

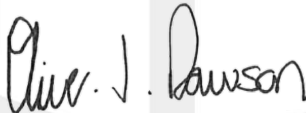


PILE DESIGN REPORT

PROJECT: ENW Eastlands
Rowsley Street
Manchester
M11 3FF

OUR REF: BM/23/5081

CLIENT: Kaberry Construction

Revision	Date	Input By	Checked By
A	11/07/2023	Oliver Dawson	
Signatures			



OVERVIEW	32 No. piles for a transformer base and 30 No. piles for a retaining wall base.
DESIGN STATUS	Approval Issue
STANDARDS AND DESIGN CODES	BS 8004: 2015 – Code of practice for foundations BS8110 – Structural use of concrete BS EN 8500-1 (2015) – Concrete
DRAWINGS	100138-00159 Rev 003 100138-00160 Rev 003
SPECIFICATION	-
SITE INVESTIGATION	EEG report dated January 2021 ref A3738/20
GENERAL LOADING CONDITIONS	Compressive load – 100kN – 250kN Tension – 0KN Shear – 10KN
GROUND CONDITIONS	The ground conditions beneath the site are shown to be made ground followed by clay and finally Sandstone at depth.
PILE TYPE	300mm diameter sectional flight auger (SFA)
PILE LENGTHS	Pile lengths are between 9.0m and 12.0m
PILE REINFORCEMENT	All piles - 4.0m x 6H12, H8 helical at 140mm pitch
MATERIAL DATA	Concrete Strength Class – C28/35 Concrete Design Class – DC-2 (DS-2, AC-1) Reinforcement Grade - B500

PILE TESTING	Integrity testing – 100% of piles Dynamic Testing – 0 No. piles Static load testing – 0 No. piles
NOTES	We note that dynamic testing has been requested on the drawing notes. While this type of testing is possible, we would advise that the results would not yield any useful information. We note an anchorage length of 350mm has been specified on the pile drawings. Our design requires an anchorage length of 480mm.

APPENDIX

- **Soil Profile**
- **Static Design Sheet**
- **Shear Calculations**
- **Pile Schedule**
- **Site Investigation**
- **Drawings**



CALCULATION SHEET



Roger Bullivant Ltd Tel: 01322 977 300
Walton Park
Heathcote Road
Swadlincote
Derbyshire
DE11 9DU
www.roger-bullivant.co.uk

Sheet No. 1 of 2

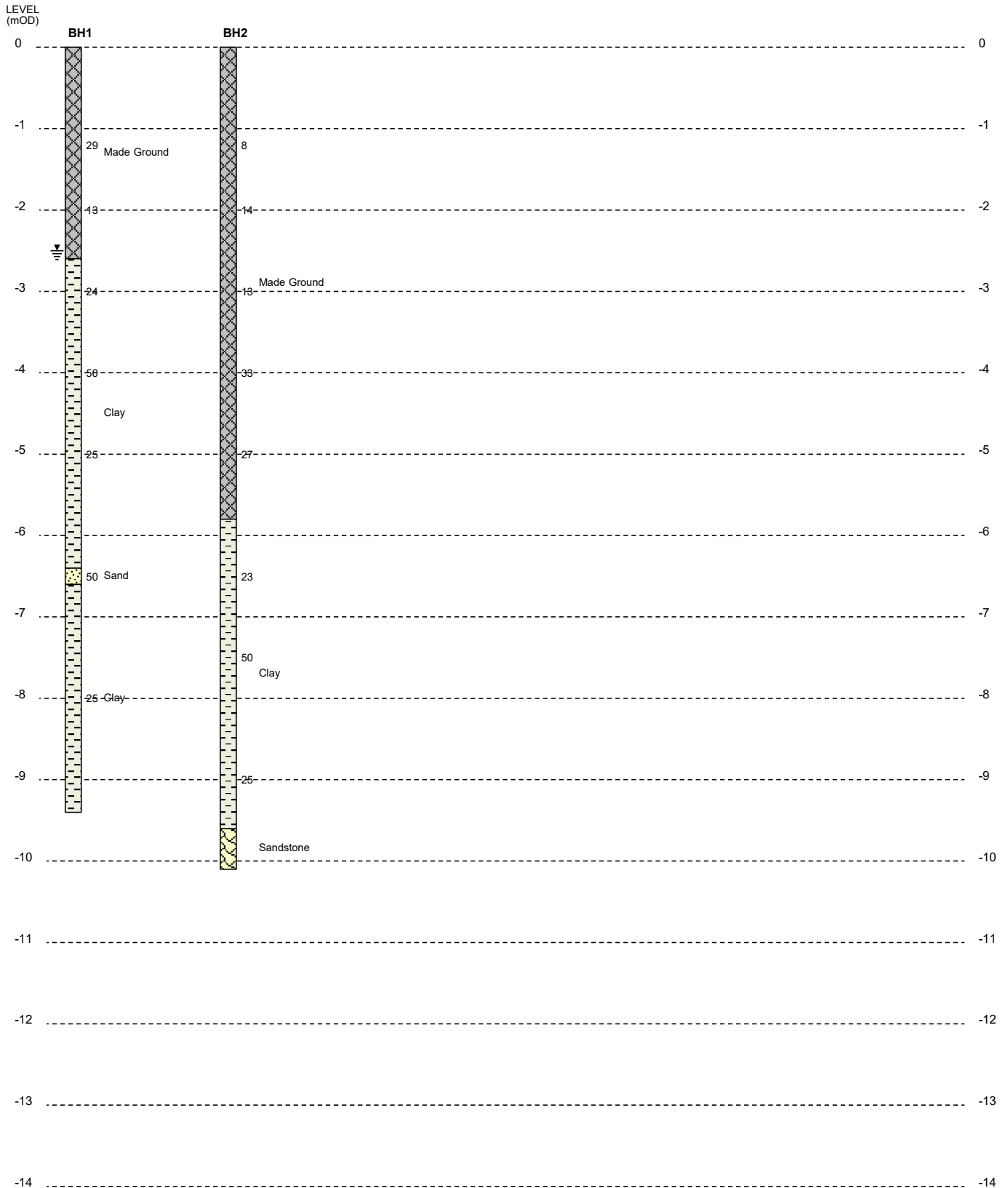
Enq. Con. No.

Calculated by: Date :

Checked by: Date :

