = 50 × (2 × π × 0.225) × 4
= 282.7 kN

RESITANCE > UPLIFT FORCE ∴ OK

NOTE: HEAVE CAN BE REDUCED BY USING CORDEK CELL CORE
→ WILL USE IN DETAILED DESIGN OF PILES

SLAB TO BE DESIGNED TO SPAN SIDE TO SIDE TO PILES



This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- EXISTING STRUCTURE
- NEW REINFORCED CONCRETE
- NEW PRECAST CONCRETE
- NEW REINFORCED WATER RESISTANT CONCRETE
- PADSTONES
- LOAD BEARING STRUCTURE BELOW
- EXISTING STRUCTURE TO BE REMOVED
- NEW STEEL BEAMS
- NEW LINTELS OVER OPENINGS
- MOMENT CONNECTION
- CRANK IN BEAM
- (NC) NON-COMPOSITE USED BEAM
- ASSUMED SITE BOUNDARY

NOTES

1. METAL DECK SLABS TO BE 140mm THK KINGSPAN MULTIDECK 80 V2 WITH 1.0mm GAUGE AND A142 MESH TO TOP + H10 BARS IN EACH TROUGH
2. ALL SETTING OUT TBC BY ARCHITECT
3. ALL BEAMS ACTING COMPOSITLY WITH SLAB UNLESS NOTED OTHERWISE. ALLOW FOR 19mm, 95mm LONG SEAR STUDS IN EVERY RIB OR MIN 350mm CRS.

BRACING SCHEDULE

REF.	DESIGNATION
VB1	100x15mm FLAT PLATE VERT CROSS BRACING
VB2	INVERTED V - BRACING FLAT PLATE 100x15mm
VB3	V - BRACING FLAT PLATE 100x15mm

NOT FOR CONSTRUCTION

rev	date	by	chk	description
P1	04.03.19	Oiv	SCo	Issued For Planning

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Elliott Wood Partnership Ltd
Central London • Wimbledon • Nottingham
Consulting Structural and Civil Engineers
(020) 7499 5888 • elliottwood.co.uk

Project
The Hall School
NW3

Drawing title
Proposed Lower Ground Floor Plan

Scale (s)	Date	Drawn
1:50@A1; 1:100@A3	March / 2019	Drawn

Drawing status: Preliminary
Status S2 Revision P1

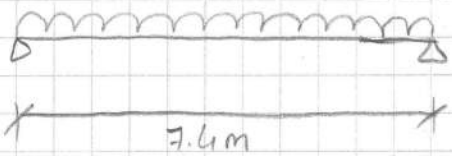
Project no.	Originator	Zone	Level	Type	Role	drg no.
2190008	EWP	ZZ	B1	DR	S	0900

DESIGN OF SLAB

$w = 61.2$ - SW OF SLAB

$= 61.2 - (25 \times 1 \times 0.35)$

$= 52.5$ kN/m



$M = 52.5 \times 7.4^2/8 = 359.4$ kNm/m

$V = 52.5 \times 7.4/2 = 194.3$ kN/m

FLEXURE:

$k = 0.171$ $z = 224.1$mm

$A_S = 5008.5$ mm^2 (USE 8 NO. H32s ... $A_{SPROV} = 6434$ mm^2)

H32s @ 140 o/c

8.3 Ground beam and pile cap design

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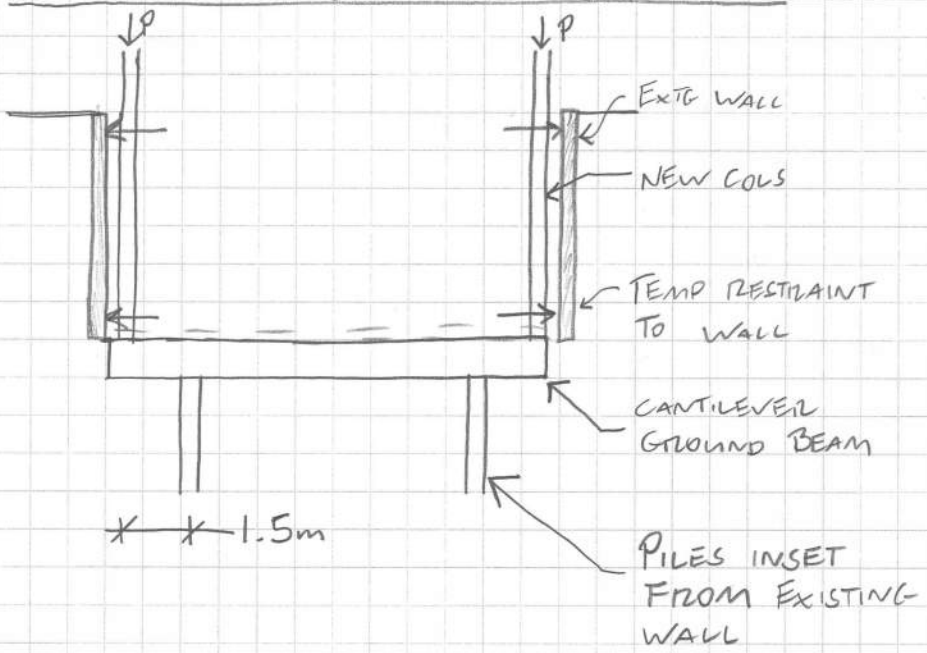
BASEMENT COLUMN SUPPORT



MAX. POINT LOAD = 1660 kN [SLS]

2360 kN [ULS]

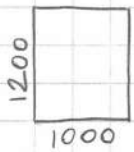
FOR GROUND BEAM:

M_{max} = 2360 × 1.5 = 3540 kNm

V_{max} = 2360 kN

LIMITING v TO 2 Nmm^{-2}, A_{req} = 1.18 × 10^6 mm^2 i.e 1000 × 1200

SPAN-TO-DEPTH OK BY INSPECTION



USE C32/40, 75mm COVER so d = 1100mm

K = 3540 × 10^6 / (1000 × 1100^2 × 32) = 0.09 < 0.168 ✓

z = 1004 mm, A_s = 3540 × 10^6 / (0.87 × 500 × 1004)

= 8106 mm^2

e.g. 11 No. H32 = 8847 mm^2

$v_{Ed} = 2360 \times 10^3 / (1000 \times 1004)$

$= 2.35 \text{ Nmm}^{-2}$

$v_{Rd,max} = 3.84 \text{ Nmm}^{-2}$ so $\cot\theta = 2.5$

$\frac{A_{sw}}{s} = \frac{2.35 \times 1000}{(0.87 \times 500) \times 2.5}$

$= 2.2 \text{ mm}^2/\text{mm}$

e.g. 10No. H10 LINKS @ 300c/c $= 2.62 \text{ mm}^2/\text{mm}$

USE 1200 × 1000 RC GROUND BEAM WITH 11No. H32 TOP BARS & 10No. H10 LINKS @ 300c/c

PILES

GEA SITE INVESTIGATION SUGGESTS WORKING LOAD OF 840kN FOR 21m DEEP 450mm Ø PILE.

