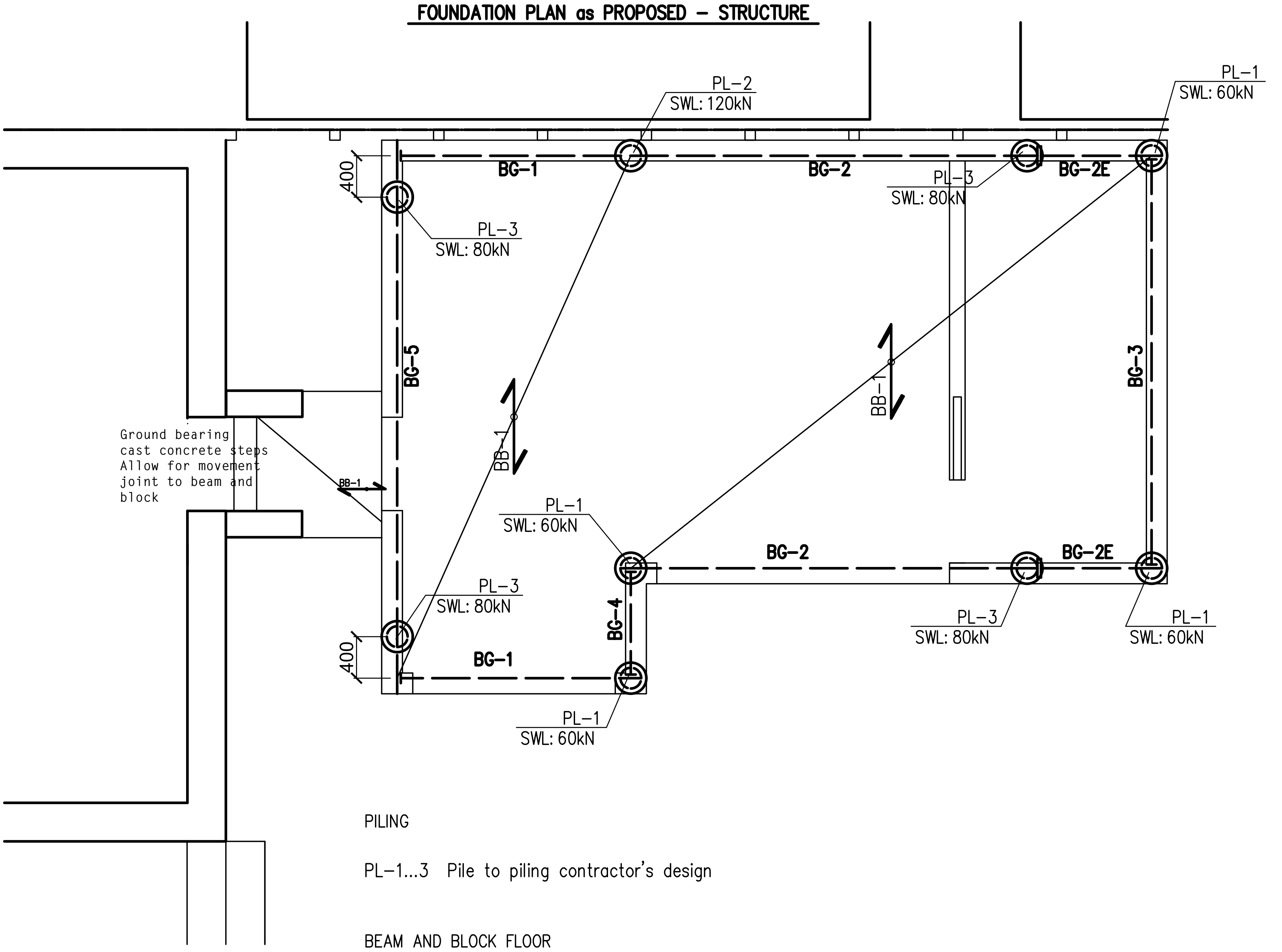
FOUNDATION PLAN as PROPOSED – STRUCTURE



PILING

PL–1...3 Pile to piling contractor's design

BEAM AND BLOCK FLOOR

BB–1 150mm deep Milbank (or similar) Beam & Block floor – floor is subject to specialists design by manufacturer/supplier who should provide all necessary designs, layouts, strapping and bracing details as may be required to provide stable floor construction

STEEL – grade S275
- all bolts to be grade 8.8
- 200mm bearing (unless noted otherwise)