Eastlands ENW

Geological Profile



CALCULATION SHEET



Roger Bullivant Ltd Tel: 01322 977 300
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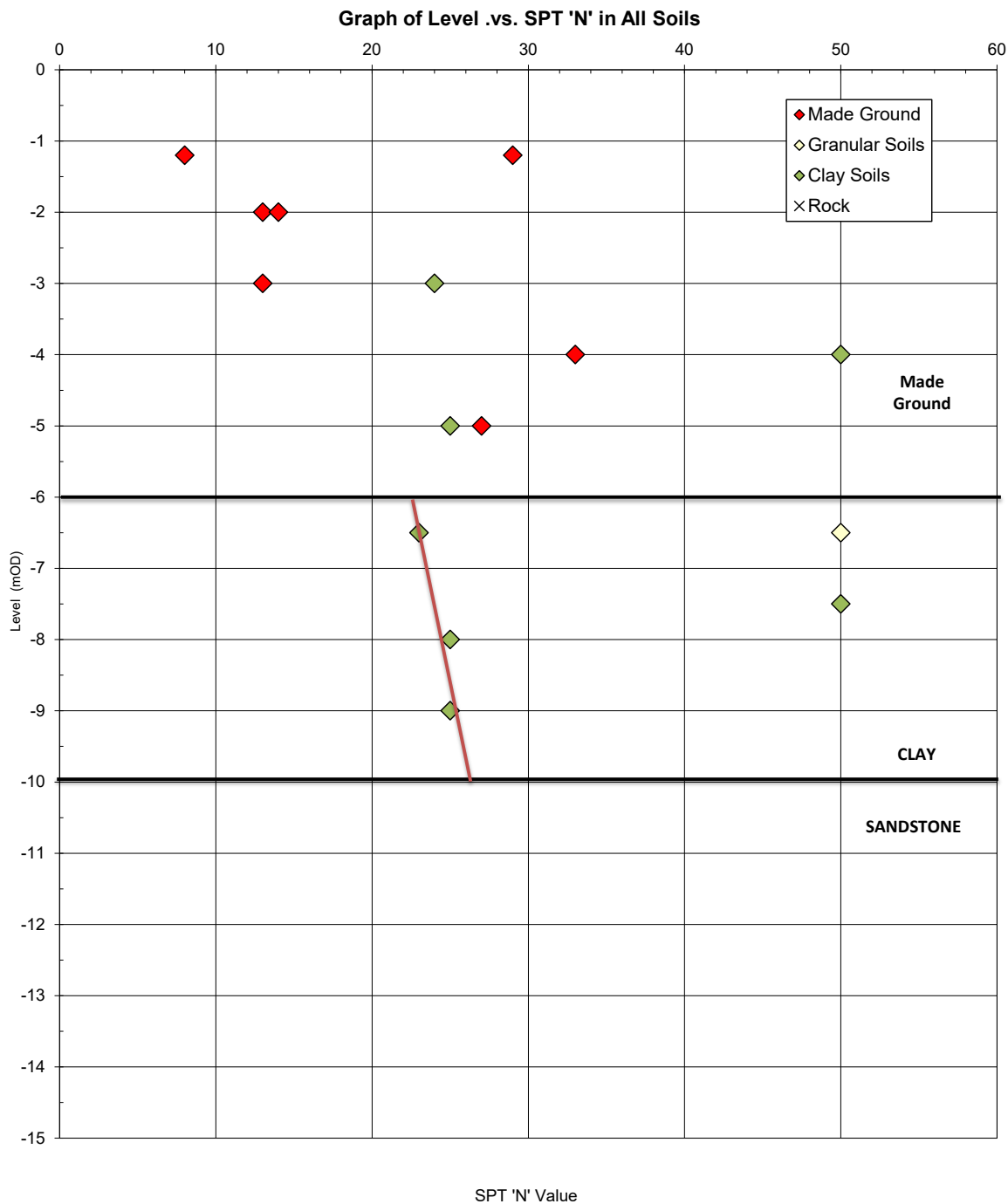
Enq. Con. No.

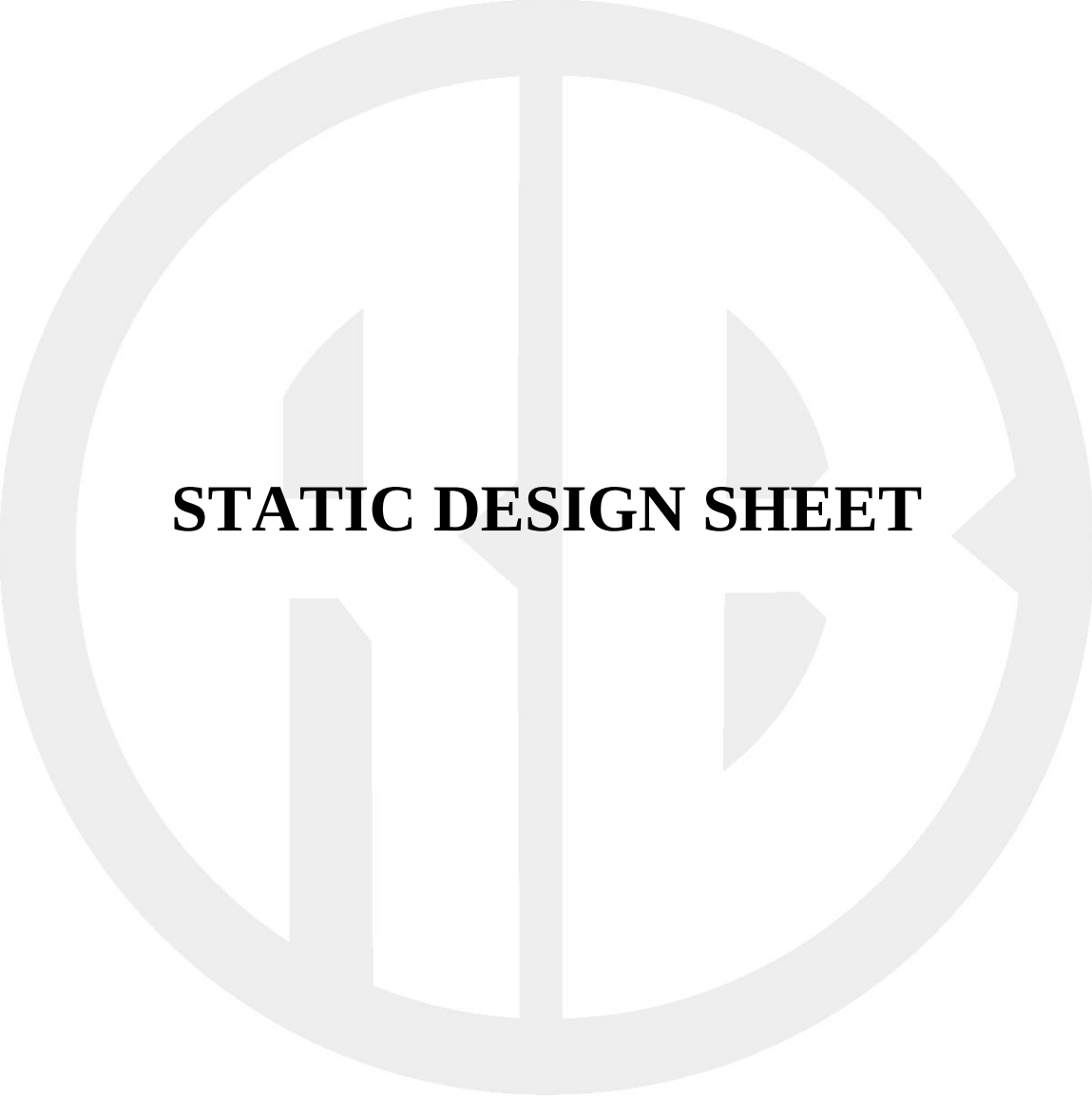
Calculated by: Date :

Checked by : Date :

Eastlands ENW

Geological Profile





STATIC DESIGN SHEET

Project : ENW Eastlands Manchester

Project No : BM/23/5081

Comments:

STATIC DESIGN SHEET
SECTIONAL FLIGHT AUGER PILE
(SFA)
(BS 8004 : 1986)



File :

Revision :

Based on :

Input by : O. Dawson

Revised By :

Chkd By :

Approved For
Construction :

F of S shaft =

3.0

F of S shaft =

1.5

F of S base =

3.0

F of S base =

50.0

F of S NSF =

1.0

F of S NSF =

1.0

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (13) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28)

