Job Title The Montague Centre Liverpool Road Worthing West Sussex		Date 12 June 2025
Item Planning condition 27 – Safeguarding of groundwater/Piling	Job No. E9352	Sheet No. 1
Prepared by RP	Checked by DG	

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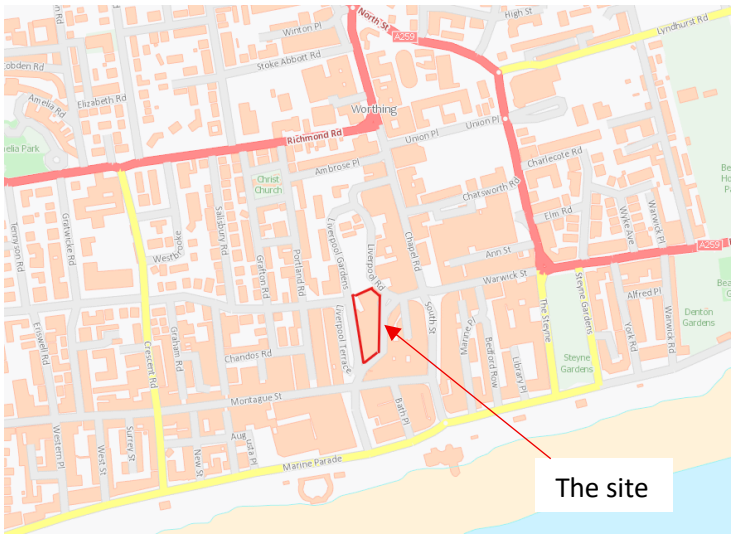
1.0 Introduction

SWP were appointed to provide structural engineering services for the alterations and residential extensions to the Montague Centre. As part of our services, we are required to provide designs for the superstructure and substructure including preliminary designs, drawings and specifications for the piled foundations to the new central stair and lift core, to be formed within retail unit 11 of the existing building.

Site location



2.0 Planning condition discharge

Planning condition 27 wording:

Safeguarding of Groundwater/ Approval of Piling

Piling or deep foundation using penetrative methods, if used shall not be carried out other than with the written consent of the Local Planning Authority. The development shall be carried out in accordance with the approved details.

Reason: Piling or deep foundation using penetrative methods has the potential to mobilise contamination which could impact on groundwater resources beneath the site, controlled waters in accordance with policy DM22 of the Worthing Local Plan 2020-2036 and the NPPF, 2023.

3.0 Site investigation report references

Structural Soils Limited site investigation report No:70306, dated September 1987.

Trial pit TP01 through the ground floor slab of Unit 11 to expose an existing piled column base, dated 19 February 2025.

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4.0 Site conditions and ground conditions

The site was previous occupied by a large Odeon Cinema that opened in 1934. This was subsequently demolished in 1987 and replaced with the existing two to three storey building, which is to remain largely intact as part of its developement.

The geological map suggests the area is underlain by superficial River Terrace Deposits of Sand, Silt, and Gravel over Lewes Nodular Chalk Formation and this was confirmed by the original ground investigation.

A total of four bore holes were sunk across the site to 10m depth. These showed clay-based superficial soils, of variable strength, between 3.5 and 5.7m below ground level, over a structureless Grade V Chalk, the strength of which increased with depth. Maximum ground water levels were recorded as 2.5m and 3.5m below ground level and these were noted as variable. The report recommended that the new building should be piled, but the ground floor slabs could be ground bearing, and this is now the building was supported.

The trial pit in Unit 11 confirmed:

- 150mm thick A393 mesh reinforced concrete slab on blue plastic DPM on 150mm granular sub-base on compacted silty Clay (returned excavated material as backfill)
- 2.0 x 2.0 x 1.0m deep concrete pile cap cast on a concrete blinding.
- No ground water present.
- No apparent soil contamination.

5.0 Ground water

The site does not lie within a ground water source protection zone.

The south end of the building is partially within flood zones 2 and 3, but this does not extend into the location of the new piling.

Some of the area surrounding the building is at risk from surface water flooding, but this does not extend into the location of the new piling.

The River Terrace Deposits are classed as a Secondary B Aquifer. The White Chalk Subgroup is classed as a Principal Aquifer.

Ground water is predicted to flow southwards towards the sea. The recorded ground water was tidal and levels are variable.

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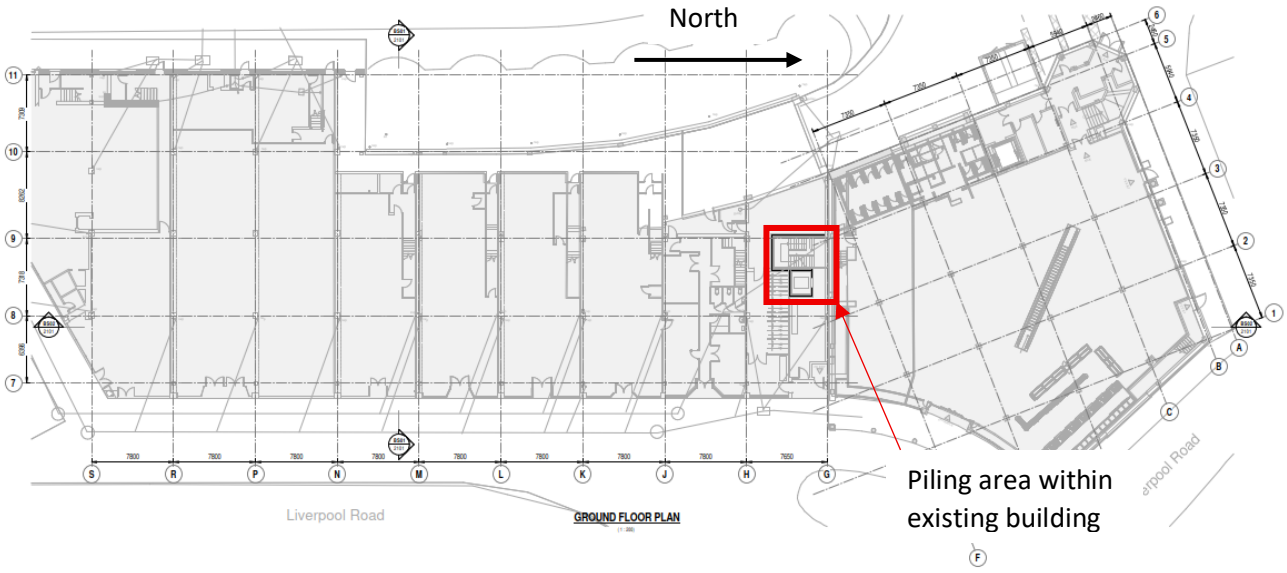
6.0 Sources of Contamination

Testing of soils and water for contamination was not carried out as part of the original 1987 report. However, the depth of made ground varies between 0.2 and 1.5m across the site, with that in borehole 2, closest to the new piling location, being 0.3m. This thin layer of material would be have been removed as part of the original construction. In addition, no suspect fill was noted in trial pit TP01, only natural silty Clay that had been used as returned backfill around the pile caps, and the graular material below the slab was a natural crushed stone type.

7.0 Piling proposals

Due to the building loads, ground conditions and the fact that the existing building is piled, it is proposed to use a piled foundation system to support the new central core. Due to the reduced headroom and ground conditions a bored, sectional flight auger (SFA) pile, is deemed to be the most appropriate type and this is shown on the piling drawing.

A total of 20No 300mm diameter piles are required in a small area within the building. Pile depths are likely to be 10m deep to support loads up to 300kN.



SFA piles are introduced by penetrating the ground with a hollow stemmed auger. Piles are bored in segmental lengths ranging from 1-2m to reach the required depth. The spoil generated by the augering process is brought to the surface and removed as the pile is formed. Upon reaching the design depth, concrete or grout is then pumped through the hollow stem of the augers as they are withdrawn. Finally, a reinforcement cage is inserted into the wet concrete. In this was the bore is never left open so that contaminates can enter it, and contaminates are not driven down, as with a driven pile.

SFA is one of the quietest piling techniques on the market and is virtually vibration free making it suitable for working in close proximity to existing buildings, in restricted access or residential areas.

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8.0 Conclusions

The correct process has been followed to identify the ground conditions across the site, including soil type and the risk to ground water and the local environment.

SFA piling is a proven method of providing a suitable foundation system, while minimising the risk of drawing contaminated soil to lower depths and into the ground water. All voids are immediately sealed with concrete which aids the above.