1660/840 = 2.0

TO ALLOW FOR LOAD FROM RC SUBSTRUCTURE, PROVIDE 3No. PILES.

FOR GROUND BEAM ON GRID 3 SUPPORTING SLAB, WORST CASE IS UPLIFT.

UPLIFT = 3.7m × 54 kN/m² = 200 kN/m

L = 6m, M = 900 kNm, V_{max} = 600kN

SO USE 1200 DEEP BEAM, WIDTH = $\frac{900}{2360} \times 1000$

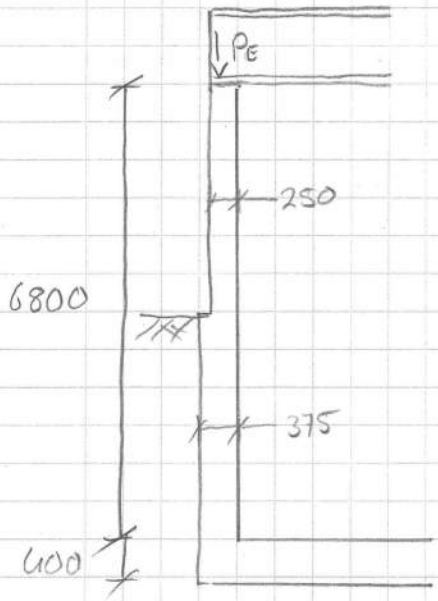
USE WIDTH PROPORTIONAL TO LOAD DIFFERENCE TO CANTILEVER. = 381

USE 500 WIDE BEAM.

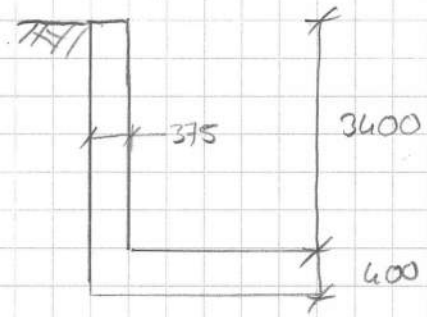
8.3 Check on existing basement wall in the proposed case

8.4 Check on existing basement wall in the proposed case

EXISTING BASEMENT WALL



THE EXISTING BASEMENT WALL IS TO BE CUT DOWN & THE NEW COLUMNS ARE TO BE SAT ON THE WALL
∴ THE RETAINING WALL NEEDS TO BE CHECKED IN THE PROPOSED CASE:



EXISTING NEW

↳ SEE OVER FOR ARCHIVE DRAWING OF EXISTING BASEMENT

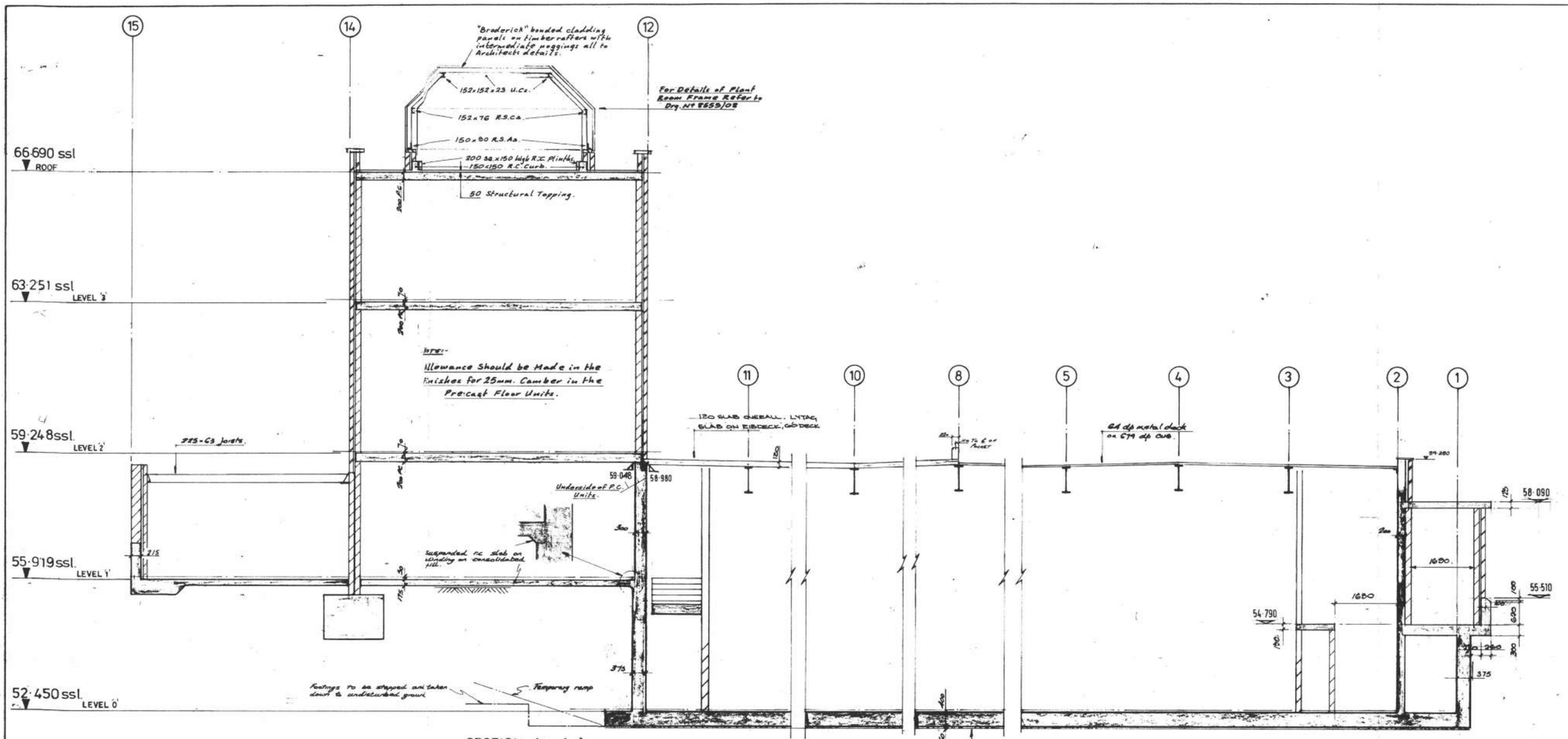
EXISTING LOAD:

BAY WIDTH = 3m (FROM ARCHIVE DRAWINGS) SPRED OVER 3m

DL = 3.05 kN/m² (ribdeck)
LL = 0.75 kN/m² (access)

PE DL = 3.05 × 1.35 × 3 × 11.9/2 = 73.5 kN /3 = 24.5 kN
LL = 0.75 × 1.5 × 3 × 11.9/2 = 20.1 kN /3 = 6.7 kN

LOAD REMOVED IN THE PROPOSED CASE



General Notes

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DETAILS.
2. For general notes see drg no. 8653/01.

ISSUED FOR CONSTRUCTION

Revision	Description
H	LEVELS AMENDED BETWEEN ℄'s 12-14 TO SUIT REVISED PATCH REINFORCEMENTS. DETAIL 'A' REVISED STAIRS BETWEEN ℄'s 1-2 AND 11-12 ADDED.
G	LEVELS CHANGED + DIMENSIONS TO ROOF OF SECTIONS A-A + B-B
F	Amended for Contract Issue
E	Stairs on ℄'s 1 & 12 Revised to Arch's. Detail
D	Roof enclosure added. Roll stairs at 1-2 removed.
C	Plant Room Roof Details added and other revisions to Architects details.
B	Revised in accordance with latest Architects and services requirements
A	Minor revisions Issued for Building regulations approval.

Date	2.4.87	15.4.87	14.5.87	15.7.87	25.7.87	11.8.87	8/11/87	9/12/87												
Revision	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T			
Client																				
Architect	1	1	1			1	1	1												
Quantity Surveyor	1	1	2			2	3													
Contractor H.O.																				
" S.O								1												
M & E. Consultant	1	1	1			1														
Mech. Engineer																				
Elect. "																				
Local Authority		1				D	1	1												
Project Manager																				
Issued 10/8/87 D																				

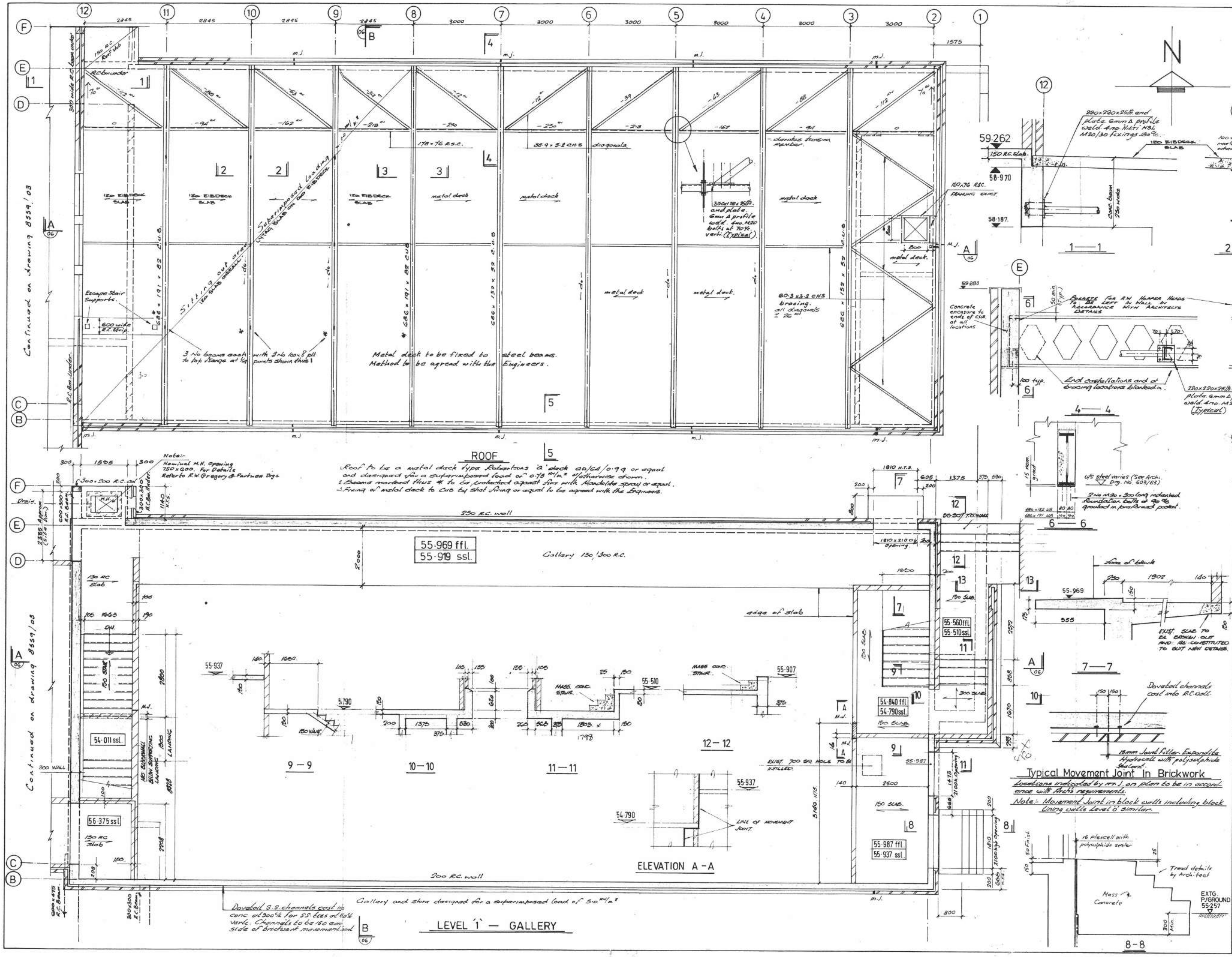
Franks and Lewin
Consulting Civil and Structural Engineers
21 Bloomsbury Way, London, WC1A 2TH Tel: 01-242 7943

Job
THE HALL SCHOOL HAMPSTEAD EXTENSION PHASE TWO.

