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Appendix 6 – Monitoring Proposals

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Hampstead Green
Rowland Hill Street,
London NW3 2AB

Structural Monitoring
Proposals – Movement
(Temporary Works Review)

Job number. 213839.5
Revision: P1
Status: Information
Date: 04.01.16

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Document Control

		remarks:	Issued for Comment				
revision:	P1	date:	04.01.2016	prepared by:	J Nunns	checked by:	M Renshaw

Scope of Monitoring and limits on ground movements during demolition, excavation and construction

1. The Contractor shall provide movement monitoring at points to be agreed along the boundary of the Hampstead Green site – please refer to the relevant drawing 213839/SK56 for proposed locations. This includes points to the retained party walls to the boundary with the Rosary School building throughout their height, and to the boundary wall in the region of the adjacent Cancerkin centre (part of the royal Free Hospital). Exact locations of monitoring devices are to be agreed with the monitoring specialist and contractor to suit the nature of the works.

2. Exact methodology for movement monitoring will be to the monitoring specialist's details. They will also be responsible for installing and calibrating their devices, as well as ensuring satisfactory continuous operation to ensure accurate data logging.

3. Movement monitoring shall be completed on as follows:

    1) One month prior to any works being started to provide a base reading.
    2) On a weekly basis following commencement of demolition works.
    3) On a twice a week basis during the basement excavation (the Contractor is to complete their own checks on a daily basis during this period).
    4) On a fortnightly basis during the remainder of the basement construction (the Contractor is to complete their own checks on a weekly basis during this period).
    5) On a fortnightly basis for the remainder of the construction (ie superstructure works)
    6) On a monthly basis thereafter for a 6 month period following completion of the notifiable works.

4. The monitoring specialist will provide full data for each monitoring point in diagrammatic form. The Contractor's Structural Engineer for the project will review and interpret the data in relation with construction activities ongoing on site with the Contractor's input. All data recorded will be kept on file for the duration of the construction.

5. Cumulative movement of survey points must not exceed:

    a. Settlement
    Code amber trigger values: +/-8mm from base reading
    Code red trigger values: +/-16mm from base reading

    b. Lateral displacement
    Code amber trigger values: +/-8mm from base reading
    Code red trigger values: +/-16mm from base reading

6. Movement approaching critical values:

    Code amber trigger value:

    All interested parties, including the Adjoining Owner's Surveyor and his Engineer should be informed of any code amber triggers within 6m of the Party Wall. Any further actions are to be proposed by the Contractor as soon as possible and agreed between two of the three Surveyors and implemented by the Building Owner. Notwithstanding the Party Wall requirements, the Contractor is to appoint, and to have permanently on site, a suitably qualified Structural Engineer who will be responsible for the reviewing of the movement monitoring results at the start and end of each day and provide immediate advice, remedial works and design as necessary in the event of excessive movement being noted. The Contractor is to ensure that he has 24 hour/7 days a week access to emergency support provision

including but not limited to additional temporary props, needles, waling beams and concrete supply at the start of the excavation and prior to any likelihood of this trigger value being reached. If this value is reached the Contractor, and his Engineer, must without delay provide all interested parties with their plan to implement any emergency remedial and supporting works deemed necessary. The Contractor must be ready to carry out these works without delay if the movement continues and approaches the trigger value below.

Code red trigger value:

All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately of any code red triggers within 6m of the Party Wall. Works will stop in the affected area and be made safe using methods and equipment agreed at the above stage. The Contractor is to ensure that the movement has stopped as a result of the implemented remedial works designed and installed at this stage. The requirements of the Party Wall Act will also ensure that, two of the three Surveyors and their advising Engineers shall then enter into an addendum Award, setting out whether or not the Building Owner's works can re-commence and when, and if so agree additional precautions or modifications to the proposals prior to re-commencement.

NB:- 'Interested parties' can also include the building freeholder and the residents of the other parts of the whole building as well as their Engineers and Surveyors.

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Hampstead Green
Rowland Hill Street,
London NW3 2AB

Structural Monitoring Proposals - Vibration

Job number. 213839

Revision: P1

Status: Information

Date: 10.07.15

Document Control

		remarks:	Issued for Comment				
revision:	P1	date:	10.07.15	prepared by:	A Rice	checked by:	M Antelj

Scope of Monitoring and limits on vibrations during demolition, excavation and construction

1. The Contractor shall provide vibration monitoring at points to be agreed, either along the boundary of the Hampstead Green site or adjacent to buildings on the neighbouring site if agreement is obtained. – please refer to relevant drawings for proposed locations. Vibration should be measured outside a structure, at ground level.

2. Exact locations of monitoring devices are to be agreed with the monitoring specialist and contractor to suit the nature of the works.

3. Exact methodology for vibration monitoring will be to the monitoring specialist's details. They will also be responsible for installing and calibrating their devices, as well as ensuring satisfactory continuous operation to ensure accurate data logging.

4. Vibration monitoring shall be completed on as follows:

   1) One month prior to any works being started to provide a base reading.
   2) On a daily basis following commencement of demolition works.
   3) At the start and end of every shift during the basement excavation and until the basement slab, lower ground floor slab and lining wall have been cast and gained 28 day strength.
   4) On a weekly basis during the remainder of the construction.
   3) On a monthly basis thereafter for a 6 month period following completion of the notifiable works.

5. The monitoring specialist will provide full data for each monitoring point in diagrammatic form. The Contractor's Structural Engineer for the project will review and interpret the data in relation with construction activities ongoing on site with the Contractor's input. All data recorded will be kept on file for the duration of the construction.

6. Vibration monitoring devices will have trigger values entered as alarms. Once the trigger level is reached the device will alert the Contractor and appropriate action can be taken. The method of this alert will be agreed with the monitoring specialist and the Contractor (e.g. Alert by Text message, Site Beacon etc.).

7. Recorded levels of Peak Particle Velocity (PPV) at survey points should not exceed:

   a. Intermittent vibration
      Code amber trigger value: 10 mm/s
      Code red trigger value: 20 mm/s

   b. Continuous vibration
      Code amber trigger value: 5 mm/s
      Code red trigger value: 15 mm/s

8. These trigger values have been derived from the available British Standards, notably BS 7385: *Evaluation and Measurement for Vibration in Buildings*, and BS 5528: *Code of Practice for Noise and Vibration Control on Construction and Open Sites*. The values are given are considered to restrict any effects on nearby buildings to cosmetic damage only i.e. hairline cracking on drywall, or growth of existing cracks in plaster, and hairline cracks in mortar joints of block/brick construction. This is in line with the general requirement of the site to restrict damage to neighbouring properties to category 1 ('very slight') on the Burland scale.

9. Any requirement for tighter vibration controls due to the nature of the occupancy or equipment contained in adjacent buildings should be provided by the adjoining owners and agreed as necessary.

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10. Movement approaching critical values:

    Code amber trigger value:

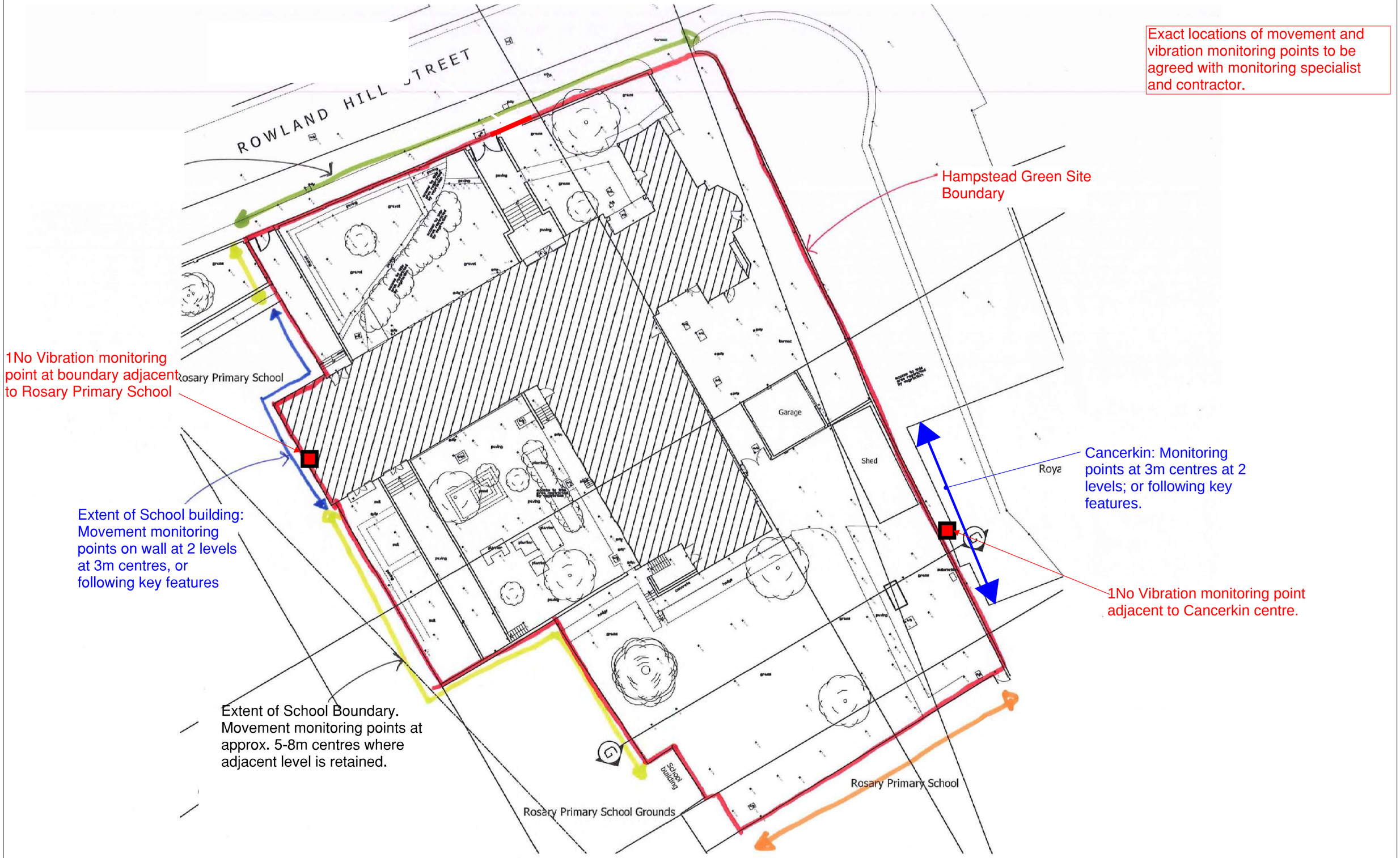
    All interested parties, including the Adjoining Owner's Surveyor and his Engineer should be informed and further actions immediately agreed between two of the three Surveyors and implemented by the Building Owner. Notwithstanding the Party Wall requirements, the Contractor is to appoint, and to have permanently on site, a suitably qualified Structural Engineer who will be responsible for the reviewing of the vibration monitoring results at the start and end of each day and provide immediate advice, remedial works and design as necessary, and a revised method of works in the event of excessive vibration being noted. The Contractor is to ensure that he has 24 hour/7 days a week access to emergency support provision prior to any likelihood of this trigger value being reached. If this value is reached the Contractor, and his Engineer, must without delay provide all interested parties with their plan to implement any emergency remedial and supporting works deemed necessary. The Contractor must be ready to carry out these works without delay if the movement continues and approaches the trigger value below.

    Code red trigger value:

    All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately. Works will stop and be made safe using methods and equipment agreed at the above stage. The Contractor is to ensure that the vibration has been limited as a result of the implemented remedial works designed and installed at this stage. The requirements of the Party Wall Act will also ensure that, two of the three Surveyors and their advising Engineers shall then enter into an addendum Award, setting out whether or not the Building Owner's works can re-commence and when, and if so agree additional precautions or modifications to the proposals prior to re-commencement.

NB:- 'Interested parties' can also include the building freeholder and the residents of the other parts of the whole building as well as their Engineers and Surveyors.

Exact locations of movement and vibration monitoring points to be agreed with monitoring specialist and contractor.



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

Do not scale from this drawing.

rev	date	by	chk	description
B	16.07.15	ARi	MA	UPDATED TO REVISED SCOPE
A	14.07.15	ARi	MA	CANCERKIN ADDED

drawing title
Demolition and Proposed Site Levels

scale (s)	date	drawn
nts	Jun 14	ARi

drawing status
Preliminary

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project
Hampstead Green, Rowland Hill Street, Hampstead, London, NW3 2AB

job no	drawing no	revision
213839	SK/56	B

Appendix 7 – Certification

CDM Residual Risks for Basement Works

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 LOAD BEARING BLOCKWORK
- NEW LOAD BEARING BRICKWORK
- NEW REINFORCED CONCRETE
- NEW MASS CONCRETE
- PADSTONES
- LOAD BEARING STUDWORK
- NON LOAD BEARING PARTY WALLS
- LOAD BEARING STRUCTURE BELOW
- EXISTING STRUCTURE TO BE REMOVED
- NEW STEEL BEAMS
- NEW LINTELS OVER OPENINGS
- INSITU CONCRETE BALCONY (180 THK U.N.O), THERMALLY BROKEN FROM MAIN SLAB

1. PILE DESIGN TO BE CARRIED OUT BY PILING CONTRACTOR INCLUDING CONFIRMATION OF PILE DIAMETER
2. FORMATION LEVELS TO BE DETERMINED BY PILING CONTRACTOR TO SUIT CUT OFF LEVELS SHOWN AND PREFERRED CONSTRUCTION SEQUENCE
3. FOR PILE LOADS REFER TO EW DRG. 213839/71

Contractor to ensure spoil is removed from site regularly and not excessively stored to avoid surcharging adjacent retaining structures.

The Contractor is to follow the Risk Mitigation Measures outlined within 1st Line Defence's Detailed Unexploded Ordance (UXO) Threat Assessment.

Approximate location of existing well - exact location TBC on site. Works to be confirmed with the permanent works engineer.

Piled retaining walls to be propped in accordance with temporary works design until they are supported by the permanent structure.

Underpinning works to be coordinated with the piling works to mitigate the risks of concurrent working e.g. ensuring piling rigs do not surcharge the local underpin excavations and ensuring the local excavations are appropriately guarded.

Underpinning works to be completed in accordance with agreed method statement to ensure the stability of adajacent structures.

BLOCK PLAN

NOT FOR CONSTRUCTION

rev	date	by	chk	description
T2	18.12.15	MJS	AR	Re-Issued for Tender
T1	30.06.15	MJS	AR	Issued for Tender

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project
Hampstead Green, Rowland Hill Street, Hampstead, London, NW3 2AB

drawing title
Proposed Pile Layout

scale (s)	date	drawn
1:000@A1; 1:000@A3	April 2015	M JS

drawing status
Tender

job no	level	originator & drg no.	revision
213839	B03	S/70	T2

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Hampstead Green
Rowland Hill Street,
London
NW3 2AB

Temporary Works

Structural Calculations

Job number. 213839
Revision: C1
Status: Construction
Date: January 16

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Document Control

		remarks:	construction				
revision:	P1	prepared by:	JNU	checked by:	MR	approved by:	MR
date:	[date]	signature:		signature:		signature:	

Design Aids

Design Codes

BS 5268: Part 2: 2002	Structural use of timber. Part 2: Code of practice for permissible stress design, materials & workmanship
BS 5628: Part 1: 2005	Code of practise for the use of masonry. Part 1: Structural use of unreinforced masonry
BS 5950: Part 1: 2000	Structural use of steelwork. Part 1: Code of practice for rolled sections and welded sections
BS 6399: Part 1: 1996	Loading for buildings. Part 1: Code of practice for dead & imposed loads.
BS 8110: Part 1: 1997	Structural use of concrete. Part 1: Code of practice for design and construction.