On this basis SWP are satisfied that SFA piling is the most appropriate method to prevent mobilisation contamination which could impact on groundwater resources beneath the site.

9.0 Appendix

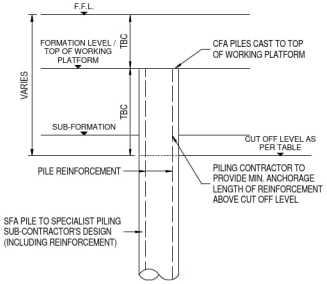
Structural Soils Limited site investigation report No:70306

Trial pit report - TP01

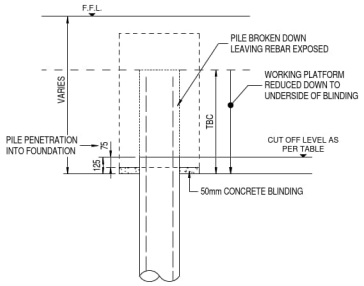
Drawing 9352-SWP-Z1-ZZ-DP-S-5010 P1

PILE SCHEDULE

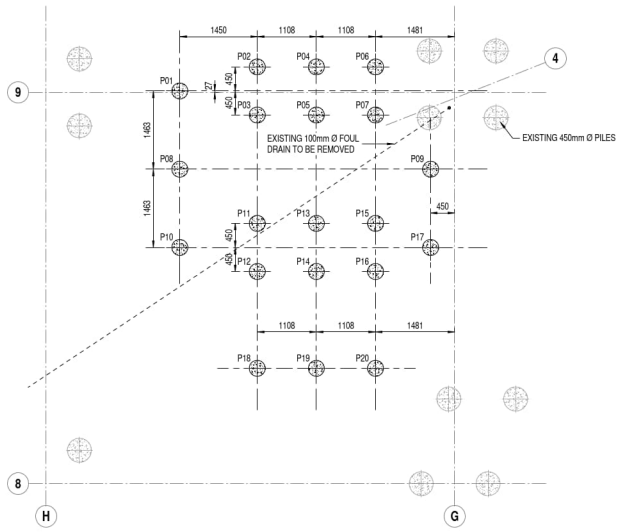
PILE REF.	PILE GEOMETRY				VERTICAL ACTIONS			HORIZONTAL ACTIONS
	CUT OFF (m)	DIA. (mm)	EASTING (mm)	NORTHING (mm)	Gk (kN)	Qk IMPOSED (kN)	Qk WIND (kN)	Qk WIND (kN)
P01	+4.925	300	514834940	102572354	225	50	±10	10
P02	+4.925	300	514834390	102573769	225	50	±10	10
P03	+4.925	300	514835288	102573832	225	50	±10	10
P04	+4.925	300	514834313	102574874	225	50	±10	10
P05	+4.925	300	514835211	102574936	225	50	±10	10
P06	+4.925	300	514834236	102575978	225	50	±10	10
P07	+4.925	300	514835134	102576041	225	50	±10	10
P08	+4.925	300	514836400	102572456	100	25	±10	10
P09	+4.925	300	514836073	102577140	100	25	±10	10
P10	+4.925	300	514837860	102572558	225	50	±10	10
P11	+3.875	300	514837310	102573973	225	50	±10	10
P12	+3.875	300	514838208	102574035	225	50	±10	10
P13	+3.875	300	514837233	102575078	225	50	±10	10
P14	+3.875	300	514838131	102575140	225	50	±10	10
P15	+3.875	300	514837156	102576182	225	50	±10	10
P16	+3.875	300	514838053	102576245	225	50	±10	10
P17	+4.925	300	514837533	102577242	225	50	±10	10
P18	+3.875	300	514840014	102574162	175	100	±10	10
P19	+3.875	300	514839937	102575266	175	100	±10	10
P20	+3.875	300	514839859	102576371	175	100	±10	10



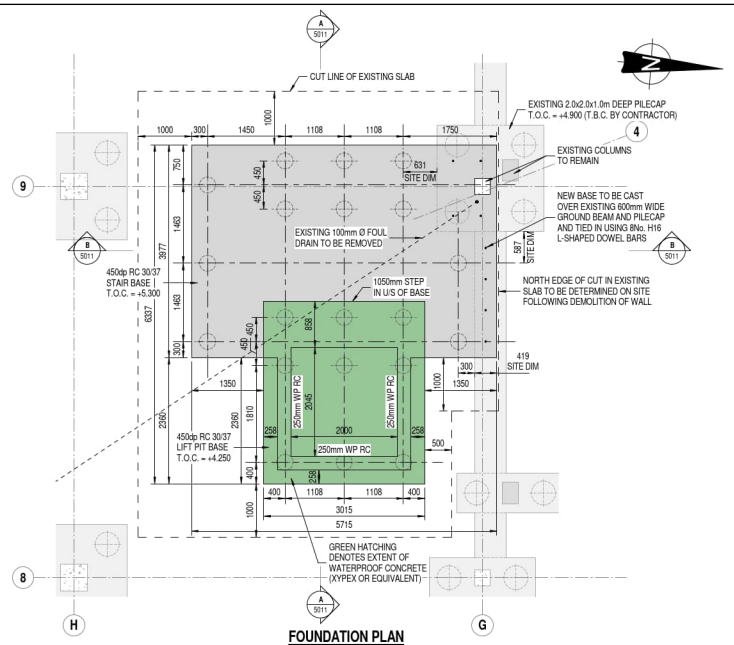
TYPICAL PILE INSTALLATION DETAIL
(1 : 25)



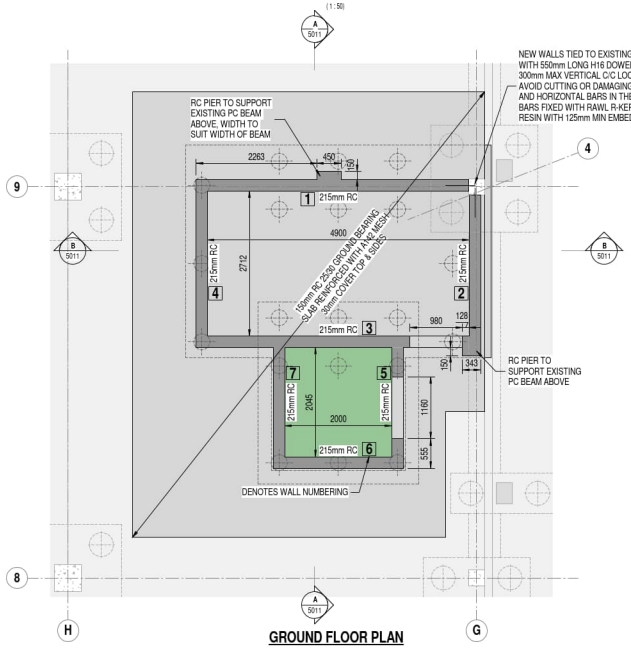
TYPICAL WORKS TO PILE HEAD AND FORMATION DETAIL
(1 : 25)



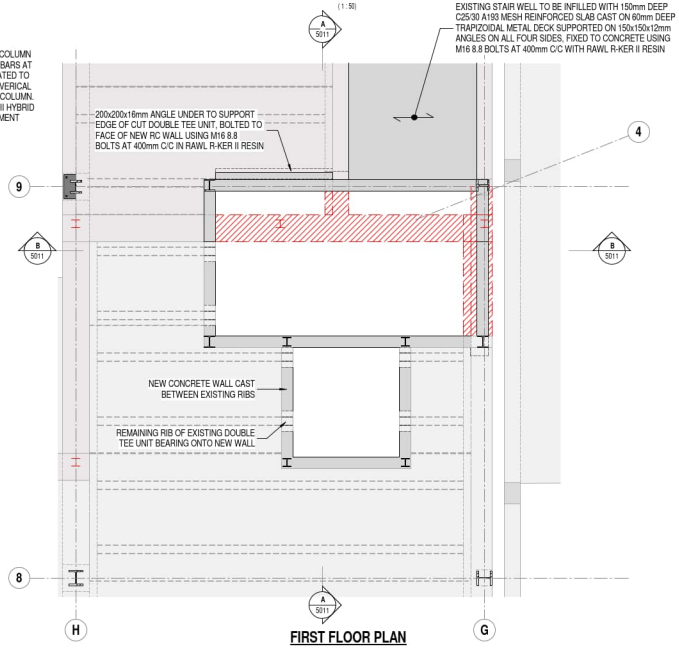
PILE PLAN
(1 : 50)



FOUNDATION PLAN
(1 : 50)



GROUND FLOOR PLAN
(1 : 50)



FIRST FLOOR PLAN
(1 : 50)

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER SWP DRAWINGS, AND WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND SPECIFICATION AND ANY DISCREPANCIES FOUND ARE TO BE REPORTED IMMEDIATELY TO THE ENGINEER.