Depth (Thk. 0.5 m) (m)	Soil Description	Sand Input Parameters				Clay Input Parameters		N.S.F. Parameter	Weak Rock Input Parameters						Bulk Unit Weight	Submerged Unit Weight	Effective o'burden	Unit Skin	Unit Base	(SFA) Piles		0.300	size in m	(SFA) Piles		0.300	size in m	Depth (m)
		N value	Ks tan δ	D/B	Nq	Cu	Alpha	Beta	q uc	φ	N φ	R.Q.D.	α	β	γ	γ '	pressure	kN/m ²	kN/m ²	Ult.	Ult.	Ult	Allowable	Ult.	Ult.	Ult	Allowable	
		Ratio (for Nq)				kN/m ²	α	β	kN/m ²						kN/m ³	kN/m ³	kN/m ²	kN/m ²	kN/m ²	Shaft	Base	N.S.F.	Capacity	Shaft	Base	N.S.F.	Capacity	
0.00 - 0.50	Ignore			2													0	0	0	0	0	0	0	0	0	0	0	0.00 - 0.50
0.50 - 1.00	Ignore			3													0	0	0	0	0	0	0	0	0	0	0	0.50 - 1.00
1.00 - 1.50	Ignore			5													0	0	0	0	0	0	0	0	0	0	0	1.00 - 1.50
1.50 - 2.00	Ignore			7													0	0	0	0	0	0	0	0	0	0	0	1.50 - 2.00
2.00 - 2.50	Ignore			8													0	0	0	0	0	0	0	0	0	0	0	2.00 - 2.50
2.50 - 3.00	Ignore			10													0	0	0	0	0	0	0	0	0	0	0	2.50 - 3.00
3.00 - 3.50	Ignore			12													0	0	0	0	0	0	0	0	0	0	0	3.00 - 3.50
3.50 - 4.00	Ignore			13													0	0	0	0	0	0	0	0	0	0	0	3.50 - 4.00
4.00 - 4.50	Ignore			15													0	0	0	0	0	0	0	0	0	0	0	4.00 - 4.50
4.50 - 5.00	Ignore			17													0	0	0	0	0	0	0	0	0	0	0	4.50 - 5.00
5.00 - 5.50	Ignore			18													0	0	0	0	0	0	0	0	0	0	0	5.00 - 5.50
5.50 - 6.00	Ignore			20													0	0	0	0	0	0	0	0	0	0	0	5.50 - 6.00
6.00 - 6.50	Clay			22		110	0.66										0	72	990	34	70	0	35	34	70	0	24	6.00 - 6.50
6.50 - 7.00	Clay			23		114	0.65										0	74	1026	69	73	0	47	69	73	0	47	6.50 - 7.00
7.00 - 7.50	Clay			25		118	0.64										0	76	1062	104	75	0	60	104	75	0	71	7.00 - 7.50
7.50 - 8.00	Clay			27		122	0.63										0	77	1098	141	78	0	73	141	78	0	95	7.50 - 8.00
8.00 - 8.50	Clay			28		126	0.63										0	79	1134	178	80	0	86	178	80	0	120	8.00 - 8.50
8.50 - 9.00	Clay			30		130	0.62										0	81	1170	216	83	0	100	216	83	0	146	8.50 - 9.00
9.00 - 9.50	Clay			32		134	0.61										0	82	1206	255	85	0	113	255	85	0	172	9.00 - 9.50
9.50 - 10.00	Clay			33		138	0.61										0	84	1242	294	88	0	127	294	88	0	198	9.50 - 10.00
10.00 - 10.50	Sandstone			35					600	32	3.25	0	0.70	0.65			0	250	3906	412	276	0	229	412	276	0	280	10.00 - 10.50
10.50 - 11.00	Sandstone			37					600	32	3.25	0	0.70	0.65			0	250	3906	530	276	0	269	530	276	0	359	10.50 - 11.00
11.00 - 11.50	Sandstone			38					600	32	3.25	0	0.70	0.65			0	250	3906	648	276	0	308	648	276	0	437	11.00 - 11.50
11.50 - 12.00	Sandstone			40					600	32	3.25	0	0.70	0.65			0	250	3906	766	276	0	347	766	276	0	516	11.50 - 12.00
12.00 - 12.50																												12.00 - 12.50
12.50 - 13.00																												12.50 - 13.00
13.00 - 13.50																												13.00 - 13.50
13.50 - 14.00																												13.50 - 14.00
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17.50 - 18.00																												17.50 - 18.00
18.00 - 18.50																												18.00 - 18.50
18.50 - 19.00																												18.50 - 19.00
19.00 - 19.50																												19.00 - 19.50
19.50 - 20.00																												19.50 - 20.00

Limiting Values (kN/m ²)	Sand	Clay	Weak Rock		NSF
			Bored	Driven	
Skin friction Limit	120	120	250	45	120
Base Resistance Limit	12000	12000	20000	20000	NA

GEOTECHNICAL DESIGN ONLY, STRUCTURAL DESIGN OF THE PILE TO BE CONSIDERED ELSEWHERE



SHEAR CALCULATIONS

**BROMS ANALYSIS**Project : ENW EastlandsProject No : BM/23/5081File : Revision : Based On : Comments:
Input by : O.DRevised By : Chkd By : Approved For
Construction : Date : 11-Jul-23Date : Date : Date :

LAYER	LEVEL OF TOP OF STRATUM (m)	SOIL DESCRIPTION	BULK UNIT WEIGHT (kN/m ³)	Cu (kN/m ²)	Phi (°)
1 2 3 4	0.0	Made Ground	17		27

Water Level :- -2.5 mPile Size :- 300 mmUnfactored Lateral Load at Top :- 10 kNUnfactored Moment Applied to Top :- 0 kNmOverburden Pressure on Ground at Top of Pile Level :- 0.0 kN/m²F.O.S. on Lateral Pressure :- 3

NOT CONSIDERED DUE TO FIXED HEAD CONDITIONS

Summary

Level of max moment below cut off level. (m)	Level of bottom of reinforcement below cut off level. (m)	Maximum shear load in pile. (kN)	Unfactored max. moment in pile assuming <u>FIXED</u> head conditions. (kNm)
-1.3	-2.2	10.525	4.014

Level (m)	Factored Lateral Resisting Pressure (kN/m ²)	Shear in Pile (kN)	Moment in Pile (kNm)
0.0	0.000	10.000	-4.014
-0.1	4.527	9.932	-3.016
-0.2	9.054	9.728	-2.032
-0.3	13.581	9.389	-1.075
-0.4	18.108	8.914	-0.158
-0.5	22.635	8.302	0.704
-0.6	27.162	7.555	1.498
-0.7	31.689	6.673	2.210
-0.8	36.216	5.654	2.828
-0.9	40.743	4.500	3.336
-1.0	45.270	3.210	3.723
-1.1	49.797	1.783	3.974
-1.2	54.324	0.222	4.075
-1.3	58.851	0.000	4.014
-1.4	63.378	-1.833	3.923
-1.5	67.905	-3.803	3.642
-1.6	72.432	-5.908	3.158
-1.7	76.959	-8.149	2.456
-1.8	81.486	-10.525	1.524
-1.9	86.013	-8.013	0.596
-2.0	90.540	-5.364	-0.074
-2.1	95.067	-2.580	-0.473
-2.2	99.594	0.340	-0.586

Project No: BM/23/5081	Sheet No:	ROGER BULLIVANT LIMITED RB Walton Park, Heathcote Road Swadlincote, Derbyshire DE11 9DU Tel: 01332 977 300 Web site: www.roger-bullivant.co.uk Email: info@roger-bullivant.co.uk	
Prepared by: O.D	Date:		
Checked by:	Date:		
Approved for Construction by:	Date:		

CIRCULAR COLUMN DESIGN SHEET (BS 8110-1:1997)

Loads

Load Factor = **1.5**

Maximum Unfactored compressive Load (N_{max})	=	250 kN	Maximum design compressive action ($N_{d,max}$)	=	375 kN
Minimum Unfactored Compressive Load (N_{min})	=	0 kN	Minimum design Compressive action ($N_{d,min}$)	=	0 kN
Maximum Unfactored shear (V)	=	11 kN	Maximum design shear (V_d)	=	16 kN
Maximum Unfactored moment (M)	=	4 kNm	Maximum design moment (M_d)	=	6 kNm

*Apply load factor to minimum compressive load; **No**

Concrete

Pile diameter (H)	=	300 mm
Minimum cover (c)	=	75 mm
Concrete grade	=	28/35 N/mm ²
Characteristic strength of concrete (f_{cu})	=	35 N/mm ²

Reinforcement

Characteristic yield strength of steel (f_y)	=	500 N/mm ²	f_{ywk}	=	500 N/mm ² (For links)
Longitudinal cage bars	=	B 12			
Number of cage bars	=	6			(Maximum of 16 bars)
Central bar size	=	B 0			
Designed links required (Yes/No)	=	No			
Area of steel provided (cage only)	=	679 mm ²			
Link size (links)	=	B 8			
Link spacing (closed link spacing)	=	140 mm	(Maximum link spacing	=	145 mm)
Pitch (helical link spacing)	=	140 mm	($A_{sw1,prov}$	=	50 mm ² $A_{sw1,req}$ = NA mm ²)

Designed shear links not required. For reinforcement checks satisfy Table A and Table B for closed links or Table D for helical links.

