

## 14 Netherhall Gardens

Below Ground Works

Ref No: **23959**

Date: December 2014





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## 1.0 Summary

Fluid Structures are the Structural Engineer for the 14 Netherhall Gardens Project.

14 Netherhall Gardens consists of two structures which will be joined by a common basement. The first structure (block 01) is an existing townhouse period property which will be internally refurbished. Currently, the timber floors and roof are supported on masonry walls. The external walls and façade will be retained whilst the internal structure will be replaced by a steel frame with concrete floor slabs on metal trough decking.

The second structure (block 02) will be a new four storey apartment building. The main structural frame of the building is reinforced concrete columns supporting two way spanning RC flat slabs. The exterior wall will be of cavity construction with concrete blockwork forming the internal leaf and a brickwork outer leaf. The roof shall be supported by steel framework. The RC columns supporting the 1<sup>st</sup> to 3<sup>rd</sup> floors are not at the same plan location as the columns supporting the ground floor slab, therefore the ground floor slab has been designed to transfer loads from the superstructure to RC columns in the basement.

A new basement will be formed beneath both structures. The basement beneath the new four storey block will include a contiguous piled wall around the perimeter of the basement.

Due to the presence of a nearby network rail tunnel, the new basement under the existing building will be constructed by underpinning the existing walls in a traditional “hit and miss” sequence. Internal columns will be supported on pad foundations located under the new basement slab. The existing internal walls will be re-supported using a system of needles and beams bearing onto the new columns. The existing party/boundary walls are also to be retained and will be underpinned prior to the construction of the RC retaining wall and contiguous pile wall.

The new apartment block shall bear onto piled foundations, which shall be located to adequately spread the load of the structure being carried by the columns onto a 600mm thick basement transfer slab. The existing building shall have a ground bearing basement slab with pad footings provided under the load bearing walls and columns.

Any piles that could potentially increase the load on the network rail tunnel (allowing for a 45° cone of influence from the tunnel roof) will be sleeved to ensure there shall be no increase in the load on the tunnel due to the piled foundations.

There shall be vehicular access to the basement via a ramp.

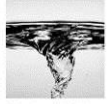
The works are summarised as follows:

- Demolition of existing building on the site of block 02.
- Removal of the non-structural interior of block 01.
- Underpinning and temporary supporting of existing walls.
- Piling, excavation and construction of the basement.
- Floor by floor construction of the replacement steel frame and composite decking in block 01.
- Floor by floor construction of the RC frame and RC slabs of block 02.
- Refurbishment / replacement of the roof in Block 01 and construction of the steel frame roof in block 02.
- Other works including the facades, ramp, retaining walls, underpinning party walls etc.



## 2.0 Outline Construction Sequence

- 1) Install Underpinning in 'hit and miss' sequence.
- 2) Remove floorboards and joists to ground floor level and install needles and beams each side of walls to allow walls to be supported by beams and columns. Install temporary works where required to allow installation and support beams and needles with temporary works to suit step 3 below.
- 3) Remove hydraulic lift and equipment and demolish existing liftshaft from top down, providing temporary support where required at each level.
- 4) Install internal basement columns, pad foundations and liftshaft / pit. Temporarily prop locally as required. Note that pad foundations will be incorporated into basement slab so starter bars will need to be left exposed.
- 5) Connect beams and needles to columns and underpinning and jack loads onto beams.
- 6) Once jacking is complete excavate to form basement and complete basement slab.
- 7) Install remaining ground floor beams and decking and pour ground floor slab.
- 8) Erect temporary works from ground floor to allow new first floor beams to be installed.
- 9) Locally remove sections of first floor to allow installation of new first floor beams and padstones along with perimeter angles.
- 10) Once new beams are installed and tied to the walls, remove existing timber floor and install metal deck and pour first floor slab.
- 11) Once the first floor slab has cured, install temporary works to allow access to second floor and locally remove sections of second floor to allow installation of second floor beams.
- 12) Install Second floor beams and padstones.
- 13) Once the beams are installed and tied to the walls, remove existing timber floor and install metal deck and pour floor slab.
- 14) Erect external scaffold and strip existing roof where required.
- 15) Once floor slab has cured, install temporary works to allow access for the third floor steelwork installation.
- 16) Install third floor steel beams and padstones.
- 17) Install metal deck and pour concrete slab.
- 18) Once the slab has cured, install temporary works to allow access for roof steelwork installation and temporary support.
- 19) Install roof steelwork and alter / re-support timber roof.



### 3.0 Ground Water Impact

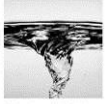
The ground investigation and basement impact assessment carried out by GEA determined that there should be no impact to the current water table. See Appendix D.

(J12015 – 9.3)