2. NO DIMENSIONS ARE TO BE SCALED FROM THIS DRAWING. FIGURED DIMENSIONS MUST BE USED FOR SETTING OUT AND DETAILING. UNLESS NOTED OTHERWISE ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METRES FROM THE SITE DATUM.

3. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL DETAILS AND DIMENSIONS RELATING TO SUB-CONTRACTORS WORK MUST BE CHECKED AND AGREED BETWEEN THE SUB-CONTRACTOR OR SUPPLIER AND THE GENERAL CONTRACTOR.

4. SWP LOGOS AND COMPANY INFORMATION MUST BE REMOVED FROM COPIES IF INFORMATION IS RE-USED.

5. AS PART OF CONSULTANTS PROFESSIONAL DUE DILIGENCE, PLEASE REVIEW YOUR PRODUCTION INFORMATION AGAINST SWP INFORMATION AND CONFIRM THIS HAS BEEN FULLY CO-ORDINATED WITH OUR LATEST ISSUE AND REPORT BACK ANY DISCREPANCIES IMMEDIATELY. SHOULD WE NOT RECEIVE ANY COMMENTS OR CONFIRMATION FROM YOU, IT WILL BE DEEMED THAT YOUR PRODUCTION INFORMATION HAS BEEN FULLY CO-ORDINATED WITH OURS.

6. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE WHILST THE WORKS ARE IN PROGRESS, AND THE DESIGN OF ALL TEMPORARY WORKS.

7. DIFFERENCES BETWEEN THIS DRAWING AND THE SITE CONDITIONS ENCOUNTERED, MUST BE REPORTED TO THE ENGINEER.

NOTE
FOR METHOD STATEMENT REFER TO DRAWING No. 5012

PILING NOTES

PILES
ALL PILES ARE TO BE 300mm DIA. SECTIONAL FLIGHT AUGERED (SFA) TYPE DESIGNED TO SUPPORT THE MAX. WORKING LOADS AS SHOWN IN THE PILE SCHEDULE.

FINAL DESIGN OF SFA PILES TO BE BY PILING SUB-CONTRACTOR.

FOR PILE DEPTHS REFER TO PILING SUB-CONTRACTOR'S PILE SCHEDULE.

NOTE
DRAWING TO BE READ IN CONJUNCTION AND IN ACCORDANCE WITH NBS SPECIFICATION.

MINIMUM PILE SPACING TO BE 3 x PILE DIAMETER.

REQUIRED FACTOR OF SAFETY (MINIMUM): MODEL FACTOR - 1.4
PARTIAL FACTORS:
SHAFT - 1.6
BASE - 2.0

PILES ARE TO BE DESIGNED IN ACCORDANCE WITH THE RECOMMENDATION OF THE GROUND INVESTIGATION REPORT.

WORKING PLATFORM

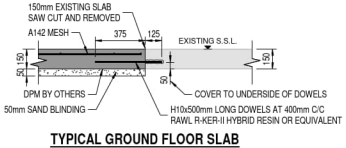
CONTRACTOR TO PROVIDE A SUITABLE PLATFORM TO SUPPORT THE WORKING PRESSURES BELOW THE TRACKS OF THE PILING RIG AS NOTED BELOW:

- MINIMUM 300mm THICK COMPACTED/SELECTED GRANULAR MATERIAL HIGHWAY 6F4 OR EQUIVALENT WITH $\phi' = 40°$ ON PROOF ROLLED SUB-FORMATION. ALL SOFT SPOTS REMOVED AND REPLACED WITH GRANULAR MATERIAL.
- LIMIT OF WORKING PLATFORM BEYOND OUTER PILES TO BE CONFIRMED BY CONTRACTOR, BUT MINIMUM OF 1.3m.

SAFETY HEALTH AND ENVIRONMENTAL ISSUES

THE FOLLOWING ITEMS ARE CONSIDERED BY THE DESIGNER TO BE A SIGNIFICANT RISK DURING CONSTRUCTION.
THE LIST IS NOT EXHAUSTIVE BUT HAS BEEN PREPARED TO COMMUNICATE RISKS WHICH HAVE BEEN IDENTIFIED DURING THE DESIGN PROCESS. FOR FURTHER INFORMATION REFER TO THE DESIGNER'S RISK ASSESSMENT.

- RISK OF INJURY FROM HIGH RISK PILING OPERATIONS, INCLUDING INSTABILITY OF THE PILING RIG.
- PRIOR TO START OF PILING WORKS ENSURE ALL CONDITIONS AS SET OUT IN FPS-PRE COMMENCEMENT PILING STANDARD HAVE BEEN IMPLEMENTED.
- WORKING PLATFORM DESIGN AND CERTIFICATION REQUIRED TO SUIT ACTUAL RIG WORKING PRESSURES.
- SOIL TO BE CLEANED FROM THE AUGER OF CFA RIGS, AS IT IS EXTRACTED.
- TRAINED OPERATIVES ONLY, WORKING TO AGREED METHOD STATEMENT.



TYPICAL GROUND FLOOR SLAB REINSTATEMENT DETAIL
(1 : 20)

1:50 0 1000 2000 3000 4000 5000
1:1 0 10 20 30 40 50 60 70 80 90 100

REV.	DATE	DESCRIPTION
P1	06.06.2025	STAGE 3 ISSUE - FOR REVIEW AND COMMENT

PRELIMINARY

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CLIENT: CAYUGA 013 LLP
ARCHITECT: ACCEL CONSULTING LTD
JOB TITLE: MONTAGUE QUARTER, WORTHING
DRAWING TITLE: STAIR AND LIFT CORE PLANS

SCALE AT A1: 1:50	DATE: MAY '24	DRAWN: CW	
	ENG: RP	CHECKED: DG	
RIBA STATUS: STAGE 3 - SPATIAL COORDINATION			
DRAWING STATUS: S3	DRAWING SUITABILITY: REVIEW AND COMMENT		
JOB No.: E9352	DRAWING No. (PROJECT - ORIGINATOR - ZONE - TYPE - FORM - ROLE - NUMBER): 9352-SWP-Z1-ZZ-DP-S-5010		REV.: P1

THE AVON GROUP

GYOURY / SELF
PARTNERSHIP
21 SEP 1987
RECEIVED

REPORT

on

SITE INVESTIGATION

at

MONTAGUE CENTRE

WORTHING

September 1987

Report no. 70306

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REPORT

on

SITE INVESTIGATION

at

MONTAGUE CENTRE

WORTHING

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(1) INTRODUCTION

This investigation was carried out on the instructions of the Gyoury Self Partnership on behalf of The Avon Group.

The purpose of the work was to investigate ground conditions and provide information for the design of foundations for a proposed retail shopping development. The proposed structure is a two and four storey steel framed building.

This report details the work carried out both on site and in the laboratory and gives recommendations relating to foundation design, settlements etc.

All information, comments and opinions given in this report are based on the ground conditions encountered during the site work, and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site which have not been taken into account. In particular, it should be noted that ground water levels vary due to seasonal or other effects and may at times differ to those measured during the investigation.

(2) GEOLOGY AND TOPOGRAPHY

The site of the proposed works lies in the centre of Worthing, Sussex. The site is bounded to the West by Liverpool Gardens and to the South and East by Liverpool Road.

The properties to the West of the site are mainly commercial and residential, and the properties to the East are mainly retail premises. The sea front is approximately 200m to the South of the site.

The Southern part of the site is currently occupied by the Odeon cinema which includes a tower block of up to 6 storeys. The Northern part of the site is occupied by several old large houses.

The ground in the vicinity of the site is generally level and the roads, pavements, car parks etc are surfaced with asphalt and paving slabs. Hoardings were situated around the cinema to enclose that area of the site. The beach to the South of the site was mainly pebble with some areas of sand.

The British National Grid Reference of the site is TQ148 025.

The Geological Survey Map of Great Britain (sheet 333) shows the site to lie on Brickearth of recent origin overlying Upper and Middle Chalk from the Cretaceous Period. The Brickearth is a brown silt with a few flint fragments and may in part be a solifluxion deposit. The Upper and Middle Chalk is an undivided formation in this area and typically consists of thickly bedded white limestone with flints and nodular bands.