A) Flexural Checks	B) Shear Design Checks - Non-Designed Links	C) Shear Design Check - Designed Closed Links	D) Shear Design Checks - Designed Helical Links
1. OK - Design Moment < Moment of Resistance	5. OK - Design Links Not Required		
2. OK - Maximum Steel Limit	6. OK - Maximum Link Spacing		
3. OK - Minimum Reinforcement provided	7. OK - Maximum Pitch Spacing		
4. OK - Minimum No. of Bars and Bar Diameter Provided			

Cage Summary Table and Approximate Cage Weight					
Length (Max)	Longitudinal Bars	Shear Links		Cage Weight	Cage Design Ref
0 m	6 B12	with	B8 @	140mm Spacing or, (0kg) 140mm Pitch (0kg)	Type

DES-SFD 0424 V2 26/09/22

Template Approved For Use : ... JDB ... Date : ... 26/09/22



SWL MOMENT OF RESISTANCE vs. SWL AXIAL RESISTANCE OF THE COLUMN

PILE DIAMETER (mm) = 300

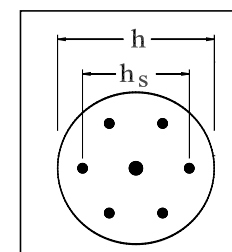
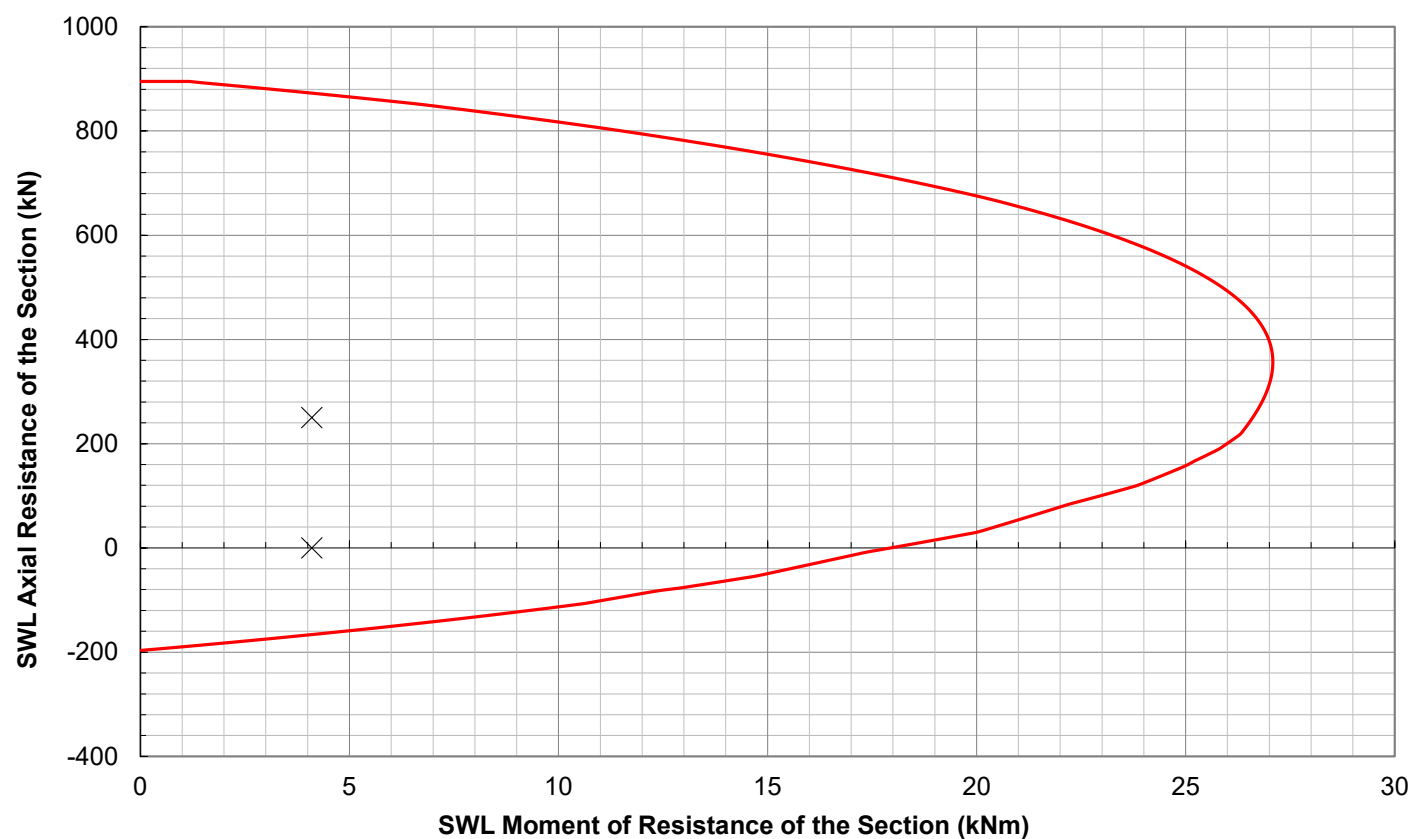
COVER TO LINKS (mm) = 75