### 4.0 Loading on Belsize Tunnel

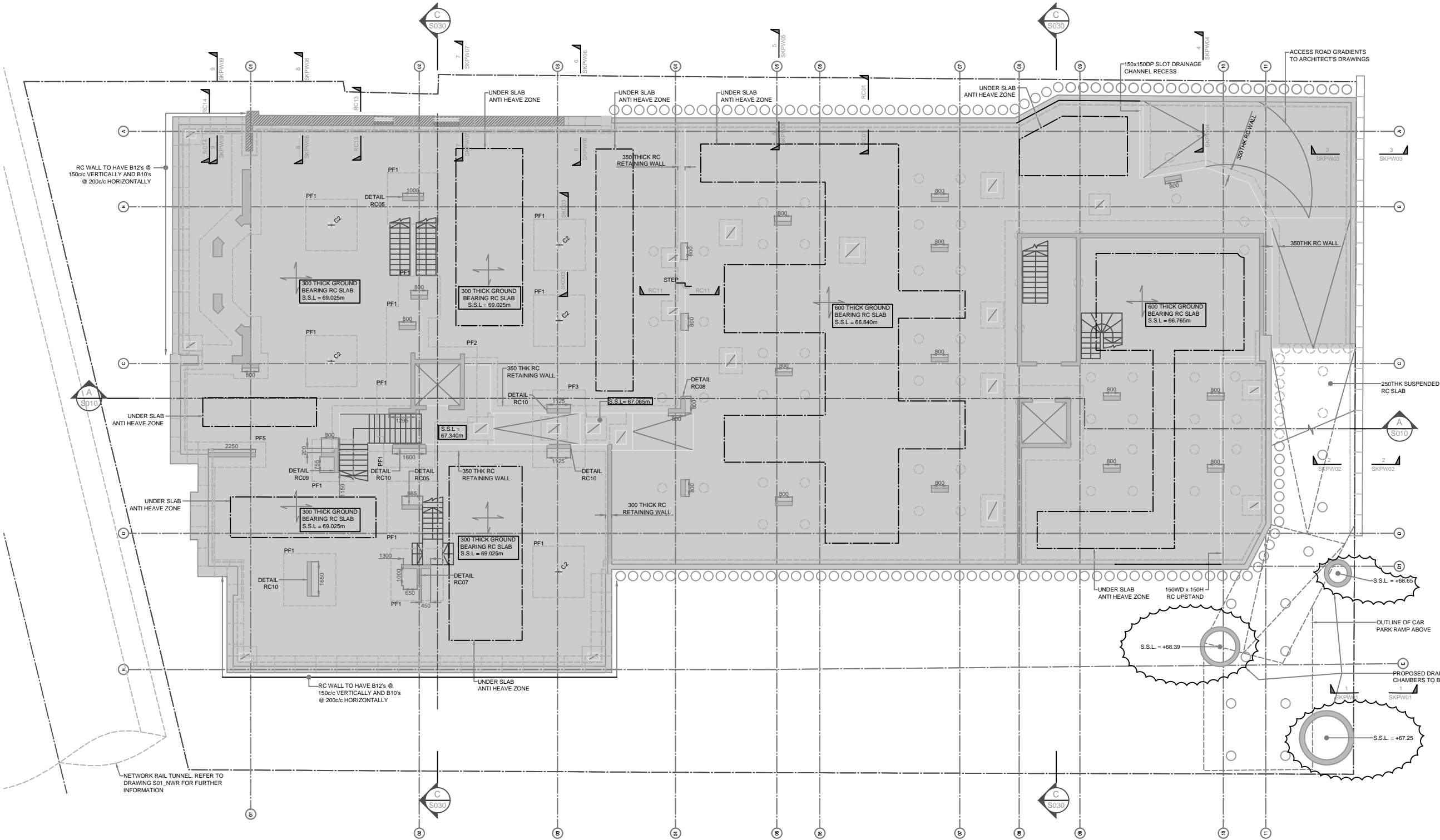
Calculations conducted to assess the effect of the increased load on the Belsize tunnel due to the proposed works have determined that the additional stress experienced by the tunnel will be negligible (~ 1% increase).

See Appendix C.



## Appendix A

## Structural Drawings & Sketches



- NOTES:**
- DRAWING IS TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES DRAWING GN01.
  - DO NOT SCALE FROM THIS DRAWING.
  - ALL DIMENSIONS ARE IN mm U.N.O.
  - DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS BY THE ARCHITECT, SERVICES ENGINEER, STRUCTURAL ENGINEER, TRANSPORT ENGINEER AND THAMES WATER LIMITED.
  - ALL LEVELS ARE TO THE ARCHITECT'S DRAWINGS
  - SITE WELDING WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES WITHOUT PRIOR WRITTEN AUTHORISATION FROM THE ENGINEER.
  - ALL CONCRETE IS TO BE GRADE C40.
  - MIN LAP OF REINFORCING BARS IS 40xbarØ.
  - U BARS TO ALL SLAB EDGES, COLUMN EDGES, WALL AND COLUMN INTERSECTIONS, EDGES AND TOPS.
  - RC MEMBERS LIST:
    - ALL PERIMETER LINING WALLS ARE 250mm THICK U.N.O.
    - ALL RC WALLS ARE 200 THICK U.N.O.
    - ALL INTERNAL COLUMNS ARE 200mm THICK x 600mm LONG U.N.O.
  - MINIMUM COVER TO REINFORCEMENT:
    - 20mm INTERNAL FACE
    - 40mm EXTERNAL FACE
  - ALL SLAB PENETRATIONS 150mm Ø AND SMALLER ARE NOT SHOWN ON FLUID DRAWINGS. CONTRACTORS SHOULD REFER TO ARCHITECTS AND M&E DRAWINGS FOR FURTHER DETAILS AND PROVIDE A PRICE PER PENETRATION.
  - ALL STEELWORK EXPOSED AND/OR IN A CAVITY IS TO BE PAINTED WITH RIW TOUGHSEAL BITUMINOUS PAINT.
  - ALL STEELWORK, EXCEPT IN THE ROOF, IS TO BE PAINTED WITH INTUMESCENT PAINT TO ACHIEVE ONE HOUR FIRE RATING.
  - ALL TIMBER IS GRADE C24.
  - ANCON CHANNELS TO BE CAST INTO ALL CONCRETE WALLS AND COLUMNS TO ALLOW BLOCKWORK/BRICKWORK TIES TO BE INSTALLED AS SHOWN ON DRAWINGS No. SKBW01 TO SKBW03. THE TOP OF ALL INTERNAL WALLS MUST BE TIED AT HEAD LEVEL AS SHOWN ON DRAWINGS No. SKBW01 TO SKBW03.
  - ALL FINISHES, WEATHERING, WATERPROOF MEMBRANES, DAMP PROOF COURSES AND FIREPROOFING ARE TO ARCHITECT'S DETAILS.
  - THE CONSTRUCTION SEQUENCE, INDICATED ON DRAWINGS IS AN OUTLINE SEQUENCE AND THE CONTRACTOR IS RESPONSIBLE FOR PREPARING AND EXECUTING A DETAILED SEQUENCE WITH RELEVANT TEMPORARY WORKS CALCULATIONS AND DRAWINGS DESIGNED SUITABILITY QUALIFIED AND EXPERIENCED TEMPORARY WORKS ENGINEER.
  - THE CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM NETWORK RAIL TO ALLOW WORKS ON SITE TO PROCEED.
  - THE TOP OF PILES WITHIN THE NETWORK RAIL INFLUENCE ZONE ARE TO BE SLEEVED SO THAT THE PILES DO NOT SURCHARGE THE TUNNEL REFER TO DRAWINGS S01\_NWR.
  - THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL STEEL TO STEEL CONNECTION DESIGN AND REINFORCEMENT DETAIL DRAWINGS.