(3) FIELDWORK

4 no. boreholes were sunk between 17 and 20 September 1987 at locations as shown on the enclosed plan.

The boreholes were drilled using a shell and auger percussion drilling rig and were 150mm diameter. The depths of the boreholes were 10.0m and they encountered fill, brown grey very silty clay and finally chalk.

100mm diameter undisturbed samples were recovered from the cohesive strata in the boreholes and returned to the laboratory for testing.

Standard Penetration Tests were carried out in-situ at regular intervals in the granular and chalk deposits and disturbed and bulk samples were taken and returned to the laboratory for classification and testing.

On completion the boreholes were backfilled.

(4) LABORATORY TESTS

(i) Moisture Content

10 no. tests were carried out to determine the natural moisture content of samples.

(ii) Unconsolidated Undrained Triaxial Compression

15 no. compression tests were carried out on undisturbed samples in sets of three, with confining pressures of 100, 200 and 400 kN/m², each set being taken from a different horizon in the boreholes. The tests were performed on 38mm diameter x 76mm long specimens.

1 no. multistage compression test was carried out on an undisturbed sample with confining pressures of 100, 200 and 400kN/m². The test was performed on a 102mm diameter x 204mm long specimen.

(iii) Consolidation

2 no. consolidation tests were carried out on undisturbed samples using an oedometer. The tests were performed on 75mm diameter x 19mm thick specimen under consolidating pressures of 25, 50, 100, 200, and 400 kN/m² to determine the coefficient of volume compressibility and the coefficient of consolidation.

(iv) Atterberg Limits

6 no. tests were carried out to determine the liquid and plastic limits and plasticity index of cohesive samples.

(v) California Bearing Ratio

1 no. test to determine the CBR values of a recompacted sample was carried out on a sample of 150mm diameter x 126mm thick.

(vi) Chemical Tests

3 no. tests to determine the total sulphate content and 3 no. tests to determine the pH value of the soil were carried out.

3 no. tests to determine the sulphate content, 3 no. tests to determine the chloride content and 3 no. tests to determine the pH value of the groundwater were carried out.

(5) RESULTS

(5.1) Strata Encountered

The boreholes encountered generally similar strata across the site. Initially they encountered shallow depths of fill over much of the site, but up to 1.5m depth at borehole 3.

This was underlain by a firm to stiff brown silty clay with some black organic deposits which became a mottled brown grey very silty clay with depth. In borehole 3 this deposit was a soft brown clayey silt. Flint and chalk gravel was encountered in these deposits at various depths.

At approximately 3.5m depth the boreholes penetrated chalk which generally contained some clay in its upper depths. The chalk became harder below approximately 5-6m, although from the undisturbed samples it appeared to be a Grade V chalk.

(5.2) Foundation Properties

The results of Standard Penetration Tests carried out in the boreholes were as follows:-

Borehole No	Depth m	SPT N-Value	Description
1	4.0	49	Yellow white CHALK
1	6.0	69	Yellow white CHALK
1	7.0	21	Yellow white CHALK

Borehole No	Depth m	SPT N-Value	Description
1	9.5	44	Yellow white CHALK
2	4.0	27	Yellow white CHALK with clay
2	5.0	31	Yellow white CHALK with clay
2	7.0	33	Yellow white CHALK
2	9.5	53	Yellow white CHALK
3	2.0	5	Brown clayey SILT
3	3.0	4	Brown clayey SILT
3	5.0	11	Yellow white CHALK
3	6.0	20	Yellow white CHALK
3	8.0	60	Yellow white CHALK
3	9.5	58	Yellow white CHALK
4	2.0	5	Brown grey silty CLAY
4	3.0	6	Brown very silty CLAY
4	5.0	10	Yellow white CHALK
4	6.0	17	Yellow white CHALK
4	8.0	30	Yellow white CHALK
4	9.5	58	Yellow white CHALK

These results give low SPT N-Values for the deposits of clayey silt and silty clay at 2-3m depth in boreholes 3 and 4.

approximately 50kN/m². The design of piles in chalk is normally based on SPT N-values rather than the grade of chalk. However we consider that many of the SPT N-values over estimate the hardness of the chalk probably due to the presence of flints and hard nodules, and pile design should therefore be based on the minimum SPT N-value in the chalk at any given depth. We therefore consider that the N-values should be taken as follows:-

Depth m	Assumed SPT N-value
3.5-6.0	10
6.0-7.5	20
7.5-9.0	30
9.0-10.0	45

Based on these values a 500mm diameter driven pile founded at 9.0m depth should have an allowable capacity of approximately 600-700kN.

As the bearing capacity of piles can vary depending on the type and method of installation we recommend that the advice of specialist piling contractors is sought with regard to detailed design of piles.

Additionally we would recommend that pile loading tests are carried out. For piles in chalk such tests should be carried out several days after driving to allow excess pore pressures associated with the piling to dissipate.

With regard to floor slabs, we consider that the firm to stiff silty clay should adequately support any anticipated floor loadings. However some consolidation settlement will occur in the clay and based on the

results of the consolidation tests we estimate that floor loadings of 25kN/m² may give rise to consolidation settlements of approximately 15mm in the clay. Lower floor loadings will give rise to proportionally lower consolidation settlements. Some elastic settlement will also occur in the chalk but this should be small.

The results of the Atterberg limit tests show the clays at shallow depth to be from Group CI as laid down in the extended Casagrande Soil Classification System. These soils are likely to exhibit medium susceptibility to shrinkage and swelling with changes in moisture content.

(5.3) Road Foundations

A CBR test on a sample of fill at 0.5m depth in borehole 4 gave a value of 3%. We consider that this value should also be representative of the clays encountered on the site.

(5.4) Chemical Properties

The results of chemical tests on samples of soil showed total sulphate contents up to 0.09% and on samples of water showed sulphate contents up to 0.08gm/litre. The site will therefore fall into Class 1 as defined in BRE Digest 250 and no special precautions are required with regard to concrete in foundations.

The chloride content of the groundwater was 0.08 gm/litre which is low.

pH values were 7.5-8.0 indicating near neutral conditions.

(6) CONCLUSIONS AND RECOMMENDATIONS

(6.1) The boreholes encountered fill overlying brown grey very silty clay and finally chalk. The silty clay is considered to be Brickearth and the chalk is undivided Upper and Middle Chalk.

(6.2) In view of the low SPT N-values at shallow depths in several of the boreholes, we consider that foundations should be piled.

(6.3) Piles should be taken down to the chalk in which they should provide adequate load capacities. For example a pile driven to 9m depth should have an allowable capacity of 600-700kN.

(6.4) Ground floor slabs may be supported directly off the firm to stiff silty clay beneath the fill. Consolidation settlements of approximately 15mm may be anticipated for a floor slab loading of 25kN/m^2.

(6.5) We consider that a CBR value of 3% may be assumed for road design in the fill and underlying clay.