Project name: HAMPSTEAD GREEN

Project number: 213839 | Sheet: | Revision:

Date: DEC '15 | Engineer: SNa | Checked:

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TEMPORARY CASE PILE DESIGN & UNDERPIN:

- PLEASE REFER TO DRAWINGS OVER LEAF FOR DETAILS ON LEVELS

→ DESIGN PARAMETERS

- SOIL PARAMETERS TAKEN FROM SITE INVESTIGATION CARRIED OUT BY CGL

ANGLE OF INTERNAL FRICTION : $\Phi = 28°$

SOIL DENSITY : $\gamma_s = 20\ kN/m^3$

WATER DENSITY : $\gamma_w = 10 kN/m^3$

SURCHARGE PRESSURE (ROAD) : $S_1 = 10\ kN/m^2$

SURCHARGE PRESSURE (STANDARD) : $S_1 = 5\ kN/m^2$

- WORST CASE PARAMETERS TAKEN FROM SI USE FOR DESIGN IN ALL WORKS

$K_o = 1 - \sin\phi = 0.53$

$K_a = \frac{1-\sin\phi}{1+\sin\phi} = 0.36$

$K_p = \frac{1+\sin\phi}{1-\sin\phi} = 2.77$

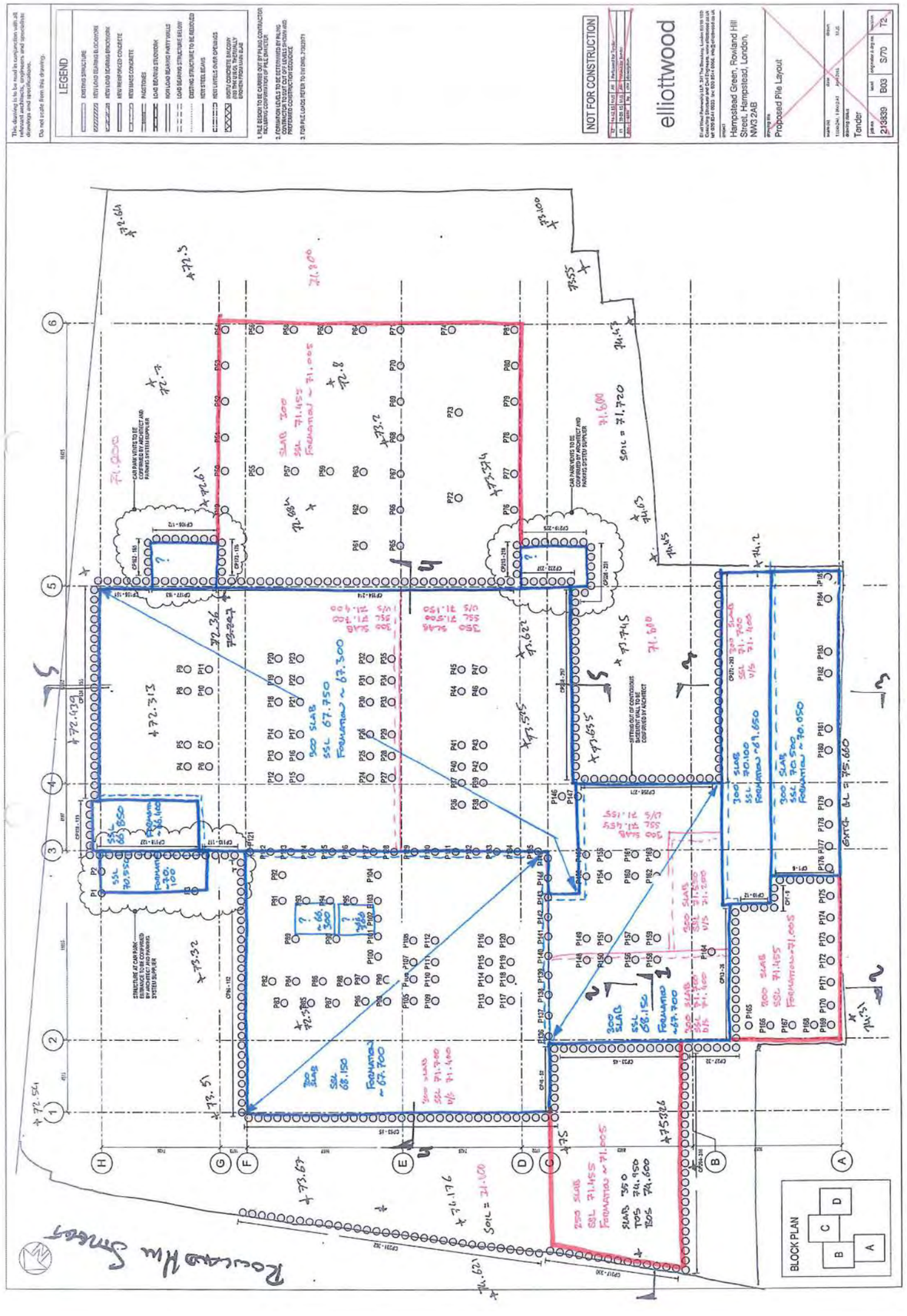
$f_{ck} = 32\ N/mm^2$

$f_{yk} = 500\ N/mm^2$

FACTORS

SOIL = 1.35

SURCHARGE = 1.5



Project name: HAMPSTEAD GREEN

Project number: 213839

Sheet:

Revision:

Date: DEC '15

Engineer: JNu

Checked:

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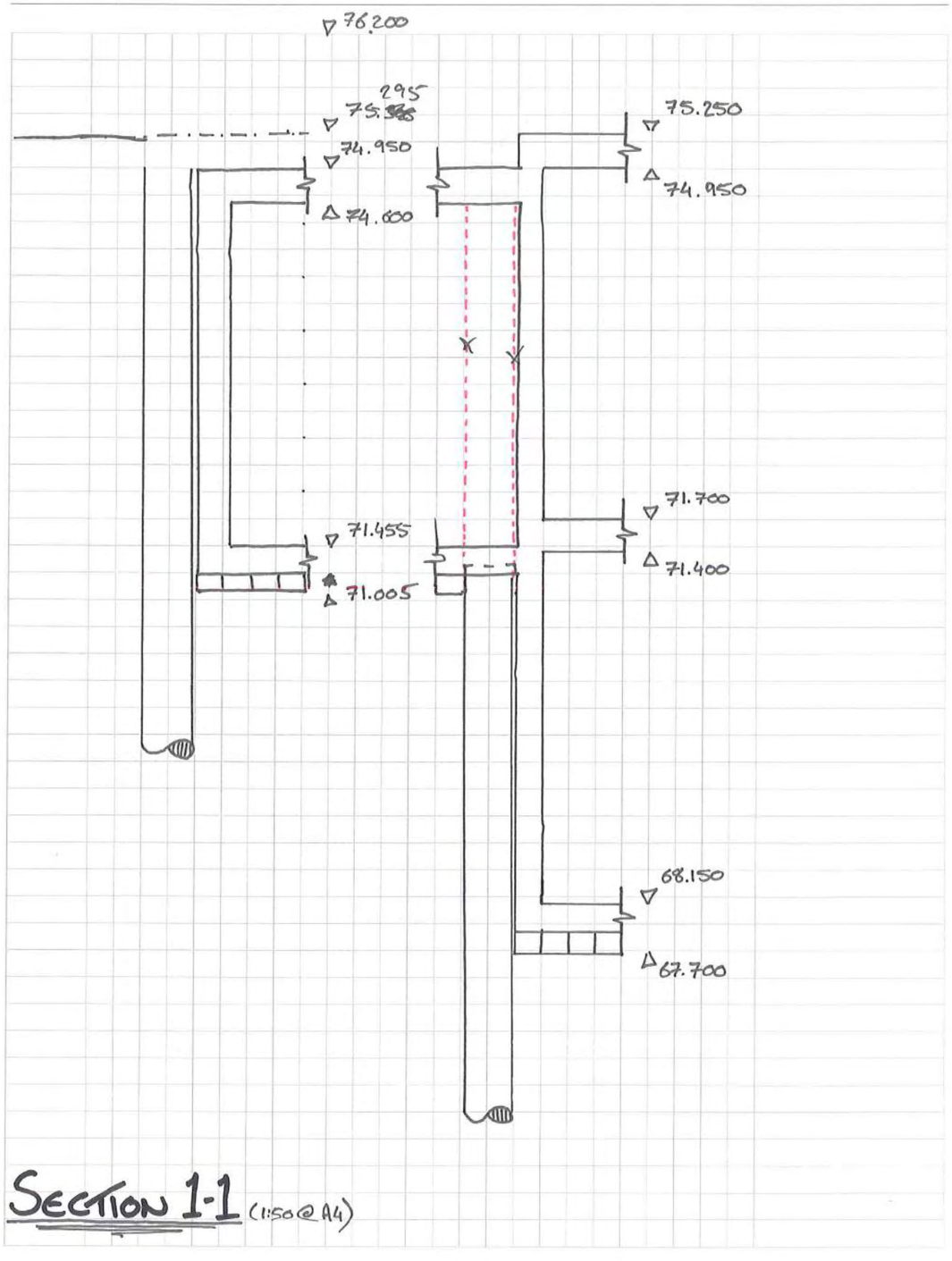