- KEY:**
- DENOTES SPAN OF COMFLOR 210 PROFILED METAL DECK WITH RC SLAB OVER REINFORCED WITH A393 MESH TO TOP FACE AND B12's IN EACH TROUGH OVER ALL DEPTH 270mm.
  - DENOTES SPAN OF CAST INSITU RC SLAB
  - DENOTES SPAN OF 50x200DP C24 TIMBER JOISTS @ 300c/c
  - DENOTES MEDIUM DENSITY BLOCKWORK INFILL MIN COMPRESSIVE STRENGTH 7N/mm<sup>2</sup>
  - DENOTES BRICK AND BLOCKWORK CAVITY WALL
  - ⊗ DENOTES CRANK IN STEEL BEAM
  - ⊕ DENOTES MOMENT CONNECTION
  - DENOTES LOAD BEARING STUD WALL 50x100 C24 TIMBER STUDS @ 400c/c WITH 12 THICK PLY EACH FACE.

**COLUMN SCHEDULE:** - ALL STEELWORK IS TO BE GRADE S355

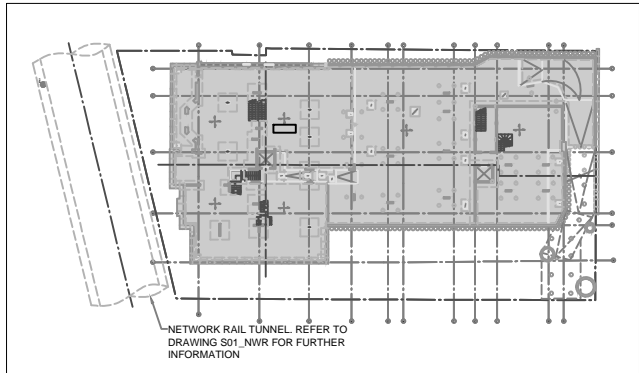
- C1: 100x100x10 SHS  
C2: 254x254x132 UC  
C3: 152x152x37 UC  
C4: 203x203x46 UC

- PADSTONES SCHEDULE:**
- P1: 450Lx225Dx225W  
P1a: 450Lx225Dx300W  
P2: 900Lx450Dx225W  
P2a: 900Lx450Dx250W  
P3: 1125Lx450Dx225W  
P3a: 1125Lx450Dx300W  
P3b: 1125Lx450Dx450W

**PADFOOTING SCHEDULE:**  
ALL PADFOOTINGS ARE 600DP AND REINFORCED WITH B10's TOP AND B16's @ 200c/c BOTTOM IN EACH DIRECTION.

- PF1: 2500x2500  
PF2: 3800x3800  
PF3: 3700x2500  
PF4: 1200x3200

- BASEMENT NOTES:**
- ALL FOUNDATION DETAILS ARE SUBJECT TO REVIEW UPON RECEIPT OF THE SITE INVESTIGATION REPORT.
  - BASEMENT SLAB IS TO BE CAST ON 75mm THICK CONCRETE BLINDING.
  - ANTI HEAVE ZONES ARE TO BE CORDEX CELLCORE HX S 160 18/24 OR SIMILAR APPROVED.
  - ALL SLEEVES ARE TO HAVE 300 THICK RC WALLS. FOR LOCATIONS AND DIMENSIONS PLEASE REFER TO DRAINAGE ENGINEERS DRAWINGS.



NETWORK RAIL TUNNEL LOCATION PLAN  
SCALE 1:500

**BASEMENT REINFORCEMENT NOTES:**

- ALL RC UNDERPINNING FOUNDATIONS AND WALLS ARE TO BE REINFORCED WITH B10's @ 200c/c VERTICALLY AND HORIZONTALLY IN EACH FACE U.N.O.
- FOR ALL COLUMN AND WALL REINFORCEMENT DETAILS REFER TO DETAIL DRAWINGS RC01 TO RC18.
- FOR ALL SLAB REINFORCEMENT DETAIL REFER TO DRAWING RC\_P090.

**TRITON WATERPROOF RC NOTES:**

- ALL CONCRETE EXCLUDING PILES TO BE CONSTRUCTED STRICTLY IN ACCORDANCE WITH TRITON WATERPROOFING SYSTEM SPECIFICATIONS.
- ALL WATERPROOF CONCRETE TO BE TRITON TT SUPER ADMIX TO TRITON SPECIFICATIONS WITH THE FOLLOWING MIX:

TRITON TT SUPER MIX:	ALKALI CONTENT	< 0.1%
	CHLORIDE ION	< 0.06%
	350kg/m <sup>3</sup> CEM I MIN CEMENT CONTENT	
	MAX WATER CONTENT RATIO = 0.5	
	NO GROUND GRANULATED BLAST FURNACE SLAB PERMITTED.	

- WATERPROOF CONCRETE ELEMENTS TO INCLUDE PAD FOUNDATIONS, LIFT PIT, SUMPS, EXTERNAL GROUND FLOOR SLAB, RETAINING WALLS AND RC UNDERPINNING.
- ALL WATERPROOF CONCRETE CONSTRUCTION INCLUDING JOINTS, SERVICE PENETRATIONS, ETC TO BE IN ACCORDANCE WITH TRITON SPECIFICATIONS.