BG–1 203x46 UC
- beam bolted to pile cap with 2no M16 bolts
- connection to BG–5: 12mm thick end plate, 4no M16 bolts

BG–2 203x46 UC
- beam bolted to pile cap with 2no M16 bolts
- connection to BG–2E: 12mm thick end plate

BG–2E 203x46 UC
- beam bolted to pile cap with 2no M16 bolts
- connection to BG–2: 12mm thick end plate, 4no M16 bolts

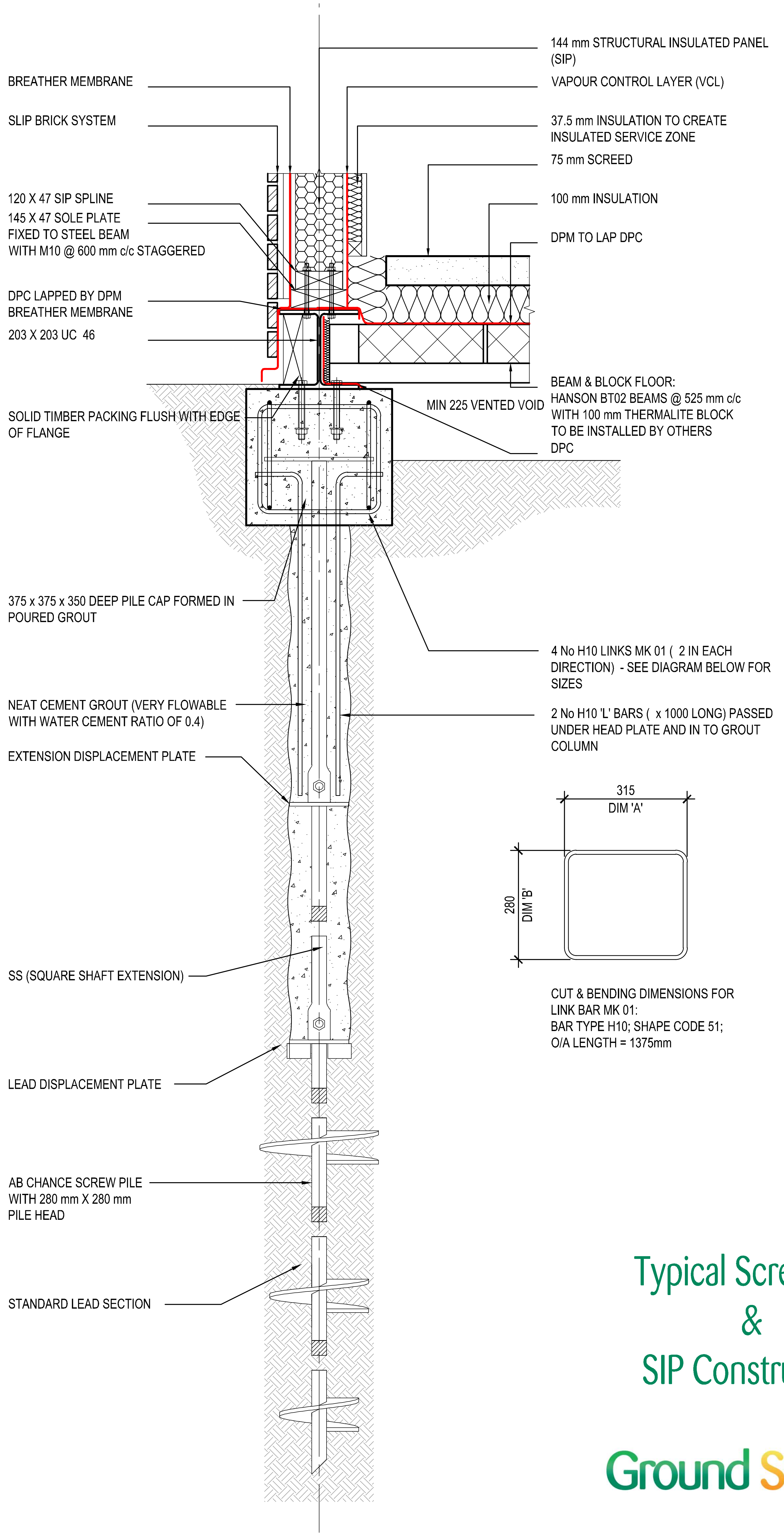
BG–3 203x46 UC
- connection to BG–2E: 180x160x12mm thick end plate, 4no M16 bolts

BG–4 203x46 UC
- connection to BG–1/BG–2: 180x160x12mm thick end plate, 4no M16 bolts