CONCRETE STRENGTH (N/mm^2) = 35

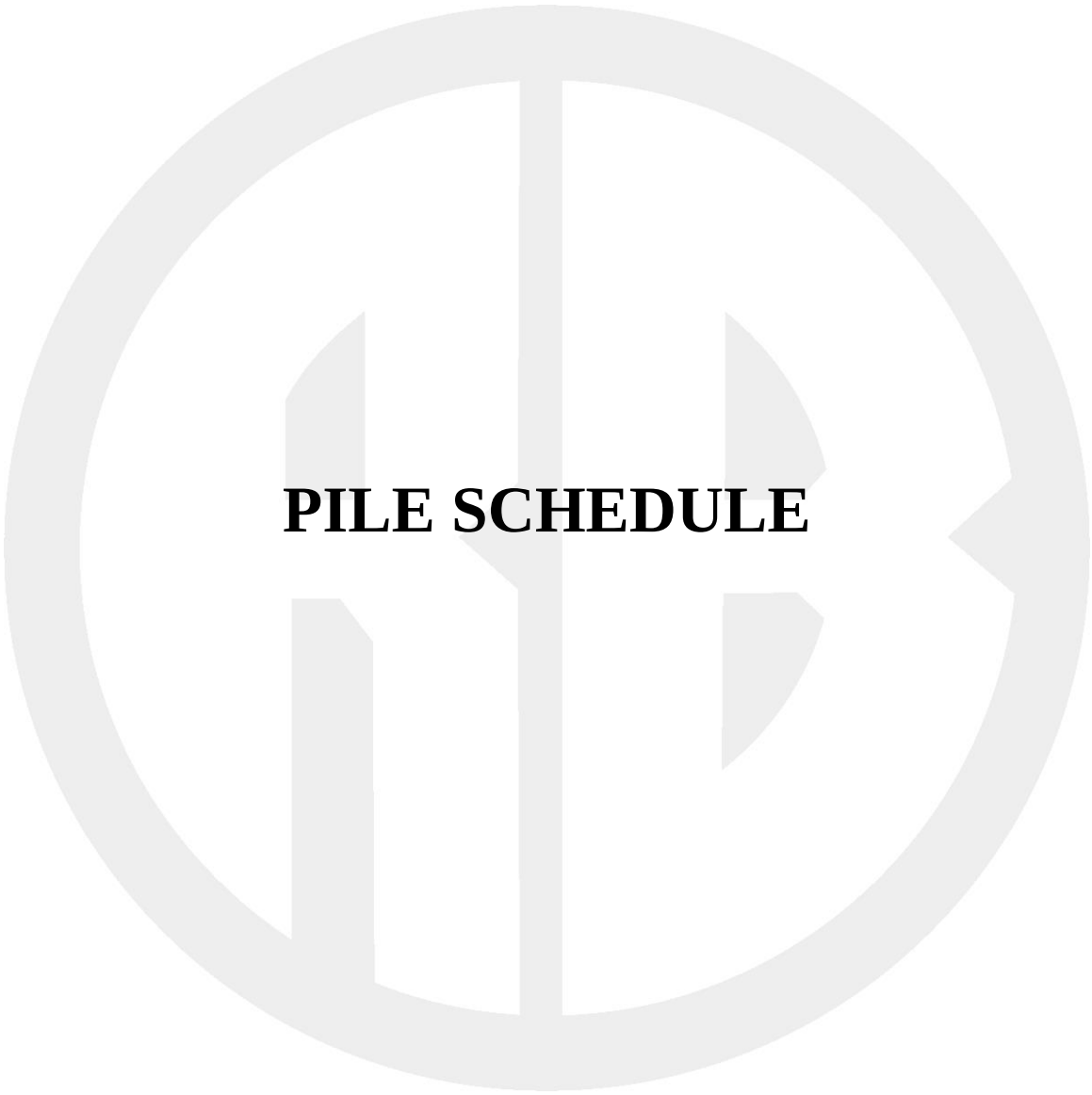
CAGE BARS = T 12

CENTRAL BAR = T 0

LINKS = T 8



f_{cu}	35
f_y	500
d/h	0.41



PILE SCHEDULE

Project Name	ENW Eastlands
Project No.	BM23/5081
Engineer	O. Dawson



ROGER BULLIVANT

British Standard	
FOS SHAFT	3.0
FOS BASE	3.0

PILE
SCHEDULE

Notes
Concrete - C28/35 DC-2

Pile no.	no. of piles	Design SWL	Tension Load	Horizontal Load	Pile Diameter	Levels			Theoretical Length	Installed Length	Pile Reinforcement	Cage Type	Total Length
						p.p.l.	c/off	Δ					
TRANSFORMER SWITCH HOUSE													
1	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
2	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
3	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
4	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
5	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
6	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
7	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
8	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
9	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
10	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
11	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
12	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
13	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
14	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
15	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
16	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
17	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
18	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
19	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
20	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
21	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
22	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
23	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
24	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
25	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
26	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
27	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
28	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
29	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
30	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
31	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
32	1	250	0	10	300	0.000		0.00	0.000	12.0	12.0	4.0m x 6H12, H8@140mm	12.0
RETAINING WALL													
33	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
34	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
35	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
36	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
37	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
38	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
39	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
40	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
41	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
42	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
43	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
44	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
45	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
46	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
47	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
48	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
49	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
50	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
51	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
52	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
53	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
54	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
55	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
56	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
57	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
58	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
59	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
60	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
61	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0
62	1	100	0	10	300	0.000		0.00	0.000	9.0	9.0	4.0m x 6H12, H8@140mm	9.0

sum	62	100		min					9.0	min			654
		250		max					12.0	max			10.5

62	300	dia. Piles	Totals	654.0
			Averages	10.5



SITE INVESTIGATION

Borehole Log

Borehole No.

BH1

Sheet 1 of 2

Project Name: Eastlands Primary

Project No.
A3738

Co-ords: 386458.00 - 398662.00

Hole Type
CP

Location: Manchester

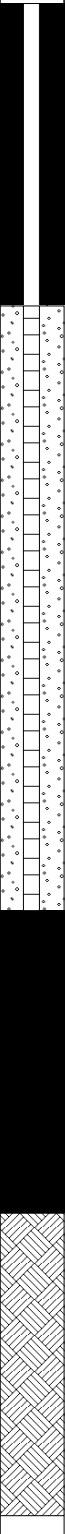
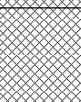
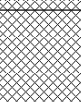
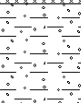
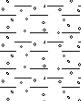
Level: 0.00

Scale
1:25

Client: Electricity North West Ltd

Dates: 12/11/2020 - 12/11/2020

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	-0.20		MACADAM. (MADE GROUND)	1
					0.60	-0.60		Grey clayey gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of quartzite, clinker and redbrick. (MADE GROUND)	
								Angular concrete cobble. (MADE GROUND) <i>Cobble pushed down.</i>	
		1.10	D	N=29 (3,4/6,6,7,10)	1.10	-1.10		Medium dense black ashly clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of redbrick, clinker and concrete. Occasional glass fragments. (MADE GROUND)	2
		1.20							
		1.50 - 2.00	B						
		2.00		N=13 (2,2/3,3,4,3)					
								<i>300mm wooden fragments. Strong hydrocarbon odour.</i>	
		2.60 - 3.00	B		2.60	-2.60		Stiff brownish grey mottled orangish brown and grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium of mudstone, sandstone and anthracite. HP of between 168 and 215 kN/m2.	3
		2.80 - 3.00	D						
		3.00 - 3.45	U						
		3.50 - 4.00	B					HP of between 120 and 215 kN/m2.	
		4.00		N=50 (5,6/9,10,15,16)				HP of between 192 and 215 kN/m2. <i>No orange mottling.</i>	4
		4.00 - 4.45	D						
		4.50 - 5.00	B						
		4.75	D						
		5.00 - 5.45	U						5

Continued on next sheet

Remarks

Location scanned with a CAT prior to excavation.

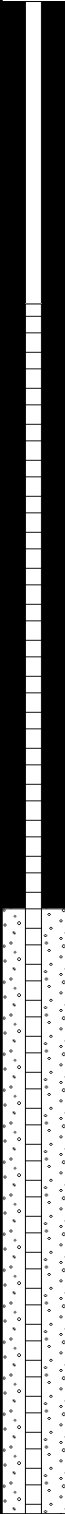
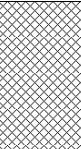
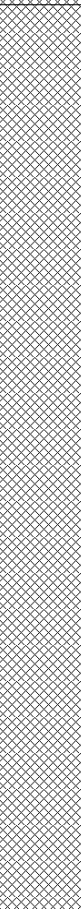
Hand dug pit excavated to 1.20m bgl.
Monitoring standpipe installed.