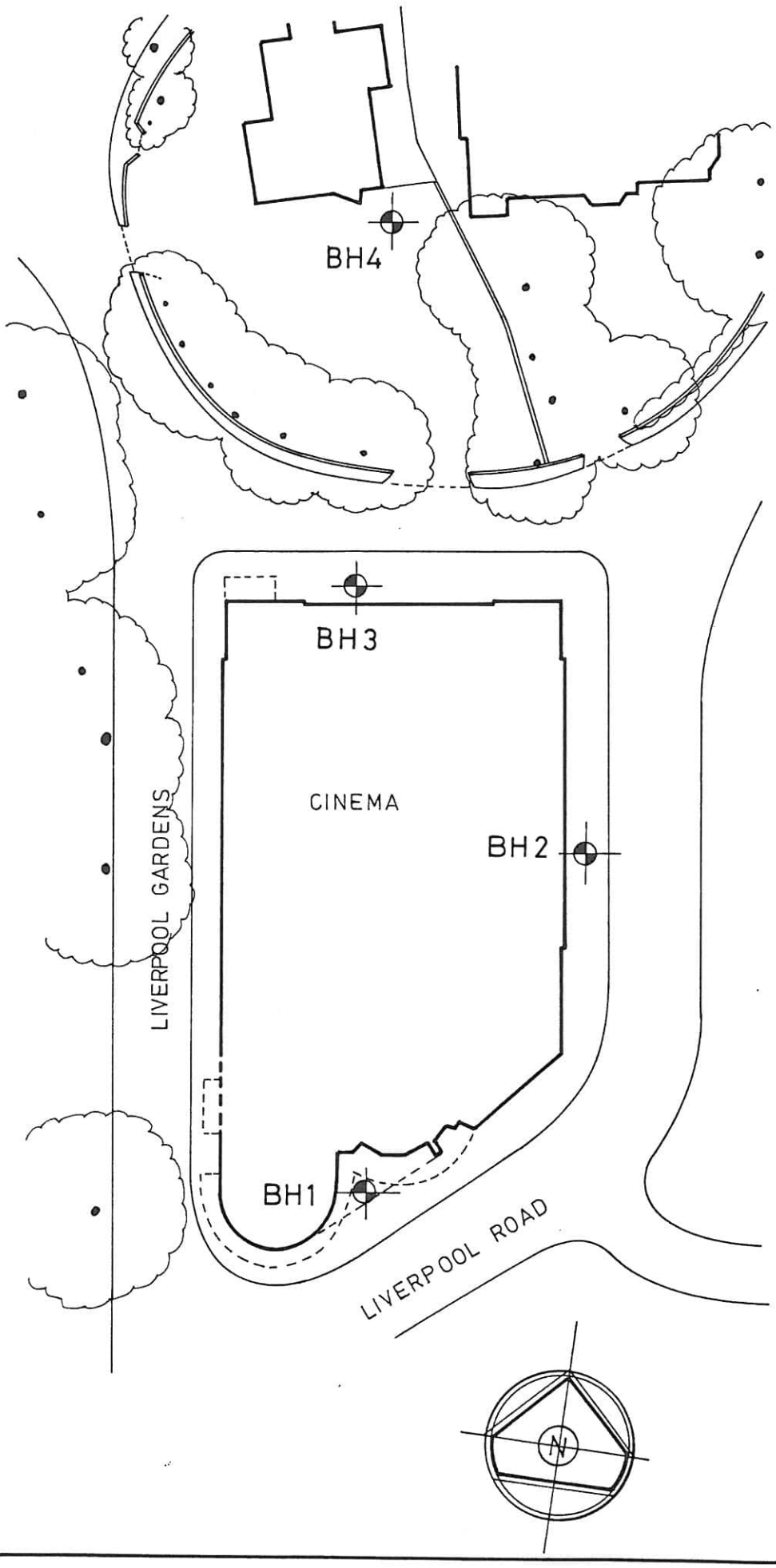
(6.6) The sulphate and chloride content of the soil and groundwater was such that no special precautions are required with regard to concrete in foundations.

STRUCTURAL SOILS LIMITED

K.R.R. Steed C.Eng., M.I.Struct.E / A.R. Handcock M.A., C.Eng., M.I.C.E.

(7) Borehole Location Plan

BOREHOLE LOCATION PLAN - WORTHING



(8) Borehole Logs

Structural Soils Limited

BOREHOLE LOG

CONTRACT	CLIENT	DATE	BOREHOLE No / SHEET
WORTHING	THE AVON GROUP	19.8.87	BOREHOLE No 1 SHEET 1 OF 1

GROUND LEVEL	GRID REF.	EQUIPMENT & METHOD	DIAMETER	DEPTH OF HOLE
		SHELL AND AUGER	150mm	10.0m

Casing Depth	Samples and In-situ Tests: No	Type	Depth	Blows	Water	Description of Strata	Depth M.	Legend
						Paving slabs on asphalt, china, sand, brick etc FILL		
	1	D	0.5			Firm brown silty CLAY with flint gravel and bands of black silty clay	0.2 0.4	
	2	U	1.0	15		Firm brown very silty CLAY with flint and chalk gravel	1.0	
	3	D	1.5				1.5	
	4	D	1.8			Firm to stiff mottled brown grey very silty CLAY	2.0	
	5	U	2.0	17				
	6	D	2.5					
	7	D	2.8			Soft yellow orange and grey clayey sandy SILT	2.7 3.0	
	8	U	3.0			Medium dense brown SILT SAND GRAVEL and CHALK	3.1	
					3.5m		3.5	
	9	D	3.8			Yellow white CHALK matrix containing small lumps of weathered chalk and broken flint (Grade VI chalk)	4.0	
	10	SPT	4.0	49				
	11	U	5.0	100			5.0	
	12	D	5.3					
	14	D	5.6					
	15	SPT	6.0	49			6.0	
	16	D	6.5			Yellow white unweathered and partly weathered CHALK blocks and fragments in a matrix of deeply weathered chalk. (Grade V chalk)	7.0	
	17	SPT	7.0	21	S			
7.5m								
	18	U	8.0	90			8.0	
	19	D	8.5					
	20	D	9.0				9.0	
	21	SPT	9.5	44				
	22	W	9.5					
						Borehole terminated at 10.0m depth	10.0	

REMARKS

Hand dug inspection pit to 1.0m to check for services

Water strikes at 4.5m and 7.5m depth

SAMPLE TEST KEY

U: Undisturbed
D: Disturbed
B: Bulk
W: Water

SPT: Standard Penetration Test
V: Vane Test

Structural Soils Limited

BOREHOLE LOG

CONTRACT	CLIENT	DATE	BOREHOLE No / SHEET
WORTHING	THE AVON GROUP	20.8.87	BOREHOLE No 2 SHEET 1 OF 1

GROUND LEVEL	GRID REF.	EQUIPMENT & METHOD	DIAMETER	DEPTH OF HOLE
		SHELL AND AUGER	150mm	10.0m

Casing Depth	Samples and In-situ Tests: No	Type	Depth	Blows	Water	Description of Strata	Depth M.	Legend
						Paving slabs over concrete and gravel FILL	0.3	
	1	D	0.5					
	2	U	1.0	20		Firm to stiff brown very silty CLAY with black organic deposits	1.0	
	3	D	1.5				1.5	
	4	D	1.8					
	5	U	2.0	30			2.0	
	6	D	2.5		2.5m	Firm to stiff mottled brown grey very silty CLAY with flint and chalk fragments		
	7	D	2.8					
	8	U	3.0	25			3.0	
	9	D	3.5		S		3.5	
	10	SPT	4.0	27		Firm yellow white CHALK in a sandy brown CLAY matrix	4.0	
	11	D	4.5					
	12	SPT	5.0	31			5.0	
	13	D	5.8				5.7	
	14	U	6.0	100		Yellow white CHALK matrix containing small lumps of weathered chalk, and broken flint with some brown silty clay	6.0	
	15	D	6.6					
	16	SPT	7.0	33	S		6.8	
7.5m	17	D	7.5			Yellow white unweathered and partly weathered CHALK blocks and fragments in a matrix of deeply weathered chalk (Grade V chalk)	7.0	
	18	U	8.0	100			8.0	
	19	D	8.5					
	20	D	9.0					
	21	SPT	9.5	53			9.0	
	22	W	9.5					
						Borehole terminated at 10.0m depth	10.0	

REMARKS

Water strikes at 3.5m and 7.0m depth

SAMPLE TEST KEY

U: Undisturbed
D: Disturbed
B: Bulk
W: Water

SPT: Standard Penetration Test
V: Vane Test

Structural Soils Limited

BOREHOLE LOG

CONTRACT	CLIENT	DATE	BOREHOLE No
WORTHING	THE AVON GROUP	18.8.87	3
			SHEET 1 OF 1

GROUND LEVEL	GRID REF.	EQUIPMENT & METHOD	DIAMETER	DEPTH OF HOLE
		SHELL AND AUGER	150mm	10.0m

Casing Depth	Samples and In-situ Tests				Water	Description of Strata	Depth M.	Legend
	No	Type	Depth	Blows				
						Paving slabs on sand FILL	0.1	
	1	D	0.5					
	2	U	1.0	20		Firm to stiff brown very silty clay with some brick and black organic deposits FILL	1.0	
	3	D	1.5				1.5	
	4	SPT	2.0	5		Soft light brown clayey SILT with some fine flint and chalk gravel	2.0	
	5	D	2.5					
	6	SPT	3.0	4			3.0	
					3.5m			
	7	D	3.8			Yellow white CHALK matrix containing chalk and flint gravel with some brown silty clay	3.5	
	8	U	4.0	38			4.0	
					S	Yellow white unweathered and partly weathered CHALK blocks and fragments in a matrix of deeply weathered chalk and bands of very hard chalk (Grade V chalk)		
	9	SPT	5.0	11			5.0	
	10	D	5.5					
	11	SPT	6.0	20			6.0	
	12	D	6.5					
	13	U	7.0	100			7.0	
7.5m	14	D	7.5					
	15	SPT	8.0	60			8.0	
	16	D	9.0				9.0	
	17	SPT	9.5	58				
	18	W	9.5					
						Borehole terminated at 10.0m depth	10.0	