**WATERPROOF RC KEY:**

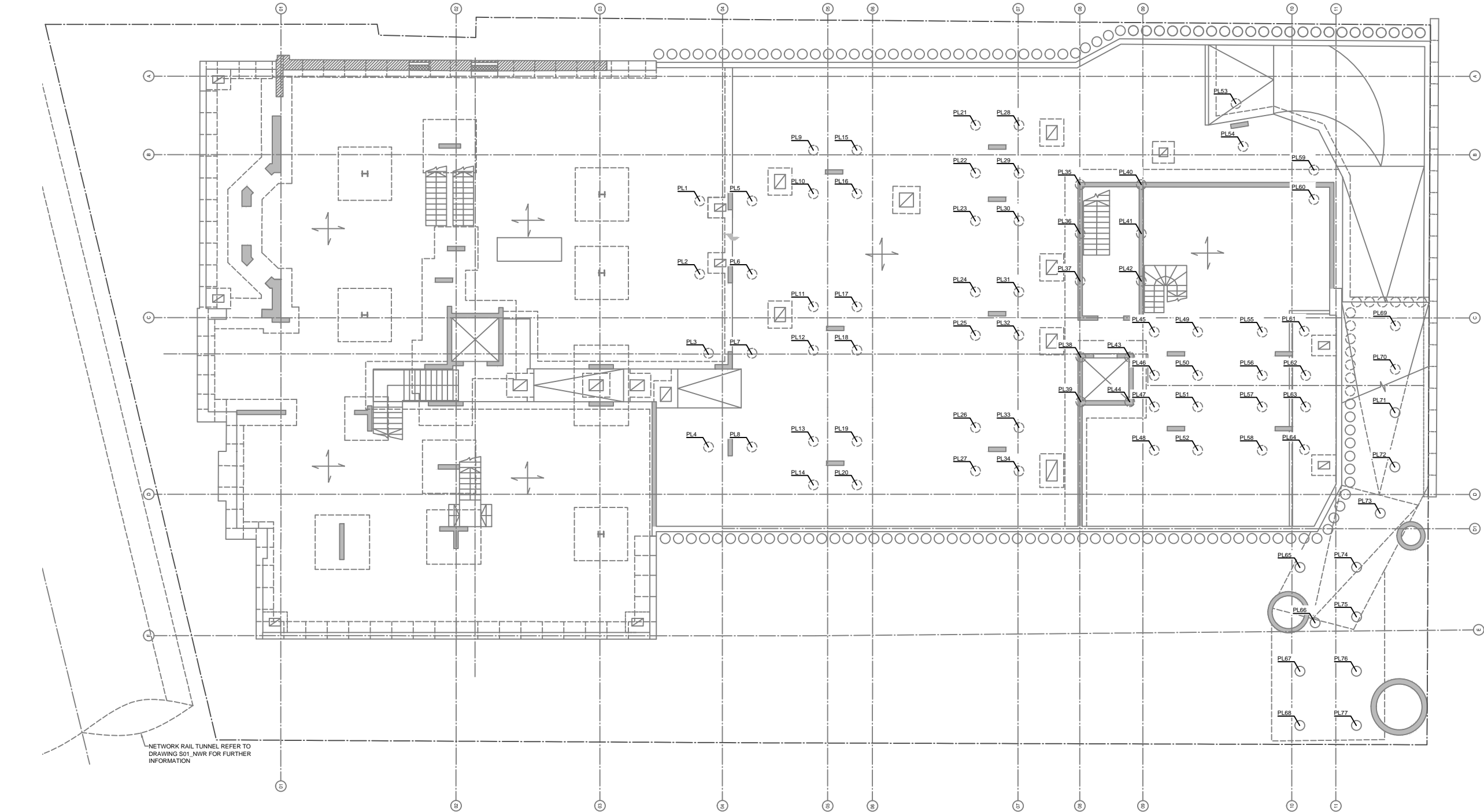
- DENOTES EXTENTS OF WATERPROOF CONCRETE TO ACHIEVE GRADE 3 BASEMENT DESIGNED IN ACCORDANCE WITH BS 8102. SUGGESTED B+C PROTECTION.
- DENOTES WALL FOR GRADE 3 BASEMENT DESIGNED IN ACCORDANCE WITH BS 8102, SUGGESTED B+C PROTECTION.

**STAGE E REPORT ISSUE**

T1 ISSUED FOR STAGE E DRN: SA CHK: SB 01/12/14

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E-mail: [firstname]@fluidstructures.com  
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Project:	14 NETHERHALL GARDENS
Title:	BASEMENT PLAN
Job No:	23959
Scale:	1:100 @A1; 1:200 @A3
DRN:	IRS
CHK:	SB
Date:	SEP 14
DRG. No.:	P090
T1	



PILE SCHEDULE			
PILE REF	LOADING (KN)	CUT OFF LEVEL	NOTES
PL1	1000	68.805	
PL2	900	68.805	
PL3	900	68.805	
PL4	750	66.140	
PL5	1000	66.140	
PL6	900	66.140	
PL7	900	66.140	
PL8	750	66.140	
PL9	900	66.140	
PL10	900	66.140	
PL11	1000	66.140	
PL12	1000	66.140	
PL13	800	66.140	
PL14	800	66.140	
PL15	900	66.140	
PL16	900	66.140	
PL17	1000	66.140	
PL18	1000	66.140	
PL19	800	66.140	
PL20	800	66.140	
PL21	700	66.140	
PL22	700	66.140	
PL23	700	66.140	
PL24	900	66.140	
PL25	900	66.140	
PL26	1100	66.140	
PL27	1100	66.140	
PL28	700	66.140	
PL29	700	66.140	
PL30	700	66.140	
PL31	900	66.140	
PL32	900	66.140	
PL33	1100	66.140	
PL34	1100	66.140	
PL35	1500	66.140	
PL36	1500	66.140	
PL37	1000	66.140	
PL38	1000	66.140	
PL39	1000	66.140	
PL40	1500	66.140	
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PL42	1000	66.140	
PL43	1000	66.140	
PL44	1000	66.140	
PL45	800	66.140	
PL46	800	66.140	
PL47	1000	66.140	
PL48	1000	66.140	
PL49	800	66.140	
PL50	800	66.140	
PL51	1000	66.140	
PL52	1000	66.140	
PL53	2100	66.140	
PL54	2100	66.140	
PL55	1000	66.140	
PL56	1000	66.140	
PL57	900	66.140	
PL58	900	66.140	
PL59	1600	66.140	
PL60	1600	66.140	
PL61	1000	66.140	
PL62	1000	66.140	
PL63	900	66.140	
PL64	900	66.140	
PL65	100	69.167	VEHICLE RAMP
PL66	100	69.380	VEHICLE RAMP
PL67	100	69.565	VEHICLE RAMP
PL68	100	69.561	VEHICLE RAMP
PL69	150	68.239	VEHICLE RAMP
PL70	150	68.406	VEHICLE RAMP
PL71	100	68.574	VEHICLE RAMP
PL72	150	68.783	VEHICLE RAMP
PL73	150	68.960	VEHICLE RAMP
PL74	100	69.167	VEHICLE RAMP
PL75	100	69.357	VEHICLE RAMP
PL76	100	69.565	VEHICLE RAMP
PL77	100	69.561	VEHICLE RAMP

STAGE E REPORT ISSUE

T1 | ISSUED FOR STAGE E | DRN: DB | CHK: SB | 01/12/14

**STRUCTURAL MONITORING :**

STRUCTURAL MONITORING MUST BE CARRIED OUT AT NETHERHALL GARDENS TO MEASURE THE EFFECTS THAT THE CONSTRUCTION ACTIVITY MAY HAVE ON THE SURROUNDING GROUND AND STRUCTURES.