SECTION 1-1 (1:50@A4)

Project name: HAMPSTEAD GREEN

Project number: 213839

Sheet:

Revision:

Date: DEC'15

Engineer: JNu

Checked:

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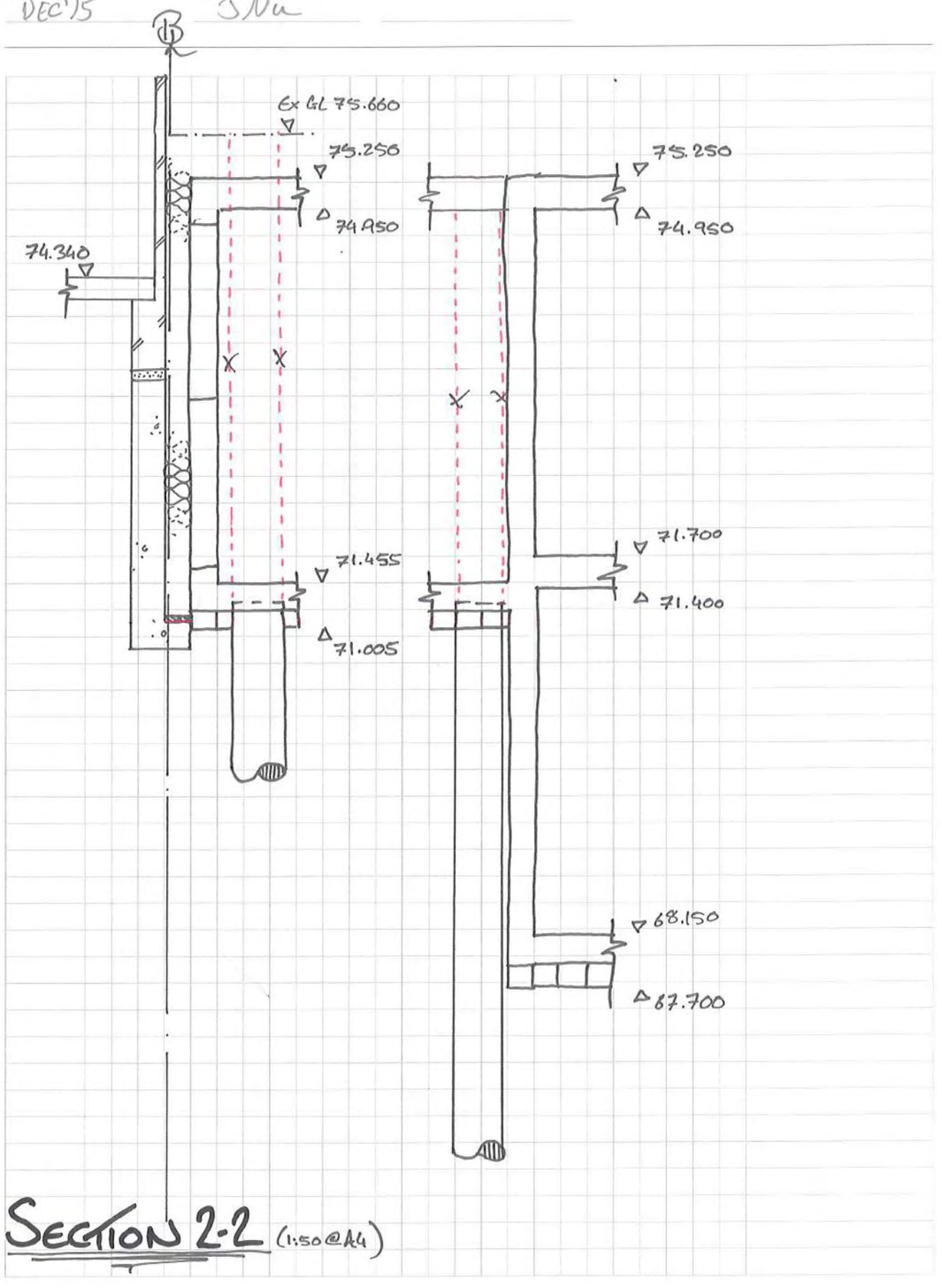

SECTION 2-2 (1:50@A4)

Project name: HAMPSTEAD GREEN

Project number: 213039 | Sheet: | Revision:

Date: DEC'15 | Engineer: JNu | Checked:

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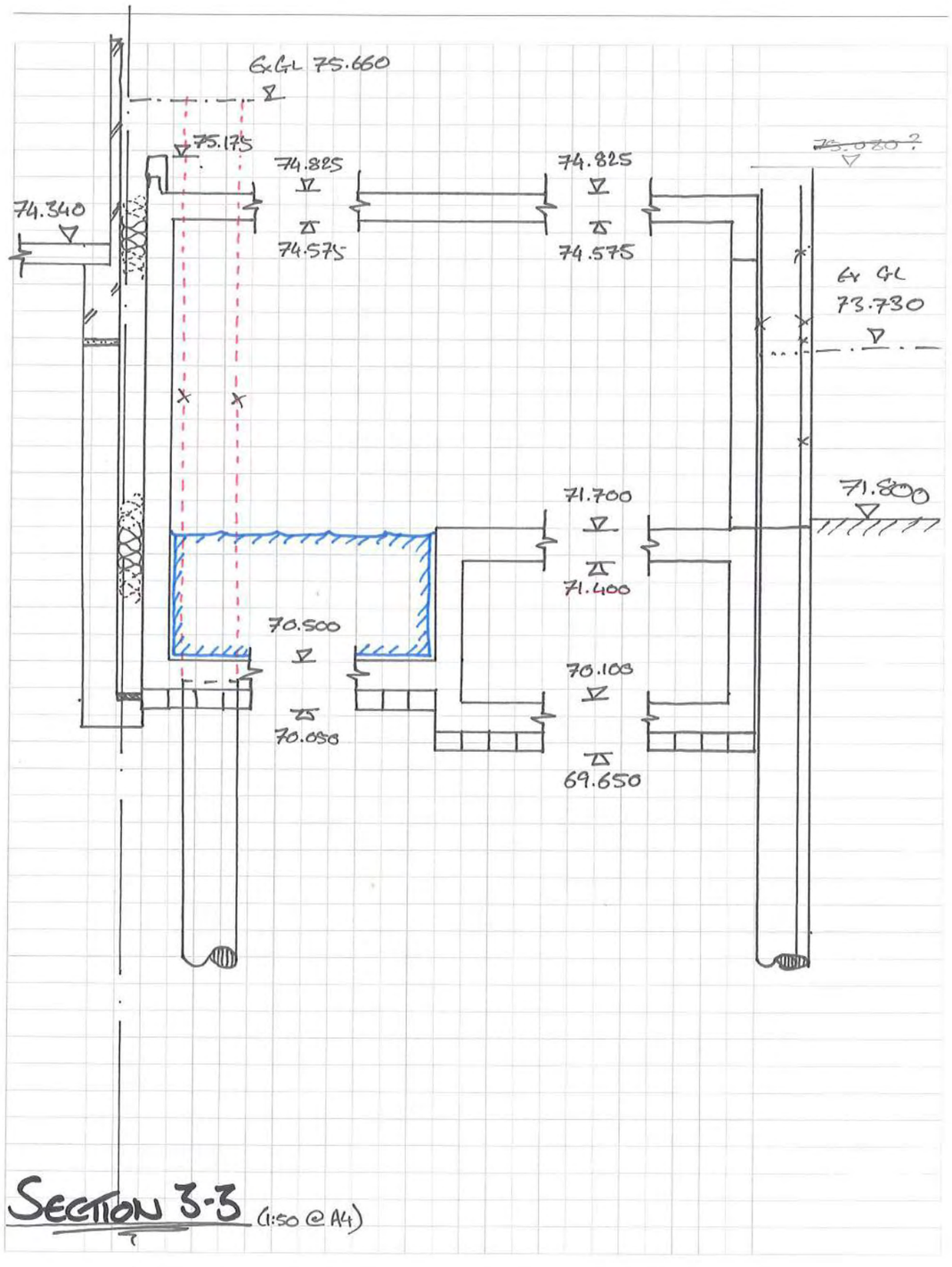