Drawing
SECTIONS A–A & B–B.

Architect Michael Haskoll Associates.

Scale	1:50	Drawing Number	Revision
Drawn	S.F.A.	8559/06	H
Checked	G.		



General Notes

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DETAILS.
2. For general notes see drg no. 8559/01.

Revision	Description
H	Stairs between G.L's 1-3 & 11/12 revised in accordance with architects requirements.
G	Levels changed, roof construction revised
F	Forces in lattice girder members to roof added for design of connections.
E	Amended for Contract Issue
D	Stairs on G.Ls. 1 & 12 Revised to Archt's Details.
C	Roof added & Stair/wall G.L.I. Revised.
B	Revised in accordance with latest Architects and services requirements
A	Minor revisions. Issued for Building requirements approval.

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21 Bloomsbury Way, London, WC1A 2TH Tel: 01-242 7943

Job: THE HALL SCHOOL HAMPSTEAD EXTENSION PHASE TWO.

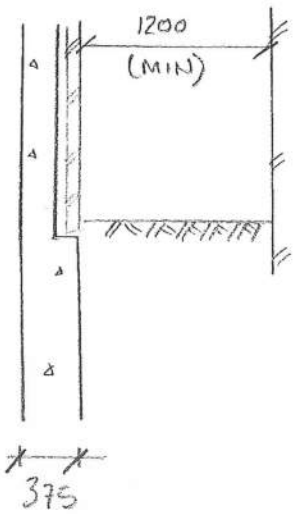
Drawing: MULTIPURPOSE HALL - G.A. LEVEL 'I' — GALLERY AND ROOF

Architect: Michael Haskoll Associates.

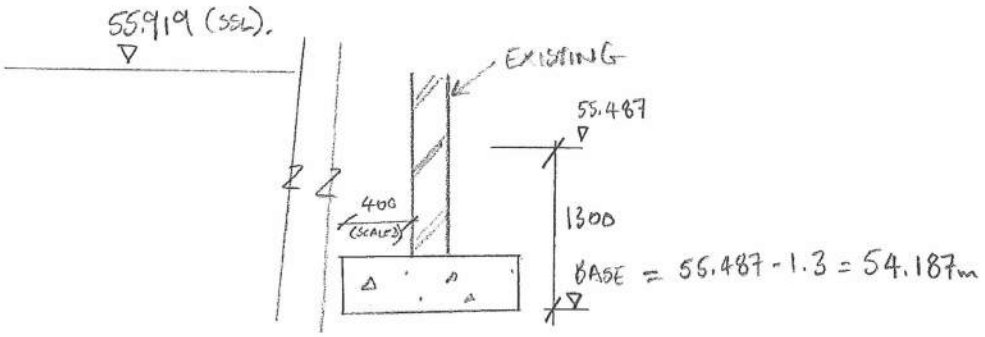
Scale: 1:50 1:20
Drawn: S.F.A.
Checked: CA
Drawing Number: 8559/02
Revision: H

1) NEIGHBOURING STRUCTURE – 1ST LOCATION OF NEIGHBOUR FROM ARCHIVE:

BASED ON ARCHIVE DRAWINGS; FRANK & LEWIN 8559/03 & 06.



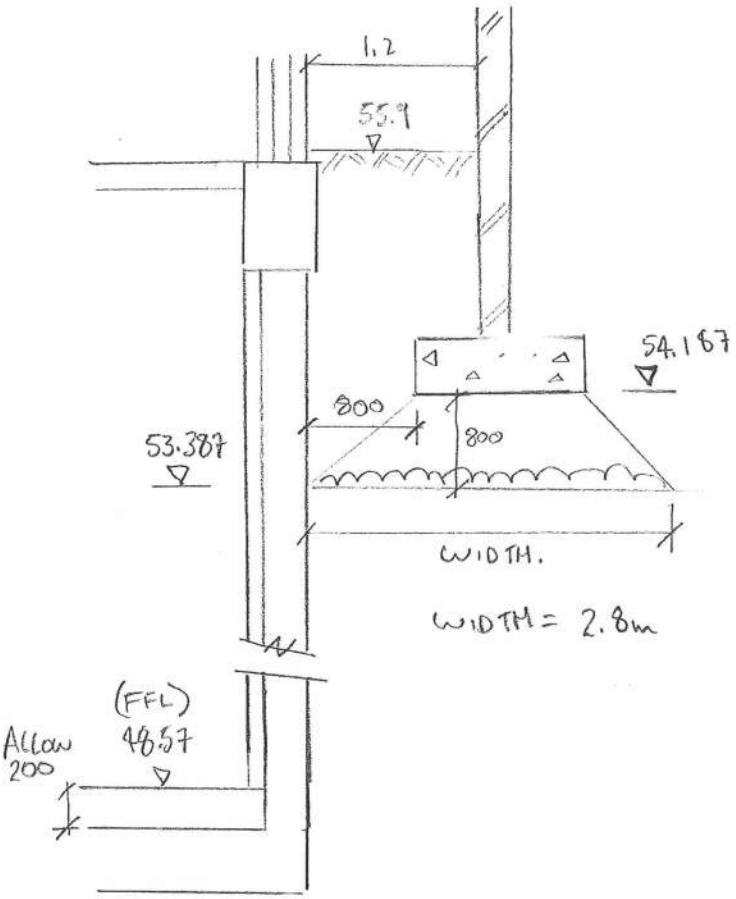
FROM SECTION B-B ON 8559/06



FROM S-S ON 8559/03.

SEE ENCLOSED DRAWINGS.

IF WE TAKE EXTERNAL = FFL = 55.9



WIDTH = 2.8m

LOAD FROM GARAGE FOUNDATION.

ALLOW DEAD LOAD ONLY AS 10KN/m² SURCHARGE WILL BE INCLUDED IN CALCS.