SURVEY TARGETS SHOULD BE INSTALLED AT KEY LOCATIONS ON THE PROPOSED PILED WALLS AS INDICATED ON FLUID DRAWING PL090. THEY SHOULD BE SURVEYED IN THE 3-DIMENSIONAL PLANE WHICH WILL PROVIDE DISPLACEMENT MEASUREMENTS IN THE HORIZONTAL AND VERTICAL PLANES TO DETERMINE THE DEFLECTION OF THE WALL DURING EXCAVATION AND BASEMENT CONSTRUCTION.

ALL MOVEMENT MONITORING MUST BE CHECKED REGULARLY AGAINST THE FILE DESIGN BY THE CONTRACTOR TO ENSURE THAT THE CONSTRUCTION WORKS DO NOT HAVE AN ADVERSE EFFECT ON THE SURROUNDING BUILDINGS.

1. INSTALLATION

- CONTROL

CONTROL STATIONS ARE TO BE ESTABLISHED AT STRATEGIC LOCATIONS, FROM WHICH THE MONITORING POINTS ARE TO BE SURVEYED. THE COORDINATE SYSTEM MUST BE SPECIFIC TO THE MONITORING.

RETRO TARGETS FOR CONTROL SHOULD BE PLACED ON SURROUNDING STRUCTURES OUTSIDE OF THE SITE'S ZONE OF INFLUENCE, AND THESE POINTS MUST BE ACCURATELY FIXED IN THE 3-DIMENSIONAL PLANE.

2. MONITORING

- TARGETS

AT LEAST TWO ROUNDS OF ANGLES ARE TO BE SURVEYED IN BOTH FACES FOR EACH SURVEY POINT. THE DATA IS TO BE RECORDED ELECTRONICALLY DIRECTLY ONTO THE INSTRUMENT. THE INSTRUMENT SHOULD BE CAPABLE OF DISPLAYING DIFFERENCES IN REAL-TIME, ALLOWING THE SURVEYOR TO ASSESS THE EXTENT OF ANY DEVIATION IN THE FIELD, AND IF NECESSARY, REPORT LARGE DEVIATIONS IMMEDIATELY TO THE CLIENT.

3. FREQUENCY OF READINGS

A MONITORING FREQUENCY WILL NEED TO BE AGREED BEFORE THE COMMENCEMENT OF WORKS. GENERALLY, FORTNIGHTLY TO WEEKLY MEASUREMENTS SHOULD BE CONSIDERED DURING THE STRUCTURALLY CRITICAL PHASES, SUCH AS PILING, EXCAVATION AND BASEMENT CONSTRUCTION.

MONTHLY MONITORING FOR 6 TO 12 MONTHS FOLLOWING BASEMENT CONSTRUCTION IS NORMALLY ACCEPTABLE TO ASCERTAIN IF THERE IS ANY LONG TERM MOVEMENT STILL PREVALENT.

CONTINGENCY SHOULD BE SET ASIDE TO ALLOW FOR ADDITIONAL VISITS AT INCREASED FREQUENCIES, SHOULD TRIGGER VALUES BE EXCEEDED.

4. REPORTING

ON COMPLETION OF EACH CYCLE OF READINGS THE DATA SHOULD BE COMPILED IN A REPORT AND ISSUED WITHIN 24 HOURS. ANY LARGE

DEVIATIONS IDENTIFIED IN THE FIELD ARE TO BE RELAYED BACK TO THE CLIENT IMMEDIATELY FOR REVIEW.

A TRAFFIC LIGHT SYSTEM OF TRIGGER VALUES SHOULD BE PROPOSED BY THE CONTRACTOR PRIOR TO WORK COMMENCING. THESE VALUES MUST TAKE INTO ACCOUNT THE ONUS ON THE CONTRACTOR AND HIS TEAM TO AVOID ANY MOVEMENT RESULTING IN CRACKING, SETTLEMENT OR HEAVE TO ADJACENT STRUCTURES.

EACH REPORT SHALL CONTAIN THE FOLLOWING:

- EXECUTIVE SUMMARY
- SCHEDULE OF VISITS INCLUDING:
  - DATE OF SURVEY
  - WEATHER CONDITIONS DURING SURVEY
  - SURVEYOR RESPONSIBLE FOR THE SURVEY.
- APPLICABLE NOTES AND ACCURACIES
- SURVEY RESULTS SHOWING:
  - TABULATED DATA HIGHLIGHTING EXCEEDING SPECIFIED TRIGGER LIMITS.
  - GRAPHS SHOWING VERTICAL AND HORIZONTAL MOVEMENTS
- LOCATION PLANS

**TOLERANCES:**

1. HORIZONTAL TOLERANCE OF 1:75 HAS BEEN ASSUMED.

2. A VERTICALITY TOLERANCE OF 1:75 HAS BEEN ASSUMED. CONTRACTORS SHOULD ADVISE FLUID STRUCTURES IF THEY CONSIDER THIS UNACHIEVABLE WITH THE GIVEN DEPTHS