SECTION 3-3 (1:50 @ A4)

Project name: HAMPSTEAD GREEN

Project number: 213839 | Sheet: | Revision:

Date: DEC'15 | Engineer: JNu | Checked:

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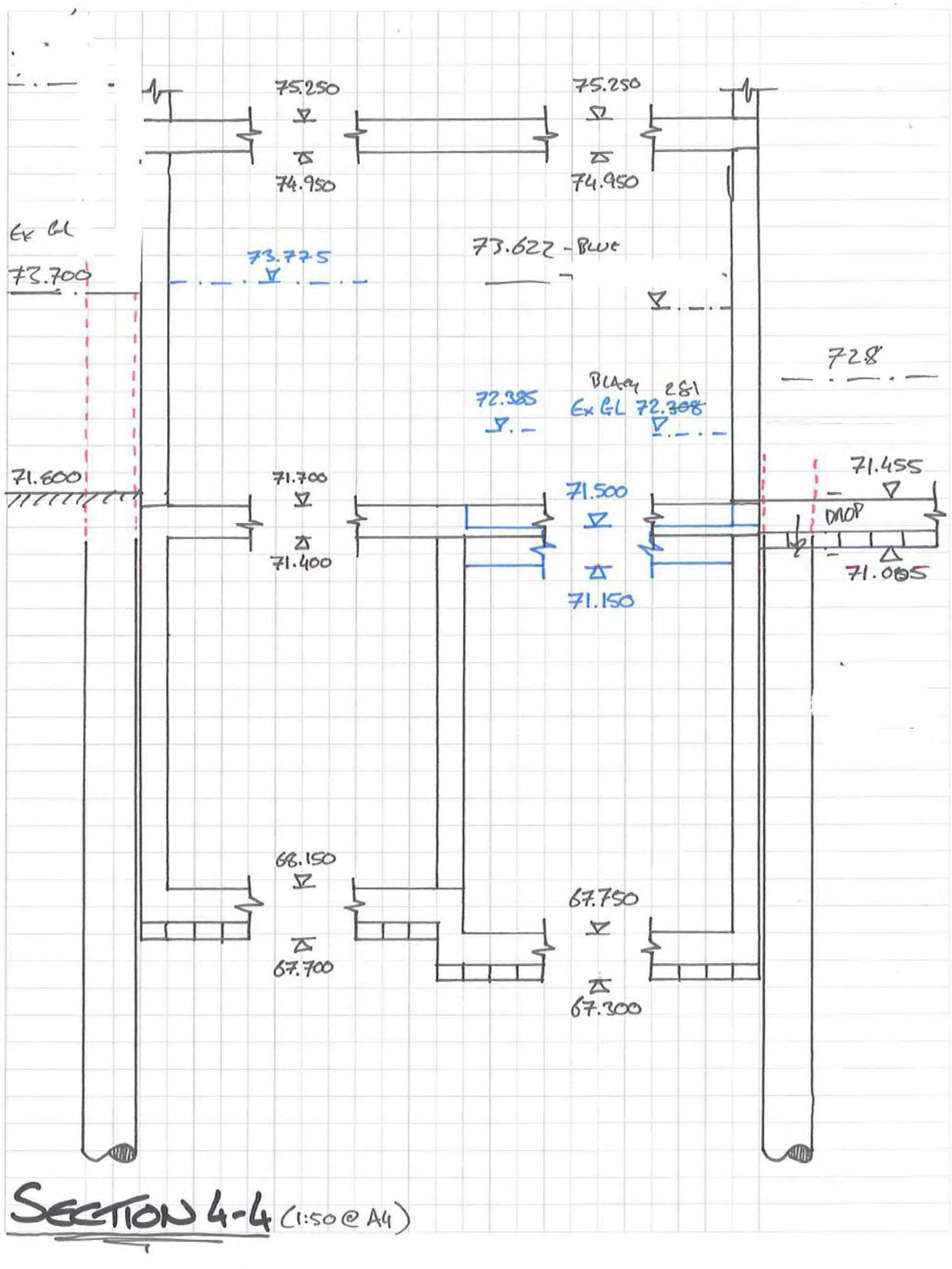

SECTION 4-4 (1:50 @ A4)

Project name: HAMPSTEAD GREEN

Project number: 213839

Sheet:

Revision:

Date: DEC' 15

Engineer: JNu

Checked:

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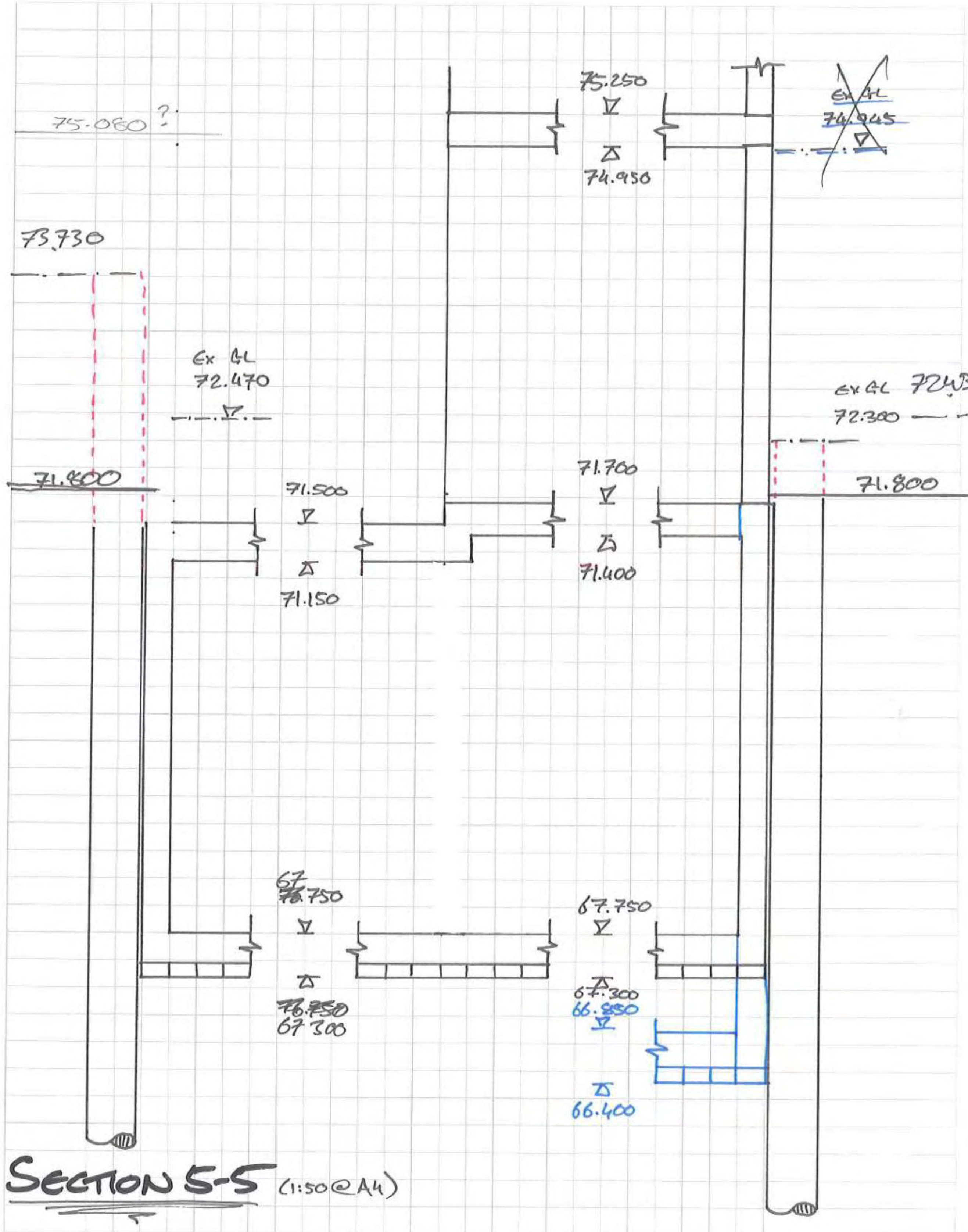
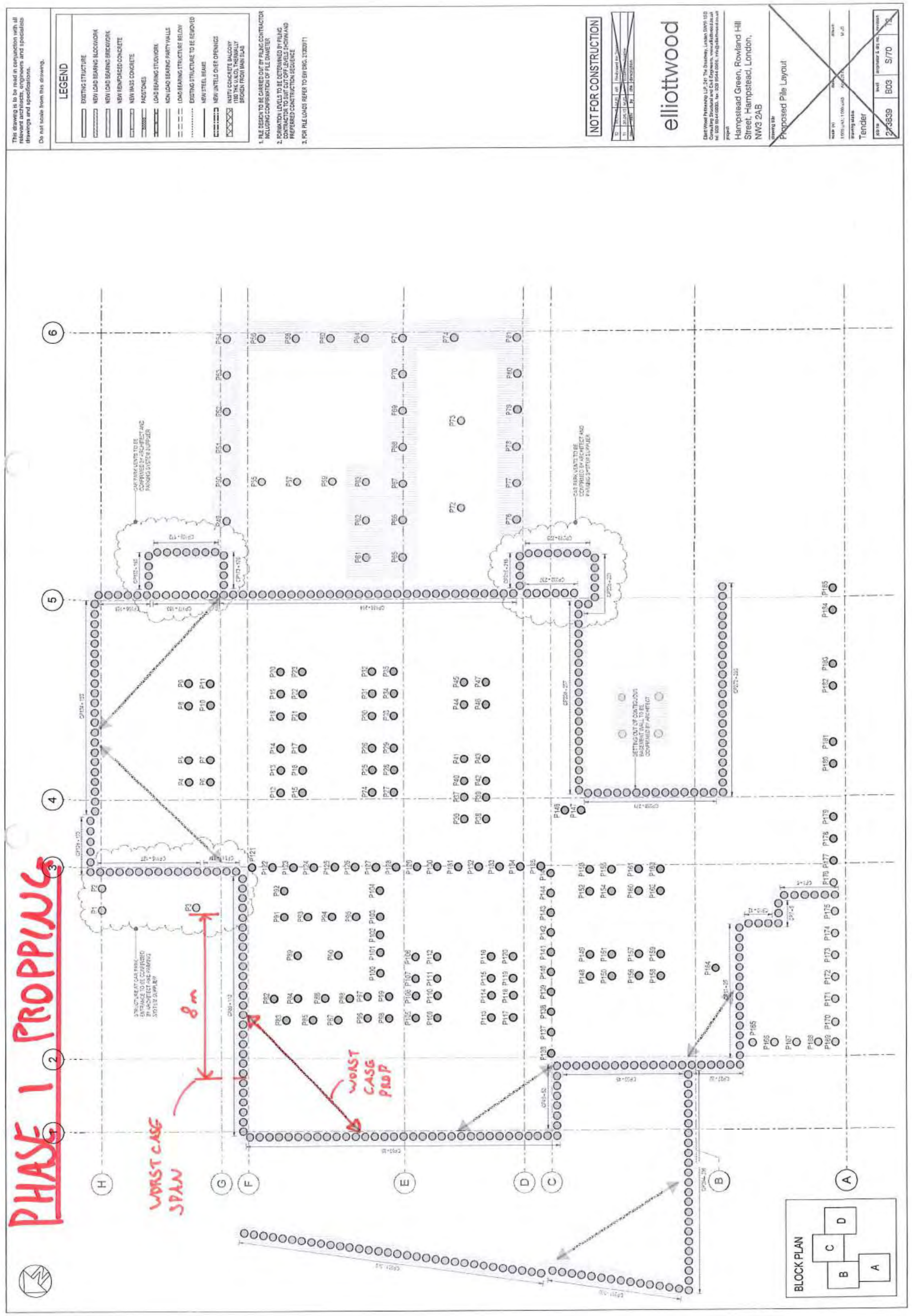


SECTION 5-5 (1:50@A4)



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(1) CHECK OF PILES, CAPPING BEAM & PROPS IN TEMPORARY CASE:

- THE WORST CASE SPAN WILL BE ANALYSED WITH SECTION SIZES FOR CAPPING BEAM AND PROPS APPLIED THROUGHOUT.

- THE PILE DEFLECTION HAS BEEN LIMITED TO $\frac{L}{200}$ TO PREVENT EXCESSIVE MOVEMENT BEFORE PROPPING.

- ALL LATERAL LOADS APPLIED ARE CONSERVATIVE AND HAVE BEEN FACTORED IN LINE WITH EUROCODES

- THE CAPPING BEAMS AND WHALING BEAMS ALLOW THE PILES TO ACT AS PROPPED CANTILEVERS. THIS ALLOWS A REACTION TO BE TAKEN FOR THE DESIGN.

Project name: HAMPSTEAD GREEN
Project number: 213839 Sheet: Revision:
Date: DEC' 15 Engineer: SNU Checked:

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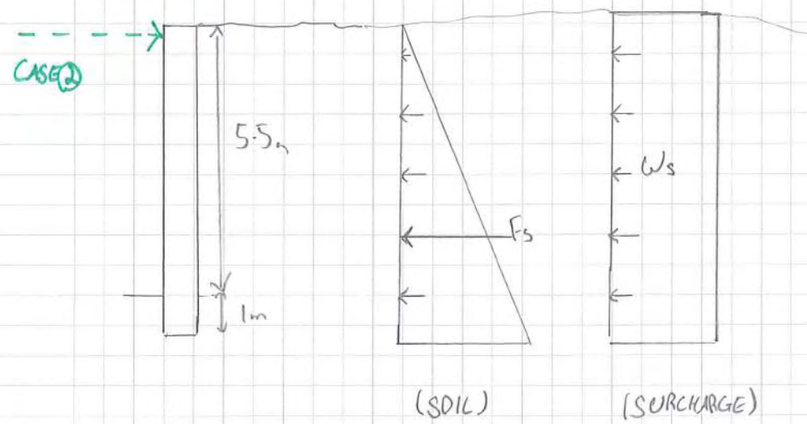
LATERAL FORCES ON PILES:



$k_a = 0.37$
$k_o = 0.53$
$\gamma_{soil} = 28$

$F_s = k_a h^2 \gamma_s \frac{1}{2} = 037 \times 6.5^2 \times 20 \times 0.5$
$= 152.53\ kN$ (SLS)

$W_s = \frac{1}{2} \times h \times S_p = 0.5 \times 6.5 \times 5 = 16.25\ kN/m$ (SLS)

PER PILE: $F_s = 50.8\ kN$ $W_s = 5.41\ kN/m$

- VALUES HAVE BEEN IN PUT INTO TEDDS, PILE IS MODDELLED AS AS 450mm DIA CANTILEVERING COLUMN TO ENSURE HORIZONTAL DEFLECTION IS MINIMISED. SEE TEDDS OUTPUT