REMARKS

Water strike at 4.5m depth

SAMPLE TEST KEY

U: Undisturbed
D: Disturbed
B: Bulk
W: Water

SPT: Standard Penetration Test
V: Vane Test

Structural Soils Limited

BOREHOLE LOG

CONTRACT	CLIENT	DATE	BOREHOLE No
WORTHING	THE AVON GROUP	17.8.87	4
			SHEET 1 OF 1

GROUND LEVEL	GRID REF.	EQUIPMENT & METHOD	DIAMETER	DEPTH OF HOLE
		SHELL AND AUGER	150mm	10.0m

Casing Depth	Samples and In-situ Tests				Water	Description of Strata	Depth M.	Legend
	No	Type	Depth	Blows				
	1	B	0.5			Tarmac overlying brick, gravel, silty clay, chalk and ash FILL	0.5	
	2	D	0.8			Firm to stiff brown sandy silty CLAY with some small black organic deposits	1.0	
	3	U	1.1	14			1.5	
	4	D	1.6			Firm mottled brown grey very silty CLAY with bands of light brown silty clay, small roots and flint and chalk gravel	2.0	
	5	SPT	2.0	5			2.5	
	6	D	2.6			Soft to firm brown very silty CLAY with white chalk and flint gravel	3.0	
	7	SPT	3.0	6	3.0m		3.7	
	8	D	3.8			Yellow white CHALK matrix containing chalk and flint gravel with some brown silty clay	4.0	
	9	U	4.0	25	S		5.0	
	10	D	4.5				5.5	
	11	SPT	5.0	10		Yellow white unweathered and partly weathered CHALK blocks and fragments in a matrix of deeply weathered chalk with bands of very hard chalk (Grade V chalk)	6.0	
	12	D	5.5				7.0	
	13	SPT	6.0	17			8.0	
	14	D	6.5				9.0	
	15	U	7.0	70			10.0	
	16	D	7.4					
7.5m	17	W	7.5					
	18	SPT	8.0	30				
	19	D	9.0					
	20	SPT	9.5	58		Borehole terminated at 10.0m depth		

REMARKS

Hand dug inspection pit to 1.0m tc check for services

Water strike at 4.5m depth

SAMPLE TEST KEY

U: Undisturbed
D: Disturbed
B: Bulk
W: Water
SPT: Standard Penetration Test
V: Vane Test

(9) Laboratory Test Results

Structural Soils Limited

RESULTS OF LABORATORY TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	1

Sample Depth	Natural (m) %	Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Index Properties %			Description of Sample
				LL	PL	PI	
0.5	33			40	24	16	Grey brown CLAY
2.0	20	2130	1775	33	21	12	Brown CLAY

Structural Soils Limited

RESULTS OF LABORATORY TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	2

Sample Depth	Natural (m) %	Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Index Properties %			Description of Sample
				LL	PL	PI	
0.5	26			39	21	18	Grey brown CLAY
1.0	24	2030	1637				Yellow brown CLAY
3.0	16	2140	1845				Light brown sandy CLAY with chalk

Structural Soils Limited

RESULTS OF LABORATORY TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	3

Sample Depth	Natural (m) %	Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Index Properties %			Description of Sample
				LL	PL	PI	
1.0	22	2044	1675	37	21	16	Brown silty CLAY
2.5	21			28	21	7	Brown CLAY
4.0	21						Brown CLAY with chalk

Structural Soils Limited

RESULTS OF LABORATORY TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	4

Sample Depth	Natural (m) %	Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Index Properties %			Description of Sample
				LL	PL	PI	
0.5	20	2099	1749				Brown gravelly clayey FILL
1.1	23	2049	1666				Light brown silty CLAY
2.6	20			27	16	11	Brown silty CLAY with gravel

Structural Soils Limited

RESULTS OF CHEMICAL TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	1

Sample Depth	Acid Soluble Sulphate as % SO_3	Ground Water or Aqueous Extract as g/litre SO_3	Soluble Chloride in Groundwater as g/litre NaCl.	pH Value	Organic Matter %	Description of Sample
0.5	0.09			7.5		Grey brown CLAY
9.5		0.08	0.08	7.5		WATER

Structural Soils Limited

RESULTS OF CHEMICAL TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	2

Sample Depth	Acid Soluble Sulphate as % SO_3	Ground Water or Aqueous Extract as g/litre SO_3	Soluble Chloride in Groundwater as g/litre NaCl.	pH Value	Organic Matter %	Description of Sample
1.0	0.07			7.5		Yellow brown CLAY
9.5		0.06	0.08	7.5		WATER

Structural Soils Limited

RESULTS OF CHEMICAL TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	3

Sample Depth	Acid Soluble Sulphate as % SO_3	Ground Water or Aqueous Extract as g/litre SO_3	Soluble Chloride in Groundwater as g/litre NaCl.	pH Value	Organic Matter %	Description of Sample
4.0	0.07			8.0		White CHALK

Structural Soils Limited

RESULTS OF CHEMICAL TESTS

CONTRACT	DATE	BOREHOLE NO.
WORTHING	SEPTEMBER 1987	4

Sample Depth	Acid Soluble Sulphate as % SO_3	Ground Water or Aqueous Extract as g/litre SO_3	Soluble Chloride in Groundwater as g/litre NaCl.	pH Value	Organic Matter %	Description of Sample
7.5		0.07	0.04	7.5		WATER

Job Title		Date
Montague Quarter Worthing		**19 02 24**
Item **TRIAL PIT REPORT**	Job No. **E9169**	Report No. **TP01**
Visit by: **Rick Potterton** For and on behalf of Stephen Wilson Partnership Ltd		

STEPHEN WILSON PARTNERSHIP LTD
Chalvington Barn, Dittons Business Park, Dittons Road, POLEGATE, BN26 6HY Telephone: 01323 412020
E-mail: info@swpeast.co.uk • Website: www.swpeast.co.uk

Requirement	Trial pit required to confirm pile cap details shown on the record drawings and as presumed from pile assessment calculations
Works	Trial pit excavated through concrete ground floor slab to 1.6m below ground level alongside and for the full depth of the pile cap.
Company	Undertaken by groundwork contractor engaged by Accel Ltd, the project manager
Location	Within Unit 11, at internal column on grid H (Originally planned for Unit 10, but contractor asked for it to be moved to unit 11. This was agreed).
Weather	Cool with some light rain
Findings	Refer to SK 13 attached. o 1600mm deep pit. o 150mm thick A393 mesh reinforced concrete slab on blue plastic DPM on 150mm granular sub-base on compacted silty Clay (returned excavated material as backfill) o 2.0 x 2.0 x 1.0m deep concrete pile cap cast on a concrete blinding. o No ground water o No apparent soil contamination