ROOF ALLOW

$1 kN/m^2 \times \frac{4m}{2} = 2 kN/m$

WALL

$19 kN/m^3 \times 0.225 \times 3 = 12.8 kN/m$

GROUND

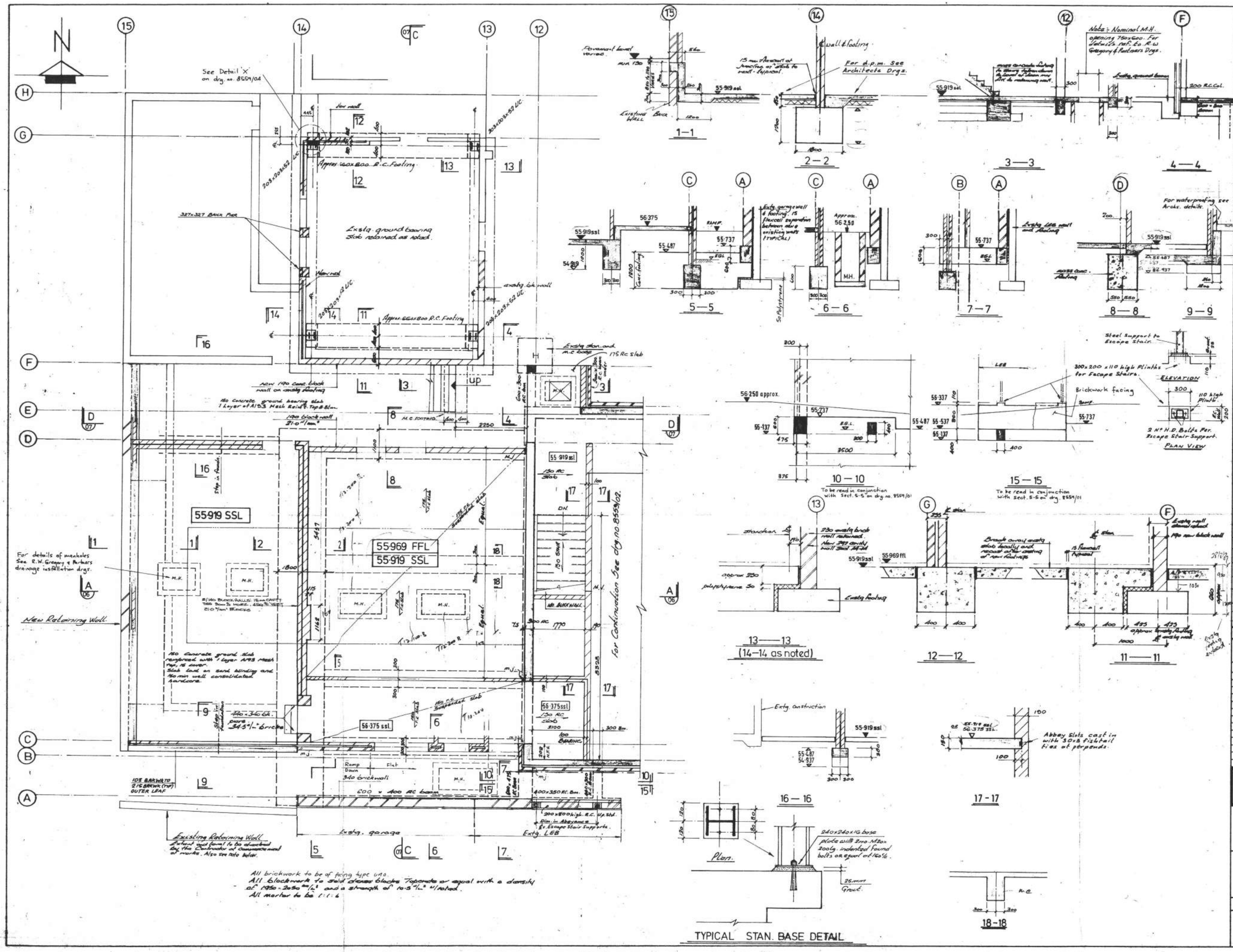
ASSUME GROUND BEARING SLAB ∴ NO REQUIREMENT AS < SOIL & NOT ON PILES

TOTAL DL = 14.8 KN/m

AS PRESSURE = $\frac{14.8}{2.8} = 5.3 kN/m^2$

DL ON WALL = 5.3 x 0.42 = 2.2 KN/m

STARTING ≈ 2m BELOW TOP



1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DETAILS.
2. For general notes see drg no. 8559/01.

ISSUED FOR CONSTRUCTION

FOR SECTION A—A TO D-D SEE DRG. NO. 8559/06 & 07.

Refer to Architects drgs. For all setting out dimensions

Revision	Description
J	Retaining wall grids 15 & B revised to suit established site conditions
H	[illegible] in accordance with architects requirements.
G	Levels changed. 300 block revised to 2/140 cavity wall
F	327sq. pier shown on Grid Line 14/F-G.
E	Amended for Contract Issue
D	Stan. Base Detail Added & Min. Amends.
C	Founds adjacent ramp adjusted. Drainage added
B	Revised in accordance with latest Architects and services requirements.
A	Minor revisions Issued for Building reg. approval.

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Consulting Civil and Structural Engineers
21 Bloomsbury Way, London, WC1A 2TH Tel: 01-242 7943

Job: THE HALL SCHOOL HAMPSTEAD EXTENSION PHASE TWO.

Drawing: THREE STOREY BLOCK & EXTENSION LEVEL '1'. FOUNDATIONS - G.A.

Architect: Michael Haskoll Associates

Scale: 1:50 1:20
Drawn: S.F.A.
Checked: CA
Drawing Number: 8559/03
Revision: J

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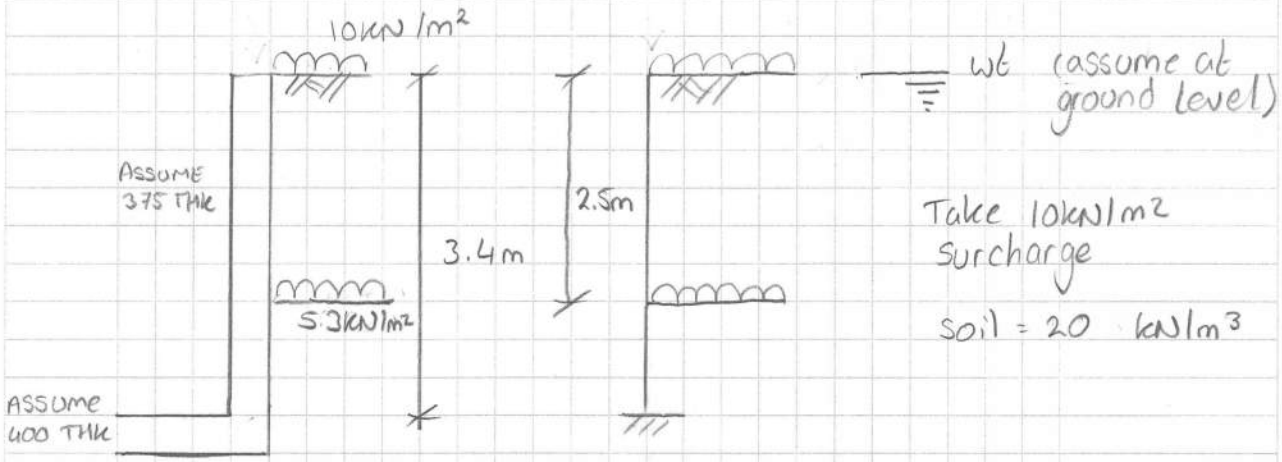
NEW CANTILEVER RETAINING WALL