					Borehole Log			Borehole No. BH1 Sheet 2 of 2	
Project Name: Eastlands Primary					Project No. A3738		Co-ords: 386458.00 - 398662.00		Hole Type CP
Location: Manchester					Level: 0.00		Scale 1:25		Logged By AB
Client: Electricity North West Ltd					Dates: 12/11/2020 - 12/11/2020				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		6.50	B	N=50 (4,4/6,10,16,18)	6.40	-6.40		Dense reddish brown clayey medium SAND.	6
		6.50 - 7.00			6.60	-6.60		HP of between 120 and 132 kN/m2.	
		7.50 - 8.00	B					Very stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of mudstone, sandstone and occasional anthracite. Occasional reddish brown medium coarse sand lenses.	7
		7.50 - 8.00	B						
		8.00 - 8.45	U						
8.50	B				HP of between 180 and 215 kN/m2.	8			
							End of borehole at 9.40 m	9	
					9.40	-9.40			10

Remarks Location scanned with a CAT prior to excavation. Hand dug pit excavated to 1.20m bgl. Monitoring standpipe installed.								
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					Borehole Log			Borehole No. BH2 Sheet 1 of 3	
Project Name: Eastlands Primary					Project No. A3738		Co-ords: 386469.00 - 398642.00		Hole Type CP
Location: Manchester					Level: 0.00		Scale 1:25		Logged By AB
Client: Electricity North West Ltd					Dates: 13/11/2020 - 13/11/2020				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50	-0.50		MACADAM. (MADE GROUND)	1
								Loose to medium dense brown clayey sandy angular to subangular fine to coarse GRAVEL of concrete, redbrick and clinker. Sand is fine to coarse. Occasional wood fragments (70mm). (MADE GROUND)	
	1.20	D	N=8 (2,2/2,2,2,2)						2
	1.20								
	1.20 - 1.65	D							
	1.50 - 2.00	B							
	2.00		N=14 (3,3/3,3,4,4)						3
	2.00 - 2.45	D							
	2.50 - 3.00	B							
	3.00		N=13 (2,2/3,3,4,3)						4
3.00 - 3.45	D								
3.50 - 4.00	B								
4.00		N=33 (3,3/6,16,6,5)						5	
4.00 - 4.45	D								
4.50 - 5.00	B								
5.00		N=27 (2,1/7,7,6,7)							

Continued on next sheet

Remarks

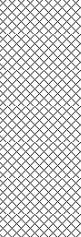
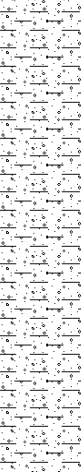
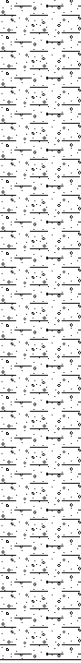
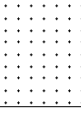
Location scanned with a CAT prior to excavation.

Hand dug pit excavated to 1.20m bgl.

Monitoring standpipe installed.



				Borehole Log				Borehole No. BH2	
Project Name: Eastlands Primary				Project No. A3738		Co-ords: 386469.00 - 398642.00		Sheet 2 of 3	
Location: Manchester				Level: 0.00		Hole Type CP			
Client: Electricity North West Ltd				Dates: 13/11/2020 - 13/11/2020		Scale 1:25			
Logged By AB									

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		5.00 - 5.45	B		5.80	-5.80		Very stiff brown mottled grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium of mudstone and sandstone. <i>HP of 215 kN/m2.</i>	6
		6.50 - 6.95	U						
		6.80 - 7.00	B		7.40	-7.40		<i>HP of 215 kN/m2.</i>	7
		7.50							
		7.50 - 7.95	D	N=50 (6,7/50 for 200mm)					
		7.50 - 8.00	B						
		8.50 - 9.00	B		9.60	-9.60		<i>HP of 168 and 215 kN/m2.</i>	9
		9.00 - 9.45	U						
		9.50 - 10.00	B						
		10.00 - 10.45	D					Very weak red sandstone recovered as clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium of sandstone. <i>Becoming less clayey with depth.</i>	10

Continued on next sheet	
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Remarks Location scanned with a CAT prior to excavation. Hand dug pit excavated to 1.20m bgl. Monitoring standpipe installed.		
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7.3.2 Piled Foundations

The proposed structure may be founded on piles taken down to depth to a suitable founding stratum, such as the firm to very stiff sandy gravelly clay, encountered in all exploratory locations.

A variety of pile types may be used, including bored and continuous flight auger (CFA) piles. Driven piles may be suitable, subject to environmental and noise/vibration constraints.

Because of the various advantages and limitations of each pile type, and the cost implications, advice should be sought from specialist piling contractors to determine the most suitable and cost-effective type. They should also be able to give recommended pile diameters and depths and likely pile capacities, with guaranteed performance. It is recommended a pile test be carried out to confirm pile capacities. In assessing the pile capacities, contractors should make an allowance for the effects of negative skin friction, particularly in the made ground and soft clays.

There may be differential settlement between piled structures and the surrounding ground level. Provision should, therefore, be made to make up ground levels at threshold positions, loading bays, vehicle access doorways, etc. Alternatively, these materials should be removed and replaced in a controlled manner by suitable existing materials or imported engineered fill.

It is essential the advice of a specialist piling contractor is sought and that positive assurances are provided by the piling contractor that their proprietary system is capable of providing the required working loads in the ground conditions encountered.

7.4 Chemical Attack on Buried Concrete

Chemical tests (see Appendices) show moderate to low levels of water-soluble sulphates and alkaline conditions. Based on these conditions, it is recommended that for concrete placed in natural strata the Design Sulphate Class for the site, as defined in BRE Special Digest 1⁽²⁰⁰⁵⁾, be taken as **DS-2**, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as **AC-1s**. The recommendations of BRE Special Digest 1 should be followed for concrete foundations and ground bearing floor slabs.