**PILE LENGTH, CUT OFF AND TOE LEVEL:**

1. INDICATIVE PILE LENGTHS AS NOTED ON DRAWING. ACTUAL PILE LENGTH TO PILE DESIGNERS SPECIFICATION.

2. PILE CUT-OFF LEVEL: FOR SECANT PILED WALL TOE LEVEL TO SUIT LATERAL STABILITY AND WATER TABLE REQUIREMENTS.

3. PILES UNDER RAFT, CUT-OFF LEVEL GENERALLY 40MM ABOVE RAFT SLAB FORMATION LEVEL - SEE DRAWINGS.

4. DEPTH OF PILE TOE BENEATH SITE DATUM (MINIMUM): REFER TO DRAWINGS

5. OTHER REQUIREMENTS:

- PILE LENGTH TO BE SUITABLE TO PROVIDE SUFFICIENT LONGTERM SHEAR RESISTANCE.
- SHEAR LOADS - DESIGN FOR A MINIMUM OF 250KN UNFACTORED SHEAR LOAD UNLESS NOTED OTHERWISE ON DRAWINGS.
- ALL PERIMETER PILES TO BE DESIGNED TO RESIST LATERAL SHEAR DUE TO SOIL, SURCHARGE PRESSURES, ETC. LATERAL DEFLECTION OF PERIMETER PILED WALLS NOT TO EXCEED LIMITS SHOWN ON DRAWINGS DURING EXCAVATION OR CONSTRUCTION OF BASEMENT.
- PILED WALLS TO BE LATERALLY PROPPED DURING EXCAVATION TO CONTROL LATERAL DEFLECTION. JACKING POINTS TO BE PROVIDED BETWEEN PROPS AND PILED WALLS TO ALLOW DEFLECTION TO BE CONTROLLED IF NECESSARY.

FLUID STRUCTURES  
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Project: 14 NETHERHALL GARDENS

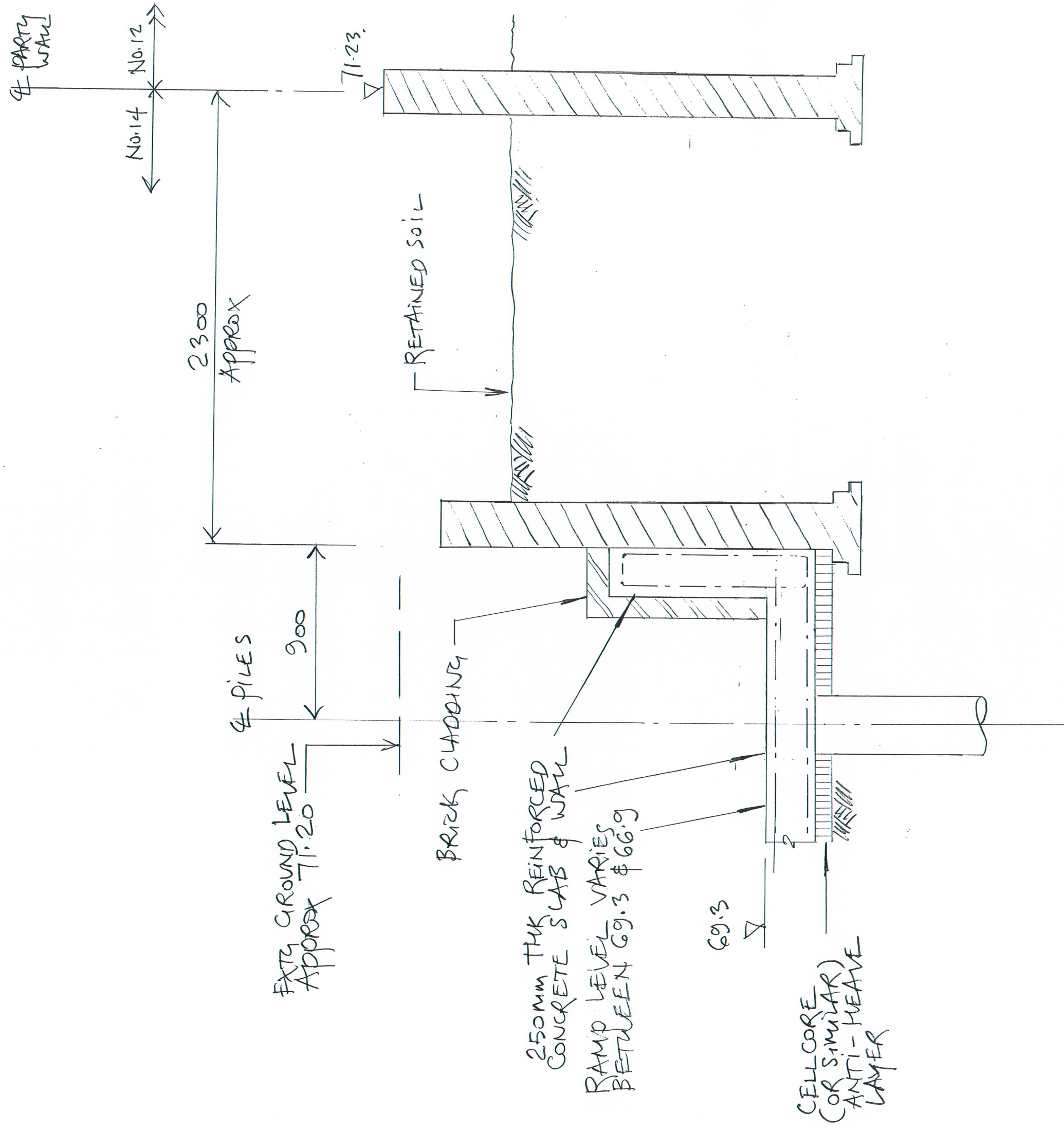
Title: BASEMENT FLOOR PLAN - PILING LAYOUT

Job No: 23959 | DRN: DB | Date: NOV '14

Scale: 1:100 @A1; 1:200 @A3 | CHK: SB | DRG. No.: PL\_P090 | T1







SECTION 1-1

Project: NETHERHALL GIONS  
Title: SECTION 1-1  
Ob No: 23959  
RG No: SKPW01  
Date: 8/14  
REV:

Drn By: M  
Chk By: SB



4 PARTY WALL

← No.14 → No.12 →

72.72

4 PILES

800

EXTY GROUND LEVEL  
71.41 APPROX

BRICK PIER

9" WALL

MAIN FLANK  
WALL OF  
SCHOOL  
BUILDING

900  
Approx

EXTY FGL  
70.30

BRICK  
CLADDING

REDUCE GROUND LEVEL  
TO MATCH NO.12 SIDE  
PRIOR TO COMMENCING  
UNDERPINNING

250mm THK REINFORCED  
CONCRETE SLAB & WALL

RAMP LEVEL VARIES  
BETWEEN 69.3 & 66.9

CELL CORE  
(OR SIMILAR)  
ANTI-HEAVE  
LAYER

68.4

PILE

1:3 SEMI-DRY MORTAR  
WELL RANMED

ASSUMED  
FOUNDATION  
DEPTH

MASS CONCRETE  
UNDERPINNING  
FORMED IN 1000mm  
LENGTHS IN "HIT &  
MISS" SEQUENCE

Project: NETHERHALL CUBNS

Title: SECTION 2-2

Ob No. 23959

Date: 8/1/14

RG No. SKpwor

Drn By: 21

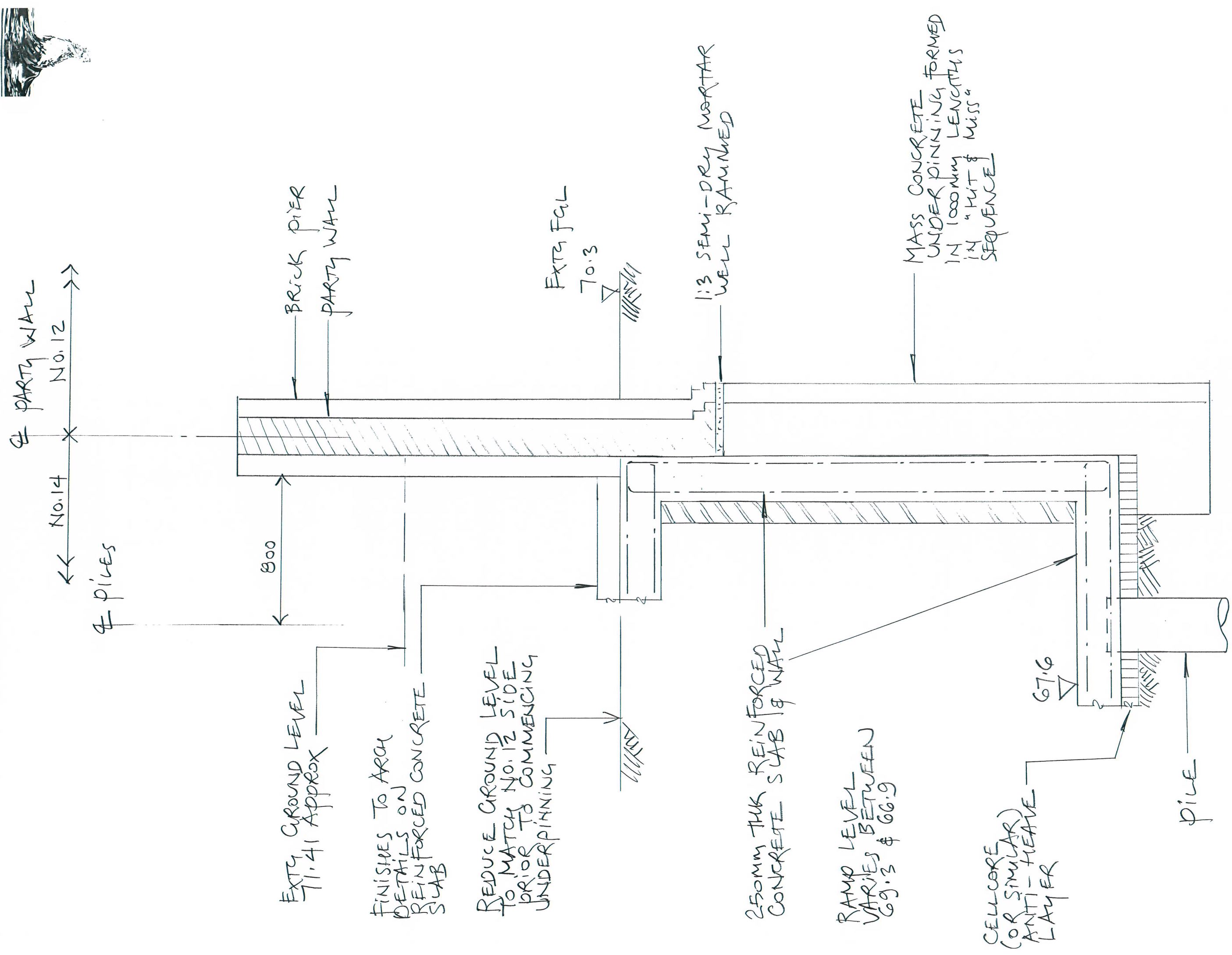
Chk By: SB

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Project: NETHERHALL GARDENS

Title: SECTION 3-3

Job No: 23959

Drawn By: SKPWO3

Date: 8/14

Rev: A

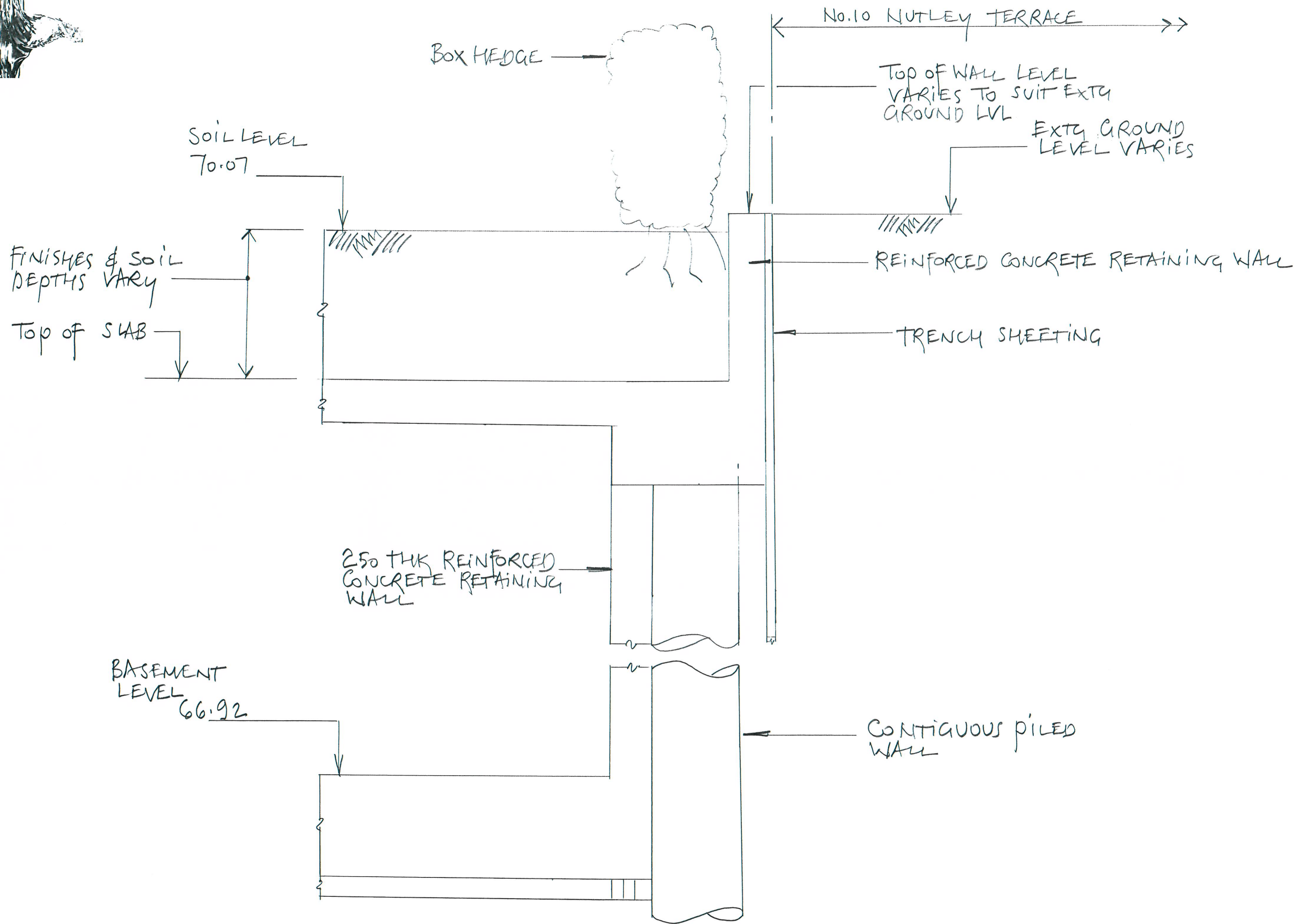
Drawn By: M

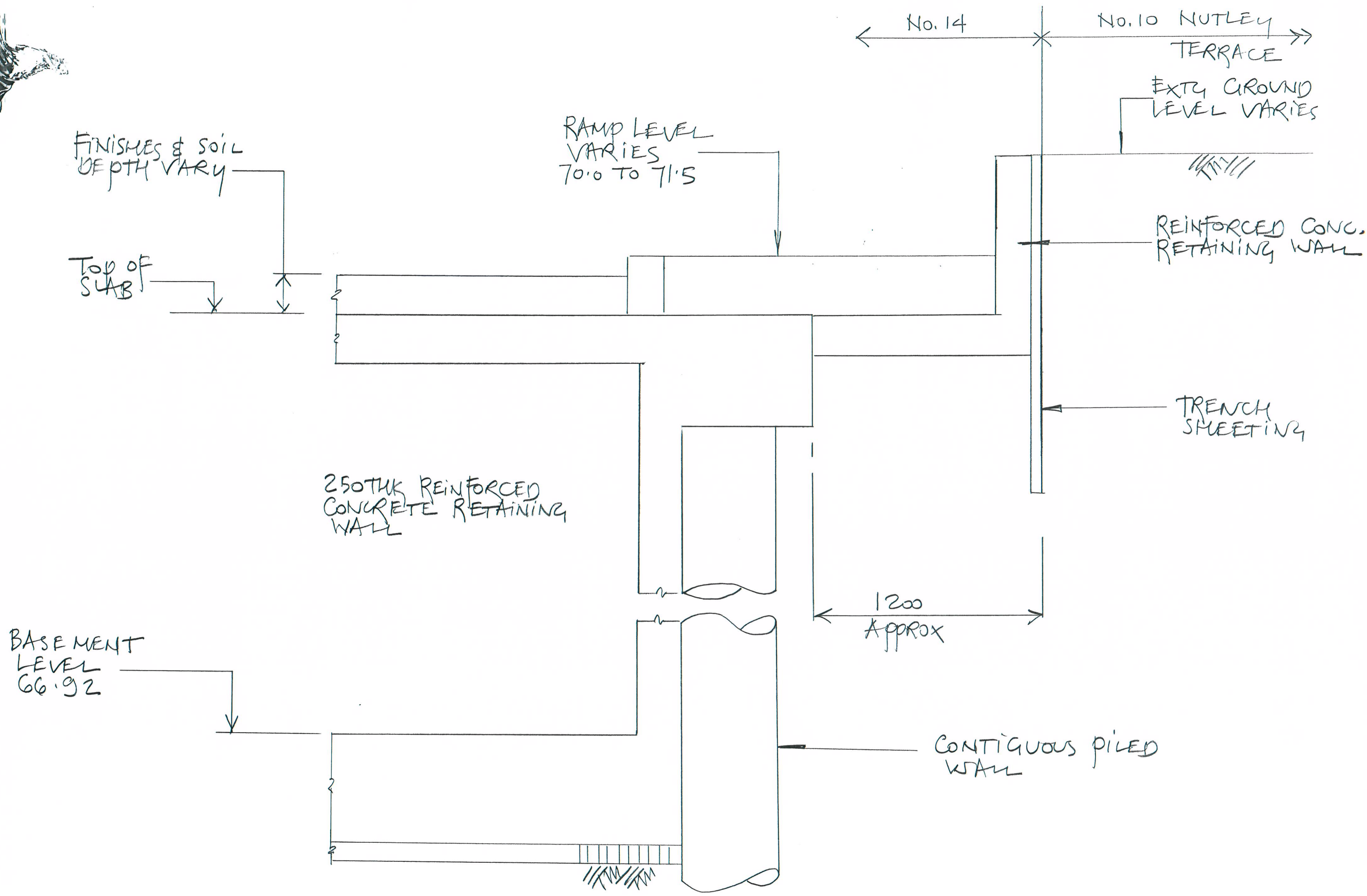
Checked By: SB

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SECTION 5-5