$\phi = 24°$ clay $\therefore$ $k_a = 0.42$ (FROM S1)

Water	Soil	Surcharge	Neighbour
$10 \times 3.8 = 38\ kN/m^2$	$0.42 \times (20-10) \times 3.8 = 15.96\ kN/m^2$	$10 \times 0.42 = 4.2\ kN/m^2$	$5.3 \times 0.42 = 2.3\ kN/m^2$
γ (1.2)	(1.35)	(1.5)	

$\Rightarrow$ SEE TEDDS CALC FOR ANALYSIS

RC MEMBER ANALYSIS & DESIGN (EN1992-1-1:2004)

In accordance with EN1992-1-1:2004 incorporating Corrigenda January 2008 and the UK national annex

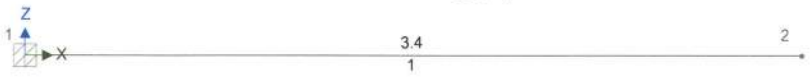
Tedds calculation version 3.0.04

ANALYSIS

Tedds calculation version 1.0.17

Geometry

Geometry (m)



Material - Concrete (C32 2500 Quartzite)

Density	2500 kg/m^3	Youngs Modulus	33.3457645 kN/mm^2
Shear Modulus	13.8940685 kN/mm^2	Thermal Coefficient	0.00001 °C^{-1}

Section type - R 1000x375

Area	3750 cm^2		
Major moment of inertia	439453 cm^4	Shear area A_y	3125 cm^2
Minor moment of inertia	3125000 cm^4	Shear area A_z	3125 cm^2

Support conditions

Support 1	X Fixed	Z Fixed	Rotationally Fixed
Support 2	X Free	Z Free	Rotationally Free

Spans

Span 1	3.4 m

Loading

Water - Loading

Soil - Loading

Surcharge - Loading

Neighbour - Loading

Load combination factors

Load combination	Self Weight	Water	Soil	Surcharge	Neighbour
ULS (Strength)		1.20	1.35	1.50	1.50
SLS (Strength)		1.00	1.00	1.00	1.00

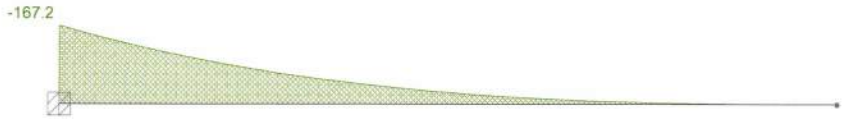
Member VDL loads

Member	Load case	Position			Load		Orientation
		Type	Start	End	Start (kN/m)	End (kN/m)	
Beam	Water	Ratio	0	1	38	0	GlobalZ
Beam	Soil	Ratio	0	1	15.96	0	GlobalZ
Beam	Surcharge	Ratio	0	1	4.2	4.2	GlobalZ
Beam	Neighbour	Absolute	0 m	0.9 m	2.3	2.3	GlobalZ

Results

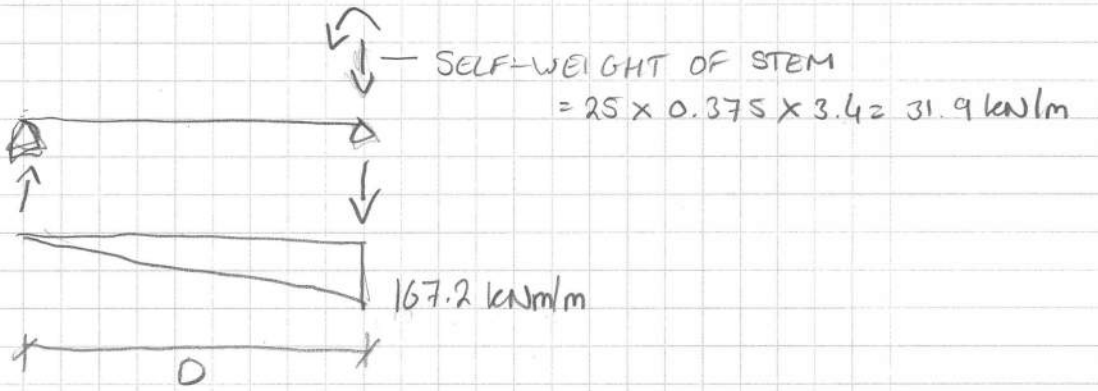
Forces

Strength combinations - Moment envelope (kNm)



Strength combinations - Shear envelope (kN)