Prepared By	**Seen By**	**Date**
Rick Potterton	Dean Giles	**19 02 24**

Copies to	Accel Consulting

Photographs







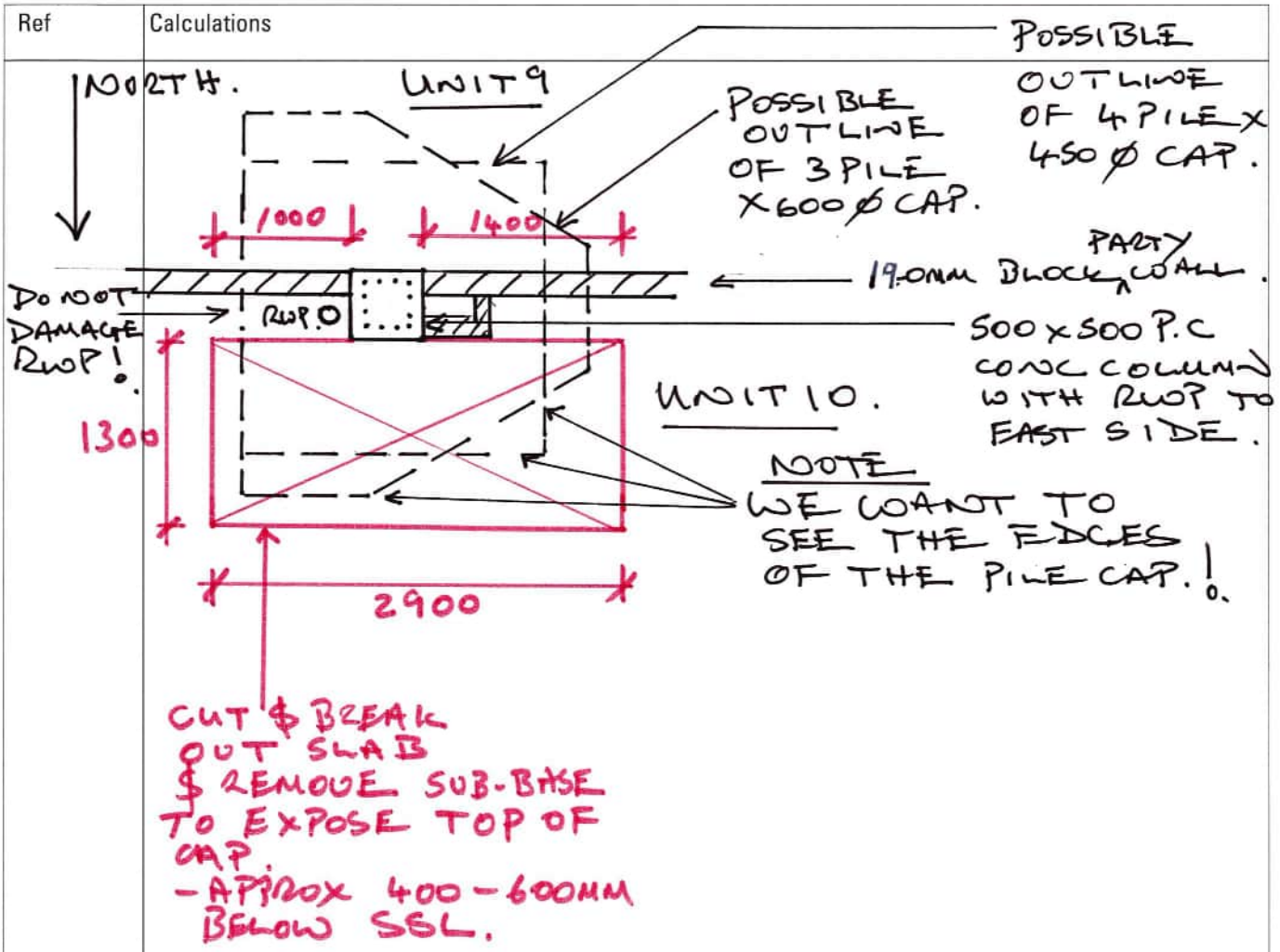


Job Title		Date
MONTAGUE QUARTER.		10.2.24.
Item PILE CAP & GROUP INVESTIGATION	Job No. E9169.	Sheet No. Sk/09.
Prepared by RP.	Checked by	

STEPHEN WILSON PARTNERSHIP LTD

Chalvington Barn, Dittons Business Park, Dittons Road, POLEGATE, BN26 6HY Telephone: 01323 412020
E-mail: info@swpeast.co.uk • Website: www.swpeast.co.uk

Ref	Calculations

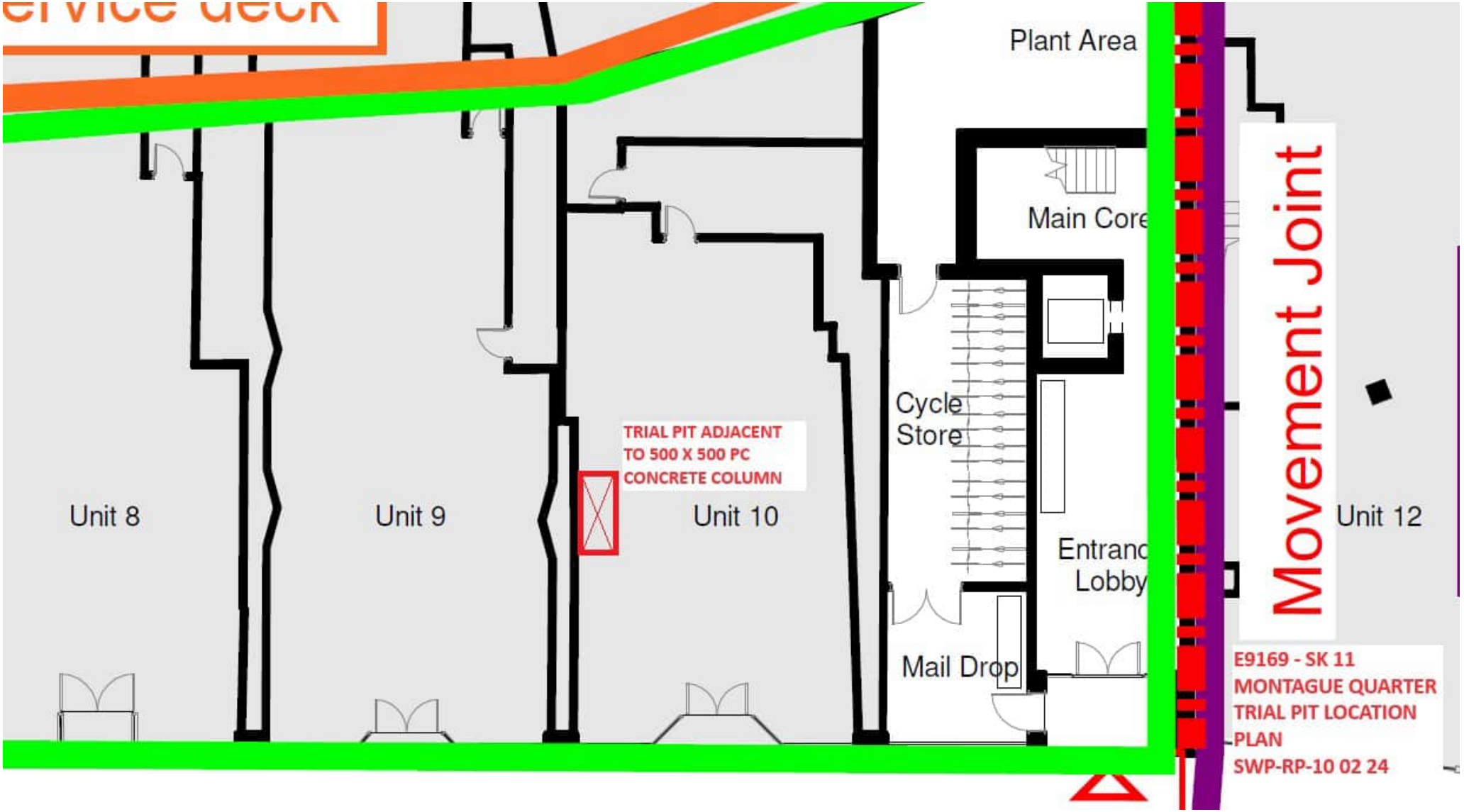


DETAILS OF TRIAL PIT TO EXPOSE TOP OF PILE CAP BELOW 500X500 MM INTERNAL PRECAST CONCRETE COLUMN IN UNIT 10.

(1:50 APPROX).