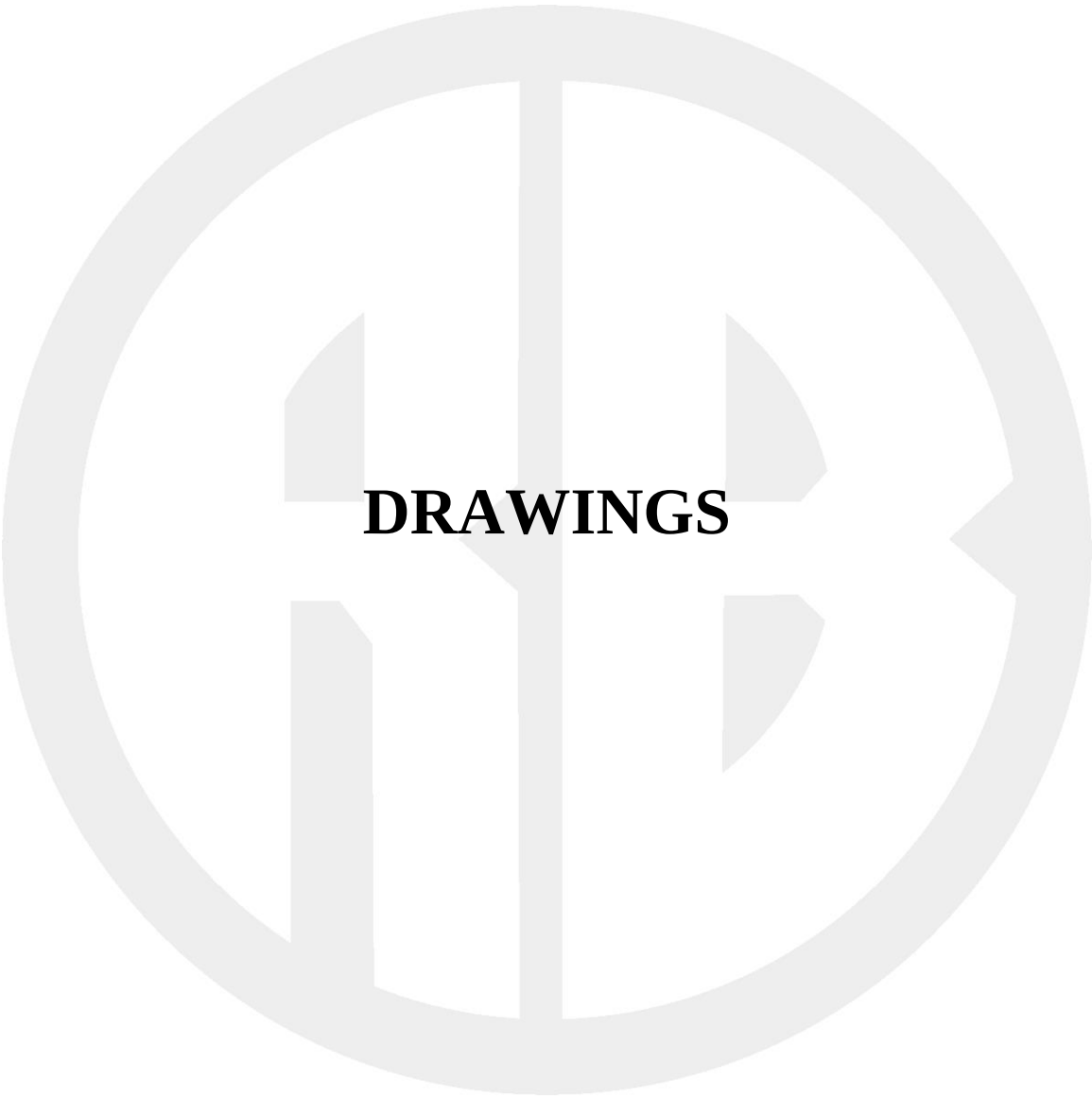
7.5 Temporary Works

Formations will be susceptible to damage both by weather and trafficking, and should be protected immediately on exposure, particularly in areas where construction plant will access the site.

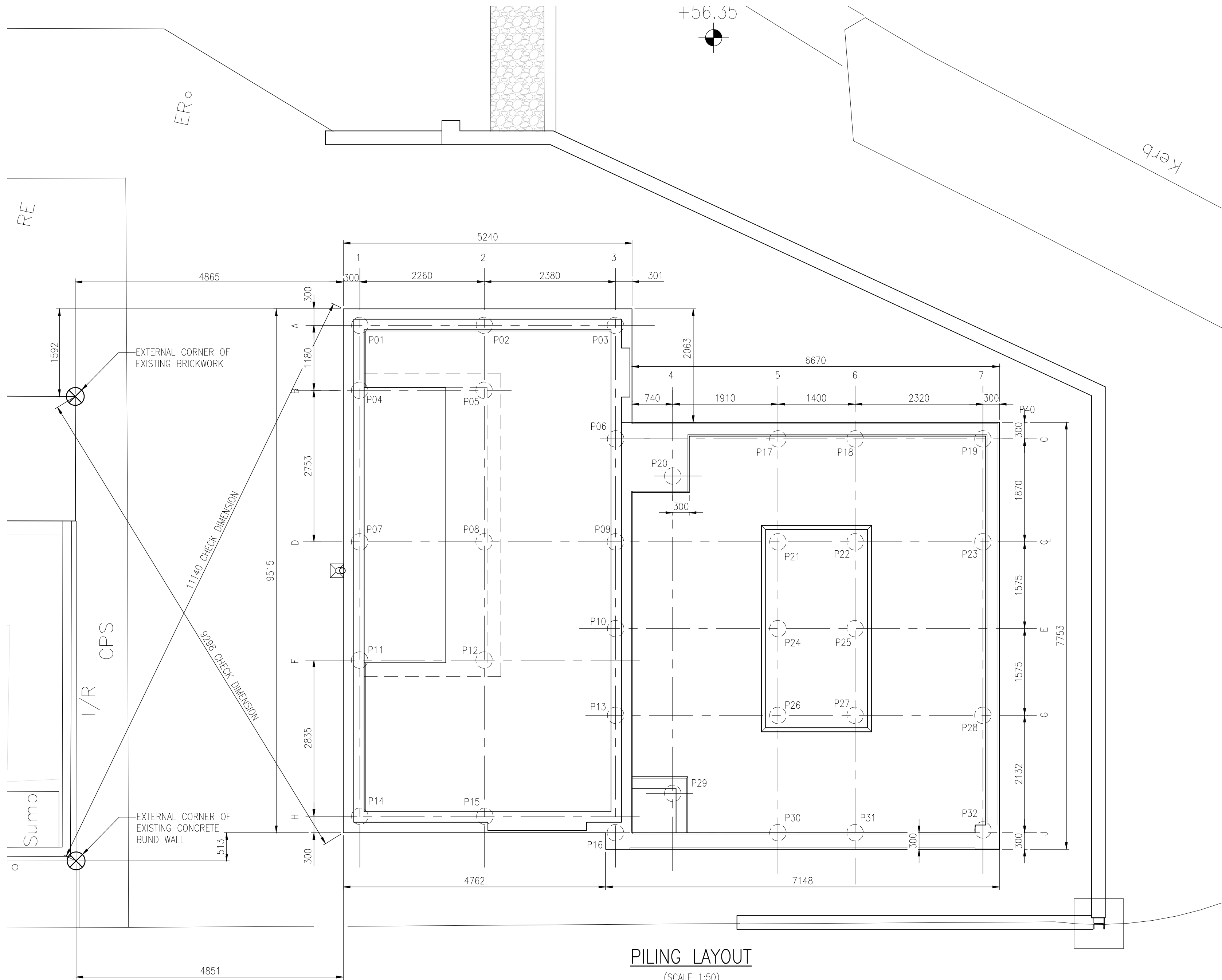
Excavations in Made Ground are likely to be unstable and should be battered back to an angle of 1 in 2, or a system of close sheeting and shoring adopted to ensure stability, and in particular where personnel are required to enter excavations. All excavations should be adequately supported where personnel are required to enter.

Groundwater seepages could be encountered near surface within excavations, particularly during the wetter months of the year. Pumping of excavations from a suitable located sump is likely to be required to keep excavations dry.

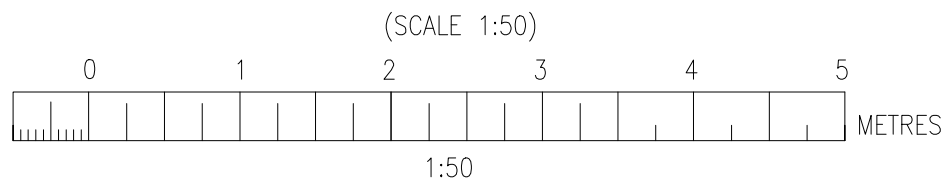
All-natural materials on site should be capable of being excavated using conventional excavating machinery.