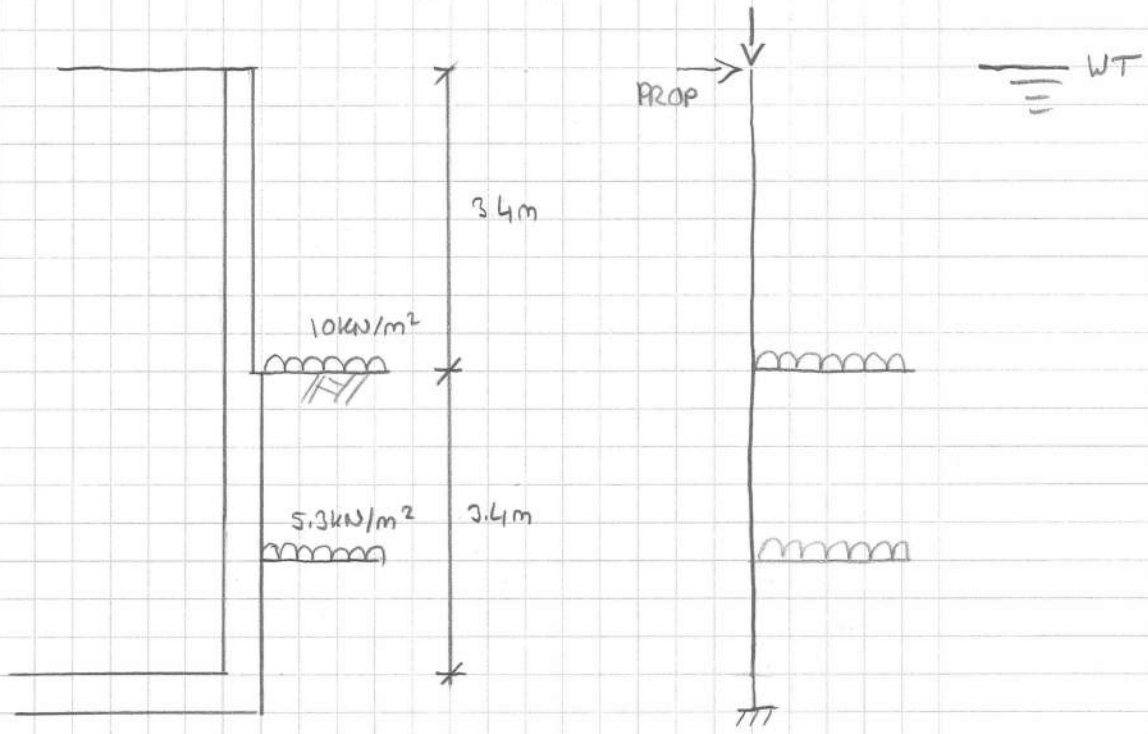
LOAD FROM WALL TO BE RE SUPPORTED ON GROUND BEAM
- CHANGED FROM GROUND BEARING IN THE EXTG CASE



DISTANCE BETWEEN WALL & PILE CAP WILL BE SUCH THAT THE SHEAR DOES NOT EXCEED THE CAPACITY OF THE SCAB. UPON SCANNING TO UNDERSTAND THE REINFORCEMENT THIS CAN BE ASSESSED.

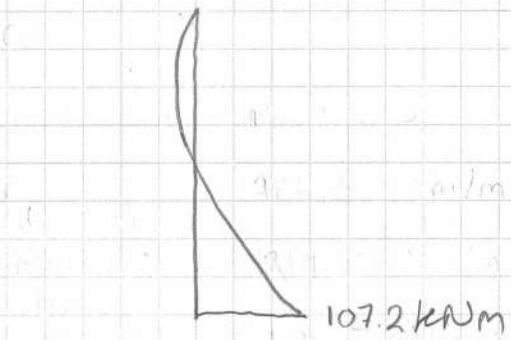
GROUND BEAM TAKES LOAD BACK TO PILES

EXISTING RETAINING WALL ANALYSIS

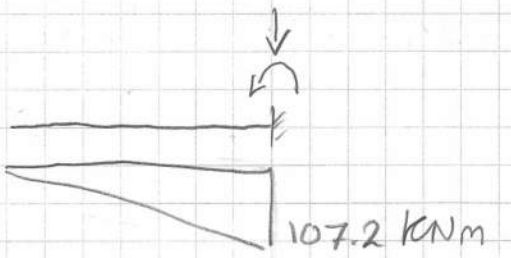


SOIL = 20. kN/m³ $\phi = 24$ $k_a = 0.42$ (FROM SI)

=> SEE TEDDS CALC



MOMENT & AXIAL LOAD GETS TRANSFERRED THROUGH THE BASE INTO THE GROUND



RC MEMBER ANALYSIS & DESIGN (EN1992-1-1:2004)

In accordance with EN1992-1-1:2004 incorporating Corrigenda January 2008 and the UK national annex

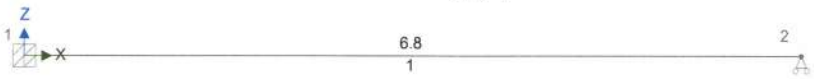
Tedds calculation version 3.0.04

ANALYSIS

Tedds calculation version 1.0.17

Geometry

Geometry (m)



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Density	2500 kg/m^3	Youngs Modulus	33.3457645 kN/mm^2
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Area	3750 cm^2		
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Minor moment of inertia	3125000 cm^4	Shear area A_z	3125 cm^2

Support conditions

Support 1	X Fixed	Z Fixed	Rotationally Fixed
Support 2	X Free	Z Fixed	Rotationally Free

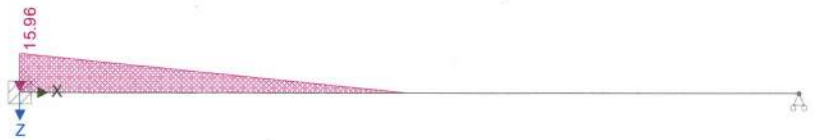
Spans

Span 1	6.8 m

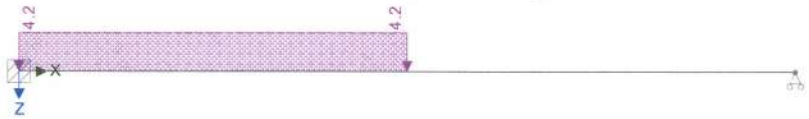
Loading

Water - Loading

Soil - Loading



Surcharge - Loading



Neighbour - Loading

Load combination factors

Load combination	Self Weight	Water	Soil	Surcharge	Neighbour
ULS (Strength)		1.20	1.35	1.50	1.50
SLS (Strength)		1.00	1.00	1.00	1.00

Member VDL loads

Member	Load case	Position			Load		Orientation
		Type	Start	End	Start (kN/m)	End (kN/m)	
Beam	Water	Ratio	0	0.5	38	0	GlobalZ
Beam	Soil	Ratio	0	0.5	15.96	0	GlobalZ
Beam	Surcharge	Ratio	0	0.5	4.2	4.2	GlobalZ
Beam	Neighbour	Absolute	0 m	0.9 m	2.3	2.3	GlobalZ