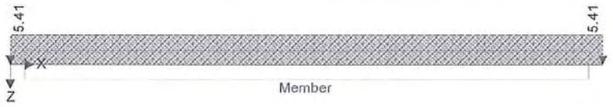
ANALYSIS

Tedds calculation version 1.0.10

Loading

Permanent - Loading

Imposed - Loading



Results

Total deflection

LoadCombination1 (Strength) - Total deflection @ 10x

Member results

Load combination: LoadCombination1 (Strength)

Member	Deflection				Axial deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)	Pos (m)	Max (mm)	Pos (m)	Min (mm)
Member	6.6	42.6	0	0	0	0	0	0

SLS (Service) - Total deflection @ 10x

Member results

Load combination: SLS (Service)

Member	Deflection				Axial deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)	Pos (m)	Max (mm)	Pos (m)	Min (mm)
Member	6.6	29.4	0	0	0	0	0	0

(Strength) - Total deflection @ 10x

Member results

Load combination: (Strength)

Member	Deflection				Axial deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)	Pos (m)	Max (mm)	Pos (m)	Min (mm)
Member	0	0	6.6	0	0	0	0	0

Node deflections

Load combination: LoadCombination1 (Strength)

Node	Deflection		Rotation	Co-ordinate system
	X (mm)	Z (mm)	(°)	
1	0	0	0	
2	0	42.6	0.46445	

Load combination: SLS (Service)

Node	Deflection		Rotation	Co-ordinate system
	X (mm)	Z (mm)	(°)	
1	0	0	0	
2	0	29.4	0.31992	

TEKLA Tedds Elliott Wood Partnership 241 The Broadway Wimbledon SW19 1SD	Project Hampstead Green			Job no. 213839	
	Calcs for Piles @ 1			Start page no./Revision 3	
	Calcs by JNu	Calcs date 06/01/2016	Checked by	Checked date	Approved by	Approved date

Load combination: (Strength)

Node	Deflection		Rotation	Co-ordinate system
	X (mm)	Z (mm)	(°)	
1	0	0	0	
2	0	0	0	

Forces

Service combinations - Deflection envelope (mm)

Member results

Envelope - Service combinations

Member	Deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)
Member	6.6	29.4	0	0

$\delta_{lim} = \frac{6600}{200} = 33mm > 29mm \therefore OK$

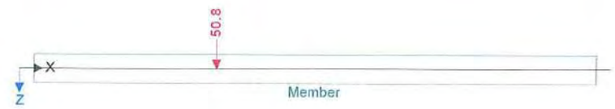
TEKLA Tedds Elliott Wood Partnership 241 The Broadway Wimbledon SW19 1SD	Project Hampstead Green			Job no. 213839	
	Calcs for Reaction for Capping Beam			Start page no./Revision 1	
	Calcs by JNu	Calcs date 06/01/2016	Checked by	Checked date	Approved by	Approved date

ANALYSIS

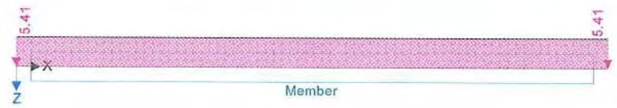
Tedds calculation version 1.0.10

Loading

Permanent - Loading



Imposed - Loading



Results

Reactions

LoadCombination1 (Strength) - Local node reactions
Node: (Horiz (kN), Vert (kN), Mom (kNm))

Load combination: LoadCombination1 (Strength)

Node	Force		Moment
	Fx (kN)	Fz (kN)	My (kNm)
1	0	91.8	-127.6
2	0	30.3	0

WHALING BEAM REACTION

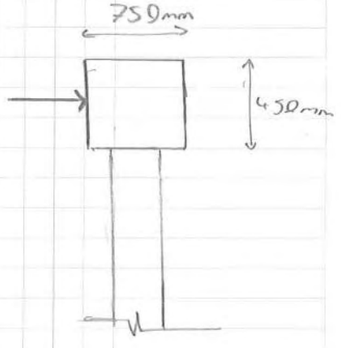
CAPPING BEAM REACTION

→ CAPPING BEAM DESIGN

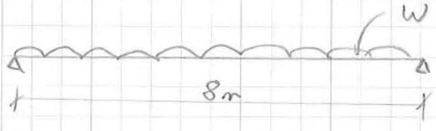
- CAPPING BEAM DESIGNED IS THE WORST CASE SPAN @ 8m. THE PILE MODELLED IN TEDDS HAS BEEN PROPPED AT THE TOP TO GIVE A REACTION WITH WHICH THE CAPPING BEAM CAN BE DESIGNED TO.

REACTION AT TOP = 33.1 kN

SINCE THIS REACTION IS PER PILE THE UDL ON THE UDC ACTING ALONG THE 8m SPAN IS ASSUMED AS 33.1 kN/m



→ DESIGN VALUES

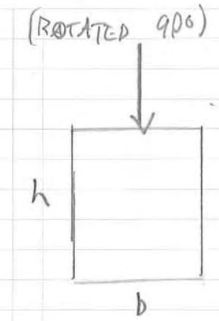


$w = 33.1\ kN/m$

$M_{max} = \frac{33.1 \times 8^2}{8} = 264.8\ kNm$

$V_{Ed} = \frac{33.1 \times 8}{2} = 132.4\ kN$

→ FLEXURAL REINFORCEMENT DESIGN



effective depth $d = 750 - 30_{cover} - 20_{bars}$

$= 700mm$

$K = \frac{M}{bh^2 f_{ck}} = \frac{264 \times 10^6}{450 \times 750^2 \times 32}$

$= 0.033$

∴ NO COMPRESSION REINF REQUIRED

$z = \frac{d}{2}\left[1 + \sqrt{1 - 1.133 \times k}\right]$

$= 727.7\ mm < 0.95d = 712.5mm$

∴ TAKE z AS 712.5 mm

AREA OF STEEL REQUIRED $A_s = \frac{264 \times 10^6}{0.87 \times 500 \times 712.5}$

$= 854.4\ mm^2$

∴ PROVIDE 4H20 BARS

$A_{s,prov} = 1257\ mm^2$

→ SHEAR REINFORCEMENT

$A_{s,prov} = 1257 mm^2$

$v_{Ed} = \frac{V_{Ed}}{bd} = \frac{132.4 \times 10^3}{450 \times 700} = 0.42$

v_{rd} $\rho_l = \frac{A_s}{(bd)} = \frac{1257}{450 \times 700} = 0.0039$

$d = 700 mm$
$\rho_l = 0.39\%$

INTERPOLATE

$\rho_l = A_s/(bd)$	Effective depth, d (mm)										
	≤200	225	250	275	300	350	400	450	500	600	750
0.25%	0.54	0.52	0.50	0.48	0.47	0.45	0.43	0.41	0.40	0.38	0.36
0.50%	0.59	0.57	0.56	0.55	0.54	0.52	0.51	0.49	0.48	0.47	0.45
0.75%	0.68	0.66	0.64	0.63	0.62	0.59	0.58	0.56	0.55	0.53	0.51
1.00%	0.75	0.72	0.71	0.69	0.68	0.65	0.64	0.62	0.61	0.59	0.57
1.25%	0.80	0.78	0.76	0.74	0.73	0.71	0.69	0.67	0.66	0.63	0.61
1.50%	0.85	0.83	0.81	0.79	0.78	0.75	0.73	0.71	0.70	0.67	0.65
1.75%	0.90	0.87	0.85	0.83	0.82	0.79	0.77	0.75	0.73	0.71	0.68
≥2.00%	0.94	0.91	0.89	0.87	0.85	0.82	0.80	0.78	0.77	0.74	0.71
k	2.000	1.943	1.894	1.853	1.816	1.756	1.707	1.667	1.632	1.577	1.516

Table derived from: $v_{Rd,c} = 0.12\, k\, (100 \rho_l f_{ck})^{1/3} \geq 0.035\, k^{1.5} f_{ck}^{0.5}$
where $k = 1 + \sqrt{(200/d)} \leq 2$ and $\rho_l = A_s/(bd) \leq 0.02$

Note
1 This table has been prepared for $f_{ck} = 30$.
2 Where ρ_l exceeds 0.40% the following factors may be used.

f_{ck}	25	28	32	35	40	45	50
Factor	0.94	0.98	1.02	1.05	1.10	1.14	1.19

- INTERPOLATE BETWEEN 0.25% & 0.5%

$v_{rd} = 0.43$

SINCE $d = 700$

$v_{rd} > v_{Ed}$

∴ NO SHEAR REINFORCEMENT REQUIRED

Project name: HAMPSTEAD GREEN
Project number: 213839 Sheet: Revision:
Date: DEC'15 Engineer: SNu Checked:
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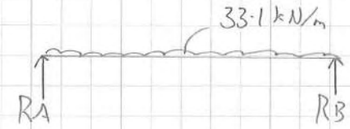
→ DESIGN FOR PROPS

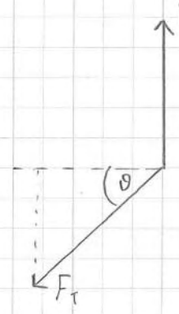
- REACTION AT END SPAN OF THE CAPPING BEAM WILL GIVE AXIAL FORCES REQUIRED FOR DESIGN OF PROPS.