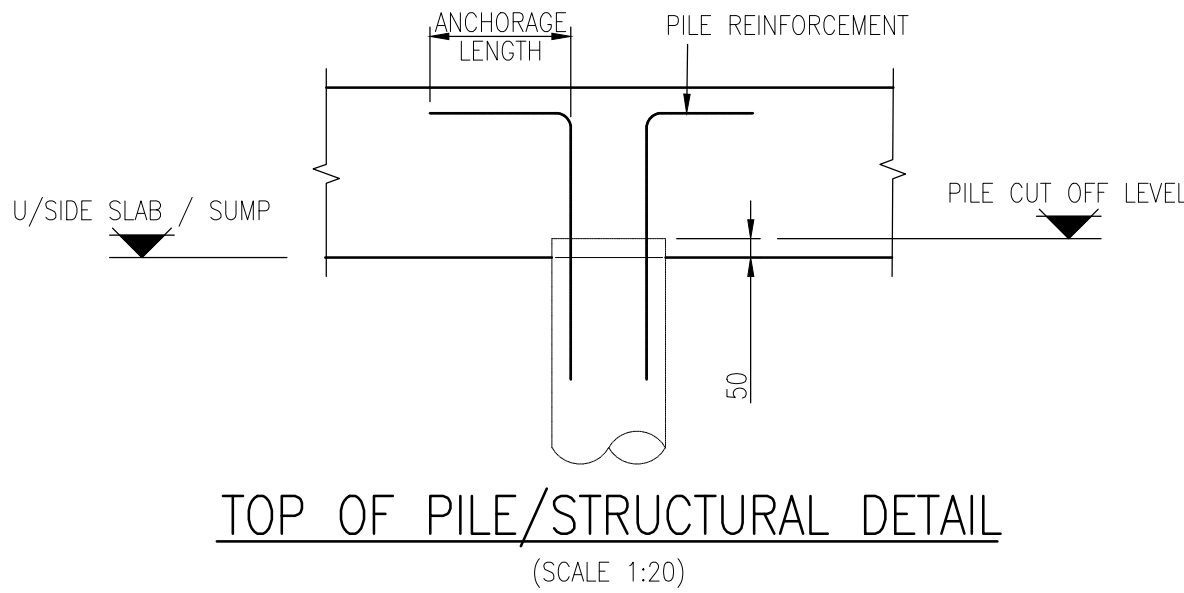
DRAWINGS



PILING LAYOUT



T13 SWITCH HOUSE AND TRANSFORMER BUND PILING SCHEDULE				
PILE REF.	VERT COMPR S.W.L. (kN)	HORIZONTAL S.W.L. (kN)	MINIMUM PILE DIAMETER	CUT OFF LEVEL
P01	250	10	150	+53.455m
P02	250	10	150	+53.455m
P03	250	10	150	+53.455m
P04	250	10	150	+53.455m
P05	250	10	150	+53.455m
P06	250	10	150	+53.455m
P07	250	10	150	+53.455m
P08	250	10	150	+53.455m
P09	250	10	150	+53.455m
P10	250	10	150	+53.455m
P11	250	10	150	+53.455m
P12	250	10	150	+53.455m
P13	250	10	150	+53.455m
P14	250	10	150	+53.455m
P15	250	10	150	+53.455m
P16	250	10	150	+53.455m
P17	250	10	150	+53.455m
P18	250	10	150	+53.455m
P19	250	10	150	+53.455m
P20	250	10	150	+53.455m
P21	250	10	150	+53.455m
P22	250	10	150	+53.455m
P23	250	10	150	+53.455m
P24	250	10	150	+53.455m
P25	250	10	150	+53.455m
P26	250	10	150	+53.455m
P27	250	10	150	+53.455m
P28	250	10	150	+53.455m
P29	250	10	150	+53.455m
P30	250	10	150	+53.455m
P31	250	10	150	+53.455m
P32	250	10	150	+53.455m



TOP OF PILE/STRUCTURAL DETAIL

(SCALE 1:20)

GENERAL NOTES

FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE
DWG No. 100138-00152.

PILING NOTES

- THE PILING CONTRACTORS ATTENTION IS DRAWN TO THE SITE INVESTIGATION REPORT CARRIED OUT BY EARTH ENVIRONMENTAL IN OCTOBER 2020.
- THE PILING CONTRACTOR SHOULD AT EACH PILE POSITION, SATISFY HIMSELF THAT THE GROUND CONDITIONS ARE IN ACCORDANCE WITH THOSE ASSUMED BY HIS DESIGNER.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS AND SPECIFICATIONS, INCLUDING THE INSTITUTION OF CIVIL ENGINEERS (I.C.E.), SPECIFICATION FOR PILING.
- ALL WORK TO BE CONDUCTED BY SPECIALIST SUB-CONTRACTOR IN CONNECTION WITH THIS CONTRACT SHALL BE IN ACCORDANCE WITH BOTH BS EN 1997-1:2004 & BS EN 1992-1:2004 AND THE SPECIFICATION.
- CONCRETE MIX TO PILES TO HAVE A MINIMUM CEMENT CONTENT OF 300kg/m³. FULL CONCRETE MIX DATA AND PILE DESIGN CALCULATIONS, TO COMPLY WITH THE LOADINGS INDICATED, TO BE SENT TO THE STRUCTURAL CONSULTANT FOR APPROVAL PRIOR TO PILING OPERATION ON SITE.
- PILES SHALL BE ACCURATELY INSTALLED IN THE CORRECT POSITION. A MAXIMUM TOLERANCE OF 75mm ON POSITION OF PILES SHALL BE ACCEPTED AT THE DISCRETION OF THE STRUCTURAL CONSULTANT.
- THE SETTING OUT OF GRID LINES SHALL BE DONE BY THE MAIN CIVIL CONTRACTOR WHO SHALL PROVIDE THE PERMANENT DATUM LEVEL AND BACK MARKS FOR THE PURPOSE OF ESTABLISHING CUT OFF LEVELS. SETTING OUT OF INDIVIDUAL PILES SHALL ALSO BE CARRIED OUT BY THE MAIN CIVIL CONTRACTOR.
- THE PILING SUB-CONTRACTOR SHALL PROVIDE THE STRUCTURAL CONSULTANT WITH TWO COPIES OF THE PILING RECORDS DETAILING ANY VARIATIONS REQUIRED AS THE WORK PROCEEDS.
- THE SUB-CONTRACTOR SHALL ACCURATELY LOG EACH DAY TOTAL PILING LENGTH, DELAY TIME, OBSTRUCTION, STANDING GROUND WATER LEVELS ETC. CROSS REFERENCED TO PILE REFERENCE NUMBER.
- PILES SHALL BE INSTALLED UP TO A MINIMUM LEVEL 300mm ABOVE THE REQUIRED CUT OFF LEVEL OR 150mm ABOVE GROUND WATER LEVEL, WHICHEVER IS HIGHER (OR TO SUIT THE SPECIALIST CONTRACTOR'S REQUIREMENTS). EACH PILE SHALL HAVE SUFFICIENT REINFORCEMENT PROJECTING AT LEAST 350mm ABOVE THE REQUIRED CUT OFF LEVEL FOR BENDING HORIZONTALLY AND LAPPING/TYING INTO THE GROUND BEAMS.
- THE RESPONSIBILITY FOR FINISHING PILES AT THE CORRECT LEVEL, CLEANING THE PROJECTING REINFORCEMENT BARS AND PREPARING REINFORCEMENT BARS FOR CASTING INTO BASES AND REMOVING ANY SPOIL RESULTING FROM THE PILING OPERATION SHALL REST ENTIRELY WITH THE MAIN CIVIL CONTRACTOR.
- PILES TO BE TO DESIGN SET TO SUPPORT LOADS INDICATED IN THE PILING SCHEDULE AND/OR A DESIGN LENGTH FOR THE TENSILE LOADS.
- THE SUB CONTRACTOR SHALL INCLUDE FOR DYNAMIC LOAD TESTING FOR 2 No. PILES. PILES FOR TESTING SHALL BE SELECTED BY THE ENGINEER WHILST PILING IS IN PROGRESS. TESTING SHALL BE IN ACCORDANCE WITH I.C.E. SPECIFICATION REFERRED TO IN ITEM 4 ABOVE.
- CONTRACTOR TO ALLOW FOR ALL MATERIALS AND CONSTRUCTION OF PILING MAT.

REVISION
003
PILE LOADINGS ADDED

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REV	AMENDMENTS	DRAWN	APP.	DATE
001	ISSUED FOR TENDER	JEWB	ASR	03-03-23
002	RE-ISSUED FOR AMENDED PRICING	ASR	JAB	30-06-23
003	RE-ISSUED FOR AMENDED PRICING	ASR	JAB	03-07-23

		ELECTRICITY NORTH WEST FREDERICK ROAD SALFORD M6 6QH	
EASTLANDS PRIMARY SUBSTATION T13 TRANSFORMER AND SWITCH HOUSE			
SITE SETTING OUT & PILING LAYOUT			
SCALE	AS SHOWN AT A1	SITE NAME	EASTLANDS PRIMARY SUBSTATION
DRAWN	JEWB	PROJECT	T13 TRANSFORMER AND SWITCH HOUSE
APPROVED	JAB	P.F.R. NO.	100138 DWG STATUS RELEASED
DATE	DEC 22	DRAWING NUMBER	REVISION
SHEET SIZE	A1	100138-00160	003
OLD DWG NO	-		