CDM	

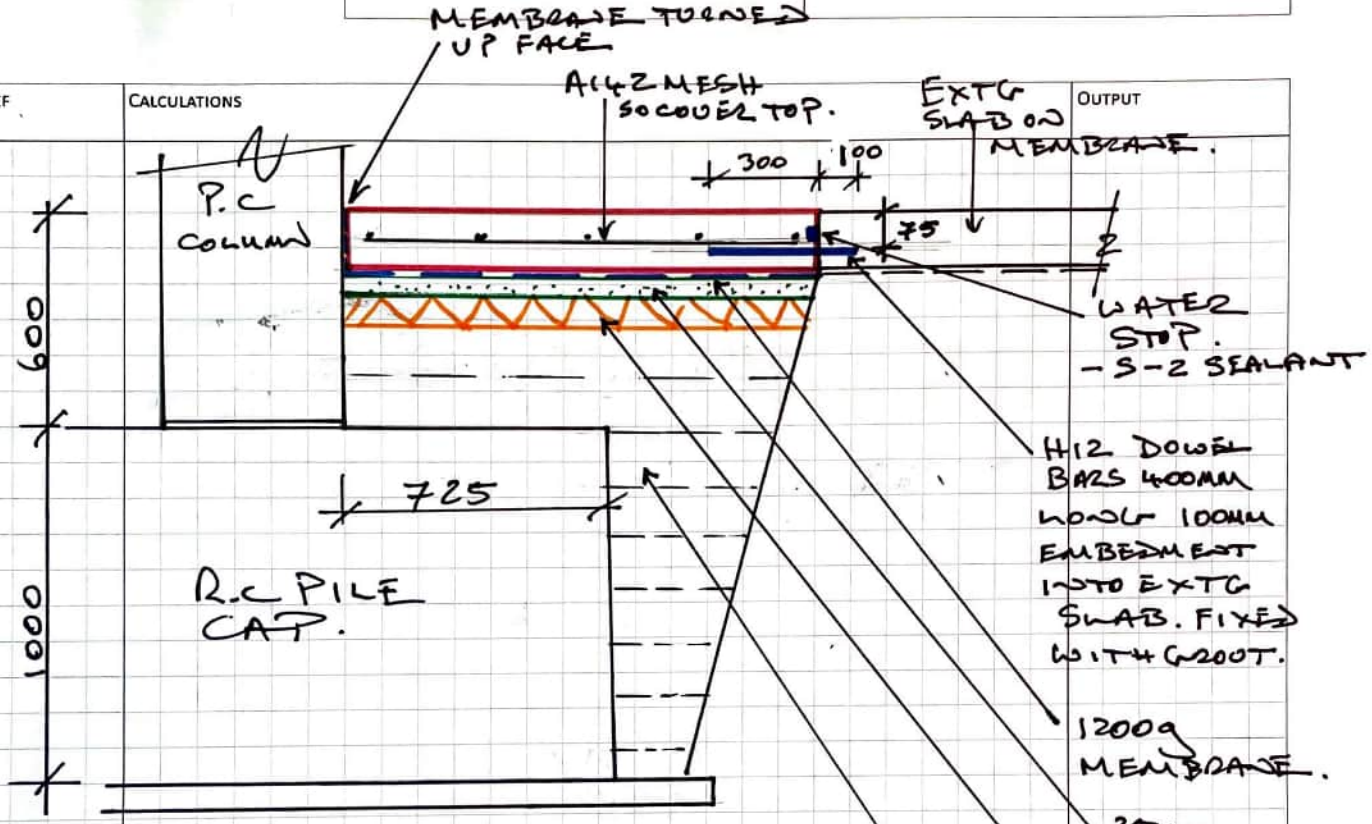

TRIAL PIT AS
SK10 IN THIS
LOCATION


Plant Area
Main Core
Movement Joint
Cycle Store
TRIAL PIT ADJACENT TO 500 X 500 PC CONCRETE COLUMN
Unit 8
Unit 9
Unit 10
Unit 12
Entranc Lobby
Mail Drop
E9169 - SK 11
MONTAGUE QUARTER
TRIAL PIT LOCATION PLAN
SWP-RP-10 02 24

SWP.

Job Title		Date
MONTAGUE QUARTER		19.2.24.
Item TRIAL PIT REINSTATEMENT	Job No. E9169.	Sheet No. Sk/12.
Prepared By RP UNIT 11.	Checked By	

Ref	Calculations	Output



· BACKFILLING DETAILS FOR TRIAL PIT IN UNIT 11.

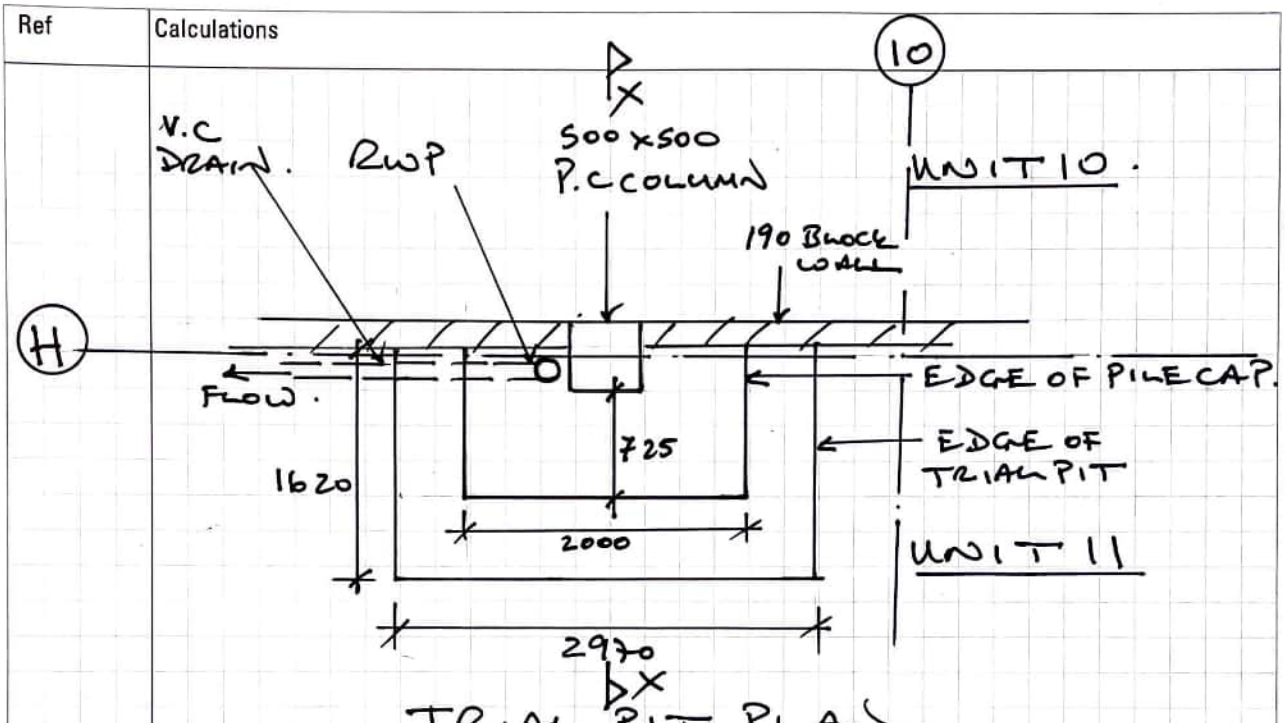
NOTE.

PROVIDE SIKASWELL S-2 SEALANT OR EQUIVALENT HYDROPHILIC WATER STOP TO THE PERIMETER JOINT BETWEEN NEW & EXTG CONCRETE SLABS.

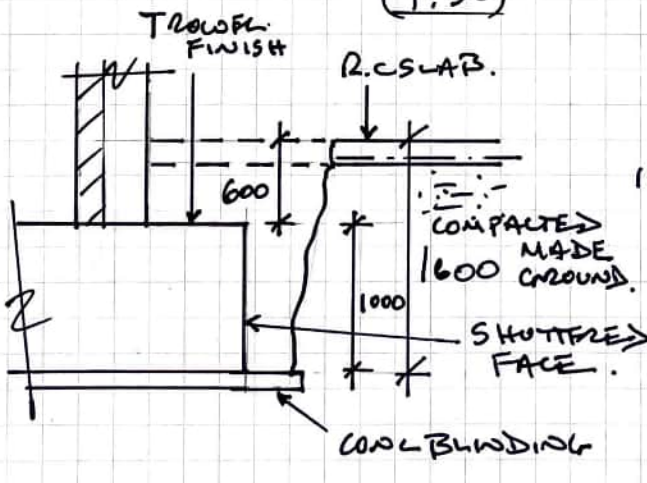
Job Title		Date
MONTAGUE QUARTER		19.2.24.
Item TRIAL PIT DETAILS UNIT 11.	Job No. E9169.	Sheet No. SK/13.
Prepared by RP	Checked by	

SWP
STEPHEN WILSON PARTNERSHIP LTD
Chalvington Barn, Dittons Business Park, Dittons Road, POLEGATE, BN26 6HY Telephone: 01323 412020
E-mail: info@swpeast.co.uk • Website: www.swpeast.co.uk

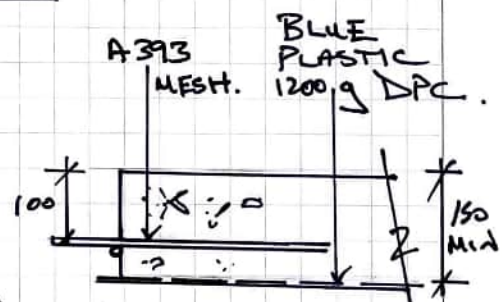
Ref	Calculations



TRIAL PIT PLAN.
(1:50)



SECTION X-X
(1:50)



SECTION THRO' CUT SLAB EDGE
(1:10)

CDM	