Results

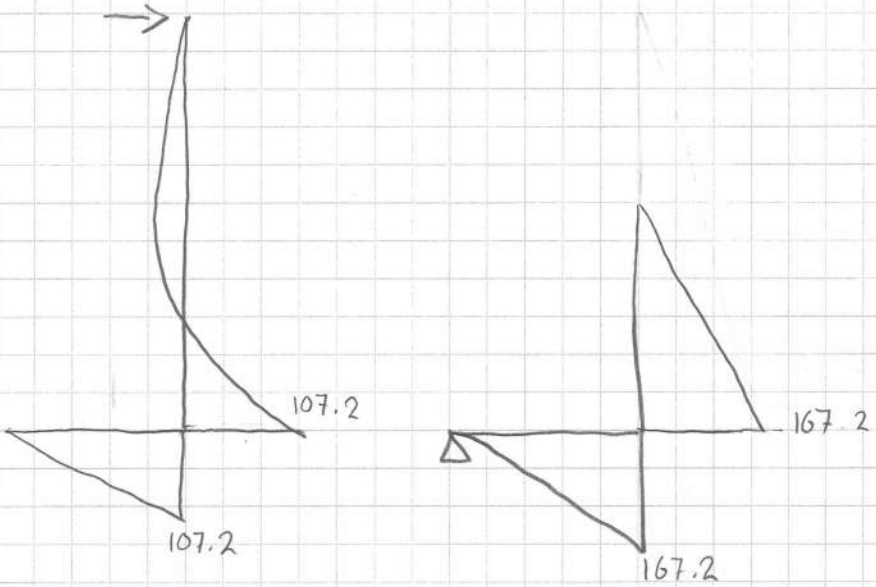
Forces

Strength combinations - Moment envelope (kNm)

Strength combinations - Shear envelope (kN)

COMPARISON BETWEEN EXTG & PROPOSED

EXTG



SLAB WILL BE SCANNED TO ASSESS IF IT HAS ADEQUATE REINFORCEMENT TO TAKE INCREASED MOMENT - ASSUME IT HAS.

REINFORCEMENT REQUIRED = 2106 mm^2/m
FOR EXAMPLE H20s @ 125 c/c

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Elliott Wood Partnership Ltd
Structural and Civil Engineers

E Movement Monitoring Report

elliottwood

The Hall School

23 Crossfield Road
Hampstead
NW3 4NU

Movement Monitoring Report

Job number:	2190008
Revision:	P1
Status:	Preliminary
Date:	March 2019

Document Control

		remarks:	Secant Piled Wall Added				
revision:	P1	prepared by:	Suzanna Cooper	checked by:	Agata Downey	approved by:	James Souter
date:	4th March 2019	signature:		signature:		signature:	

Contents

1.0 Introduction

1.1 Elliott Wood Partnership Ltd has been appointed to act as structural and civil engineers for the proposed redevelopment of the Hall School site, further details of which can be found in the 'Structural and Civil Engineering Planning Report and Basement Impact Assessment'. This report sets out the proposed movement monitoring regime to be carried out during the works. It will be updated to incorporate any specific requirements or trigger level limits agreed under the Party Wall Awards.

2. General

2.1. The contractor shall be responsible for establishing and setting out all levels and data in order to coordinate any work with the future proposed constructions.

2.2. The integrity of the excavation is to be maintained by the contractor at all times.

2.3. The contractor shall take all necessary precautions to ensure that noise, dust and vibration as a result of the works are kept to a minimum.

3. Monitoring of Perimeter Wall Structures

3.1. The contractor is to identify all buried services provide a schedule of conditions of all adjacent properties with photographs agreed with the CA and relevant wall surveyors prior to works commencing.

3.2. Any cracks to the fabric of the adjacent structures of perimeter retained walls are to have graduated tell tales applied prior to commencement of all demolition works, or as they are uncovered, subject to the contractor gaining approval from the respective party wall surveyors.

3.3. In accordance with the Burland Category of Damage, the category of damage shall not exceed "1 - Very Slight". This limits crack width to 1mm and tensile strain to 0.05-0.075.

3.4. The perimeter walls shall be monitored regularly for signs of movement via the following methods.

- 3.4.1. Visual inspection
- 3.4.2. Accurate survey techniques
- 3.4.3. Graduated tell tales

3.5. Movement shall be measured with the use of prism reflector targets allowing measurement of movement in all three directions using an electronic distance measuring instrument (EDM). Location of monitoring targets shall be agreed prior to commencing works and shall be recorded on survey drawings and results tabulated and presented graphically and submitted to the CA on a weekly basis.

3.6. During demolition, excavation and basement works, visual monitoring should be carried out daily in conjunction with measured monitoring in the morning and evening. Once basement works have been completed, measured monitoring to be carried out weekly whilst daily visual monitoring should be maintained.

3.7. Monitoring of movement shall have a minimum accuracy of ±1mm. Monitoring cracks shall have a minimum accuracy of ±0.2mm.

3.8. Exact monitoring positions to be agreed with the contractor/surveyor to permit a line of sight. 3-D monitoring to be undertaken weekly by an independent survey company during the main demolition and construction works until the demolition and basement works are complete. Following this, monitoring should continue on a monthly basis. During the defects/liability period, two measurements should be taken at least six months apart.

4. Trigger Levels

4.1. Monitoring to be undertaken for a suitable period prior to main excavation works commencing to enable base movement due to daily thermal effects to be established.

4.2. Readings should be taken at the same time each day to minimise the effects of temperature fluctuations.

4.3. Frequency of monitoring to be in accordance with CIRIA Guide C579.

4.4. Lateral or vertical movements and deflections of the perimeter retained party walls and adjacent structures above those due to thermal effects will be monitored based on a traffic light system to be proposed by the contractor based on the following trigger points (to be agreed with party wall surveyor):

Adjacent to Contiguous Piled Wall			
LEVEL	ALLOWABLE HORIZONTAL MOVEMENT	ALLOWABLE VERTICAL MOVEMENT	ACTIONS TO BE TAKEN
Green	Up to 13mm	Up to 7mm	Site works and frequency of monitoring can proceed as normal.
Amber	Exceeding 13mm but less than 18mm	Exceeding 7mm but less than 12mm	Monitoring frequency is increased and a meeting is to be convened to review working procedure and assumptions.
Red	Exceeding 18mm	Exceeding 12mm	All work to be immediately ceased and a meeting is to be convened to identify reasons for the exceedance of the limit and to discuss remedial actions that may be required.

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