$R_A = R_B$

$R_A = \frac{33.1 \times 8}{2} = 132.4 kN$

RAKING PROP ACTS AT 45° ∴ RESOLVE FORCES



$\theta = 45$

$132.4 = F_T \sin 45$

$F_T = 187.2 kN$

PROPS DESIGNED FOR MAX AXIAL FORCE OF 190kN

SPECIFY 203UC46 $L_e = 10m$ $N_{b,y,Rd} = 726 kN > 190$
$\therefore$ OK

OR MEGASHOR PROPS (LONGEST SPAN = 12m)

SEE OVERLEAF

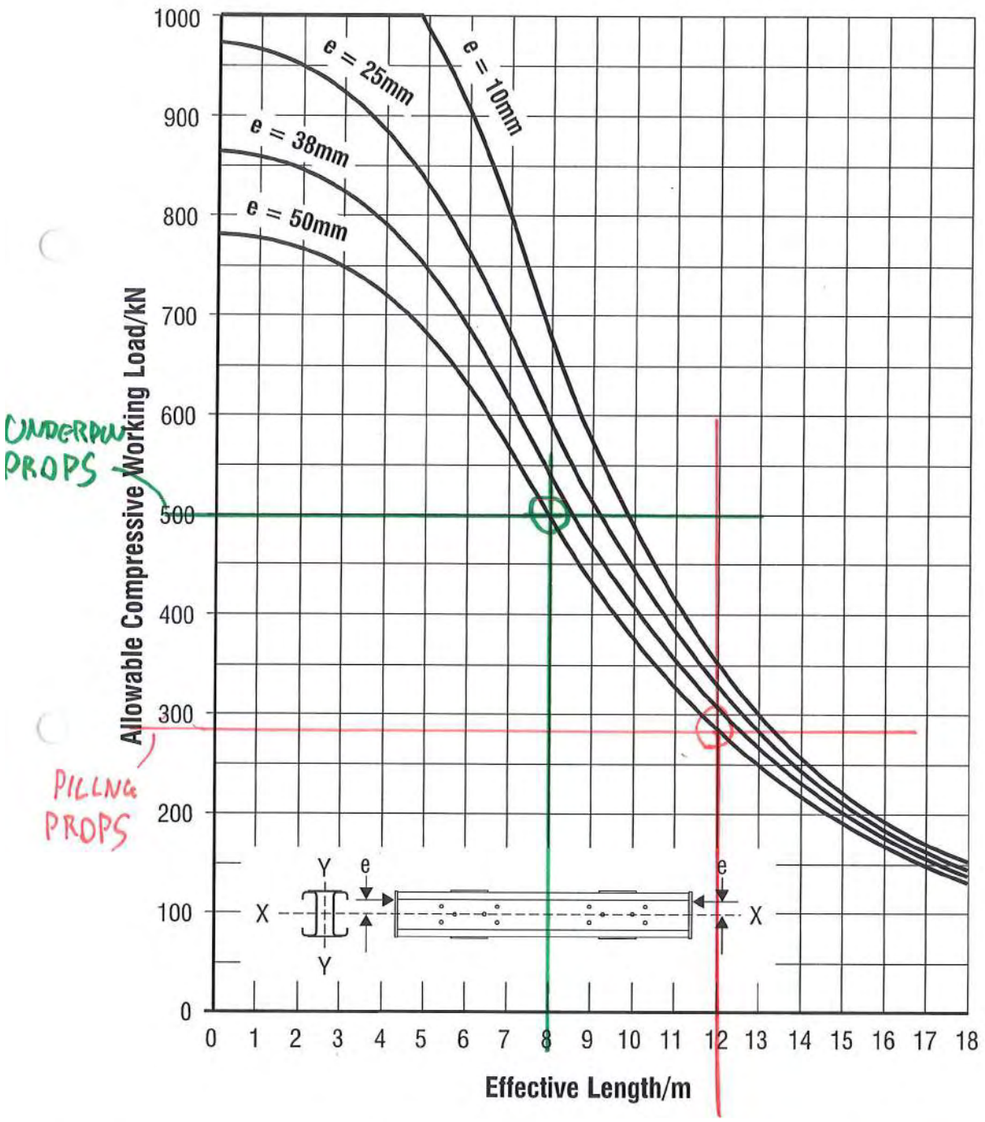
MEGASHOR

1000kN SUPPORT SYSTEM

R·M·D KWIKFORM ENGINEERING

TECHNICAL DATA

1.1.6.3. Horizontal Megashor Axial AWL XX Axis (Web vertical plane)



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COMPONENTS			

Project name: HUMPSTEAD GREEN
Project number: 213839 Sheet: Revision:
Date: DEC'15 Engineer: JW Checked:

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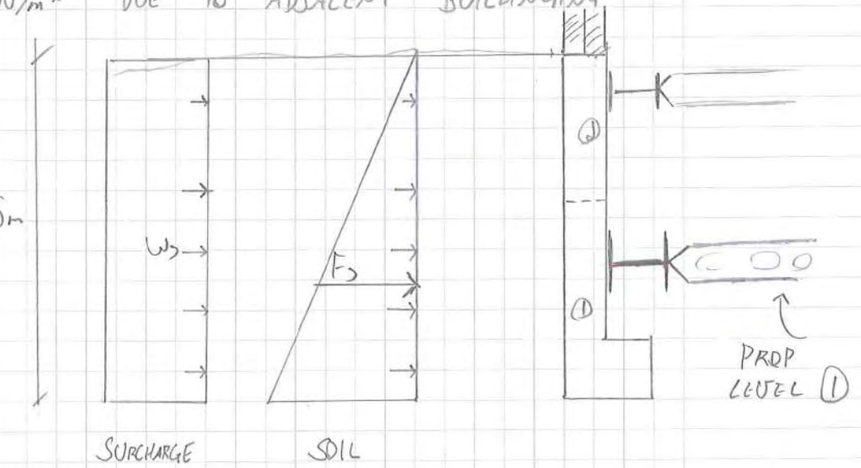
(2) CHECK OF UNDERPINS, PROPS & WHALING BEAMS IN TEMPORARY CASE:

-SAME METHOD CARRIED OUT FOR CHECK OF UNDERPINNING IN TEMPORARY CASE

→ SURCHARGE PRESSURE TAKEN AS AHIGHER 10 kN/m² DUE TO ADJACENT BUILDINGING

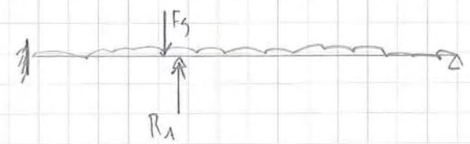


-WILL CHECK REACTIONS FOR FIRST LEVEL PROPPING AS THE WORST CASE REACTIONS WILL BE AT THIS LEVEL.

UNDERPINS WILL BE CAST IN A 2 PHASE SEQUENCE

$F_s = k_a h^2 \gamma_s \frac{1}{2} = 0.36 \times 5^2 \times 20 \times 0.5 = 90.25\ kN$

$W_s = 10 \times 5 \times \frac{1}{2} = 25\ kN/m$



$R_A = 170.9kN$ (SEE PDDS)