BG–5 203x46 UC
- beam bolted to pile cap with 2no M16 bolts
- connection to BG–1: 12mm thick plate welded between flanges

Dariusz Szul 162A High Road London NW10 2PB e-mail: dariuszul73@gmail.com

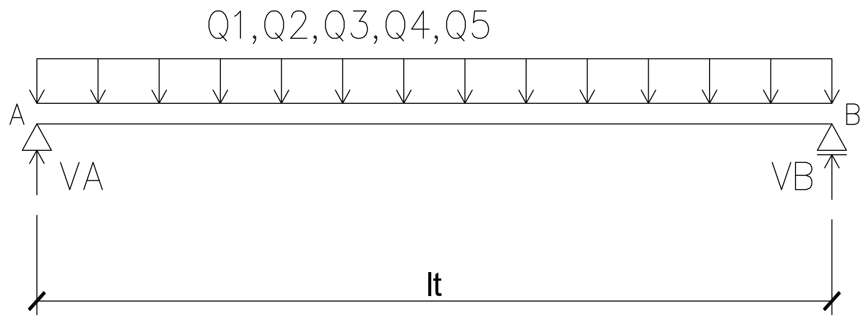
Proposals	Client		Address	
Rear Extension			35 Broadhurst Gardens, NW6	
Title	**Dwg no.**	**Rev.**	**Scale**	**Date**
Foundation Plan as Proposed - Structure	0598-01/S	A	1:50@A3	Feb 2023



Typical Screw Pile & SIP Construction

Ground Sun

Beam BG-1



$lt := 2.25 \cdot m$

Loads:

Dead loads:

Safety factor: $\gamma 1 := 1.4$

- Beam:	$Q1 := 0.46 \cdot \frac{kN}{m}$	$Q1f := Q1 \cdot \gamma 1$	$Q1f = 0.64 \cdot \frac{kN}{m}$
- B&B floor:	$Q2 := 1.9 \cdot \frac{kN}{m^2} \cdot 2.5m$	$Q2f := Q2 \cdot \gamma 1$	$Q2f = 6.65 \cdot \frac{kN}{m}$
- Screed 75mm:	$Q3 := 21 \cdot \frac{kN}{m^3} \cdot 0.075 \cdot m \cdot 2.5m$	$Q3f := Q3 \cdot \gamma 1$	$Q3f = 5.51 \cdot \frac{kN}{m}$
- Finishes 20mm:	$Q4 := 0.3 \cdot \frac{kN}{m^2} \cdot 2.5m$	$Q4f := Q4 \cdot \gamma 1$	$Q4f = 1.05 \cdot \frac{kN}{m}$
- SIP wall:	$Q5 := 1.2 \cdot \frac{kN}{m^2} \cdot 2.6m$	$Q5f := Q5 \cdot \gamma 1$	$Q5f = 4.37 \cdot \frac{kN}{m}$
- Flat roof:	$Q6 := 0.7 \cdot \frac{kN}{m^2} \cdot 2.5m$	$Q6f := Q6 \cdot \gamma 1$	$Q6f = 2.45 \cdot \frac{kN}{m}$

Imposed loads:

Safety factor: $\gamma 2 := 1.6$

- Live load:	$Q7 := 1.5 \cdot \frac{kN}{m^2} \cdot 2.5 \cdot m$	$Q7f := Q7 \cdot \gamma 2$	$Q7f = 6 \cdot \frac{kN}{m}$

- Snow: $Q8 := 0.8 \cdot \frac{kN}{m^2} \cdot 2.5 \cdot m$ $Q8f := Q8 \cdot \gamma 2$ $Q8f = 3.2 \cdot \frac{kN}{m}$

Reactions from dead loads:

Unfactored:

$VAd := (Q1 + Q2 + Q3 + Q4 + Q5 + Q6) \cdot lt \cdot 0.5$ $VAd = 16.61 \cdot kN$

Factored:

$VAdf := (Q1f + Q2f + Q3f + Q4f + Q5f + Q6f) \cdot lt \cdot 0.5$ $VAdf = 23.26 \cdot kN$

Reactions from imposed loads:

Unfactored:

$VAi := (Q7 + Q8) \cdot lt \cdot 0.5$ $VAi = 6.47 \cdot kN$

Factored:

$VAif := (Q7f + Q8f) \cdot lt \cdot 0.5$ $VAif = 10.35 \cdot kN$

Bending moment:

$Mmax := (Q1f + Q2f + Q3f + Q4f + Q5f + Q6f + Q7f + Q8f) \cdot lt^2 \cdot 0.125$

$Mmax = 18.9 \cdot kN \cdot m$

Steel grade S275

Design strength: $py := 275 \cdot \frac{N}{mm^2}$ thickness < 16mm

Modulus of elasticity: $E := 205 \cdot \frac{kN}{mm^2}$

Min plastic modulus required: $Sxreq := \frac{Mmax}{py}$

$Sxreq = 69 \cdot cm^3$

Check 203x46 UC

Single section properties:

Plastic modulus: $Sx := 497 \cdot cm^3$

Elastic modulus: $Zx := 450 \cdot cm^3$

Moment of inertia: $Ix := 4568 \cdot cm^4$

Web thickness: $sw := 7.2 \cdot mm$

Flange thickess: $t := 11 \cdot mm$

Depth of section: $h := 203.2 \cdot mm$

Width of section: $b := 203.6 \cdot mm$

Buckling parameter: $u := 0.847$

Torsional index: $x := 17.7$

Radius of gyration: $ry := 5.1 \cdot cm$

$$\varepsilon := \sqrt{\frac{275 \cdot \frac{N}{mm^2}}{py}} \qquad \varepsilon = 1$$

$$\frac{0.5 \cdot b}{t} = 9.3 \qquad < \qquad 10$$

$$\frac{h - 2 \cdot t}{sw} = 25.2 \qquad < \qquad 80$$ Class II section

Effective length: $LE := lt \cdot 1.2$ $\qquad LE = 2.7\,m$

Slenderness: $\lambda := \frac{LE}{ry}$ $\qquad \lambda = 53$

Slenderness factor: $\nu := \frac{1}{\sqrt[4]{1 + 0.05 \cdot \left(\frac{\lambda}{x}\right) \cdot \left(\frac{\lambda}{x}\right)}}$ $\qquad \nu = 0.912$

Ratio βW: $\beta W := 1.0$ Class II section

Equivalent slenderness: $\lambda LT := u \cdot \nu \cdot \lambda \cdot \sqrt{\beta W}$ $\qquad \lambda LT = 40.9$

$$pE := \left(\frac{\pi^2 \cdot E}{\lambda LT^2}\right) \qquad pE = 1.2 \times 10^3 \cdot \frac{N}{mm^2}$$

$$aLT := 7$$

$$\lambda L0 := 0.4 \cdot \sqrt{\frac{\pi^2 \cdot E}{py}} \qquad \lambda L0 = 34.31$$

$$\eta LT := \frac{aLT \cdot (\lambda LT - \lambda L0)}{1000} \qquad \eta LT = 0.046 \qquad > \qquad 0$$

$$\phi LT := \frac{py + (\eta LT + 1) \cdot pE}{2} \qquad \phi LT = 770.6 \cdot \frac{N}{mm^2}$$

Bending strength: $pb := \frac{pE \cdot py}{\phi LT + \sqrt{\phi LT^2 - pE \cdot py}}$

$pb = 259.78 \cdot \frac{N}{mm^2}$

Buckling resistance moment: $Mb := pb \cdot Sx$

$Mb = 129.11 \cdot kN \cdot m$ > $Mmax = 18.9 \cdot kN \cdot m$

< $1.2 \cdot py \cdot Zx = 148.5 \cdot kN \cdot m$

The section is satisfactory for bending moment.

Web area: $Av := h \cdot sw$ $Av = 14.63 \cdot cm^2$

Depth of the web: $d := h - 2 \cdot t$ $d = 181.2 \cdot mm$

$\frac{d}{sw} = 25.2$ < $70 \cdot \varepsilon = 70$ No shear buckling

Shear capacity: $Pv := 0.6 \cdot py \cdot Av$ $Fv := VAdf + VAif$

$Pv = 241.4 \cdot kN$ > $Fv = 33.6 \cdot kN$

The section is satisfactory for shear force.

Deflection due to distributed load:

$$d1 := \frac{5}{384} \cdot \frac{(Q1 + Q2 + Q3 + Q4 + Q5 + Q6 + Q7 + Q8) \cdot lt^4}{E \cdot Ix}$$

$d1 = 0.7 \cdot mm$ < $\frac{lt}{250} = 9 \cdot mm$

The section is satisfactory for deflection

BOREHOLE ONE

65 Priory Road, Hampstead

Date of boring 6-7 January, 1983

Diameter of boring : 200mm

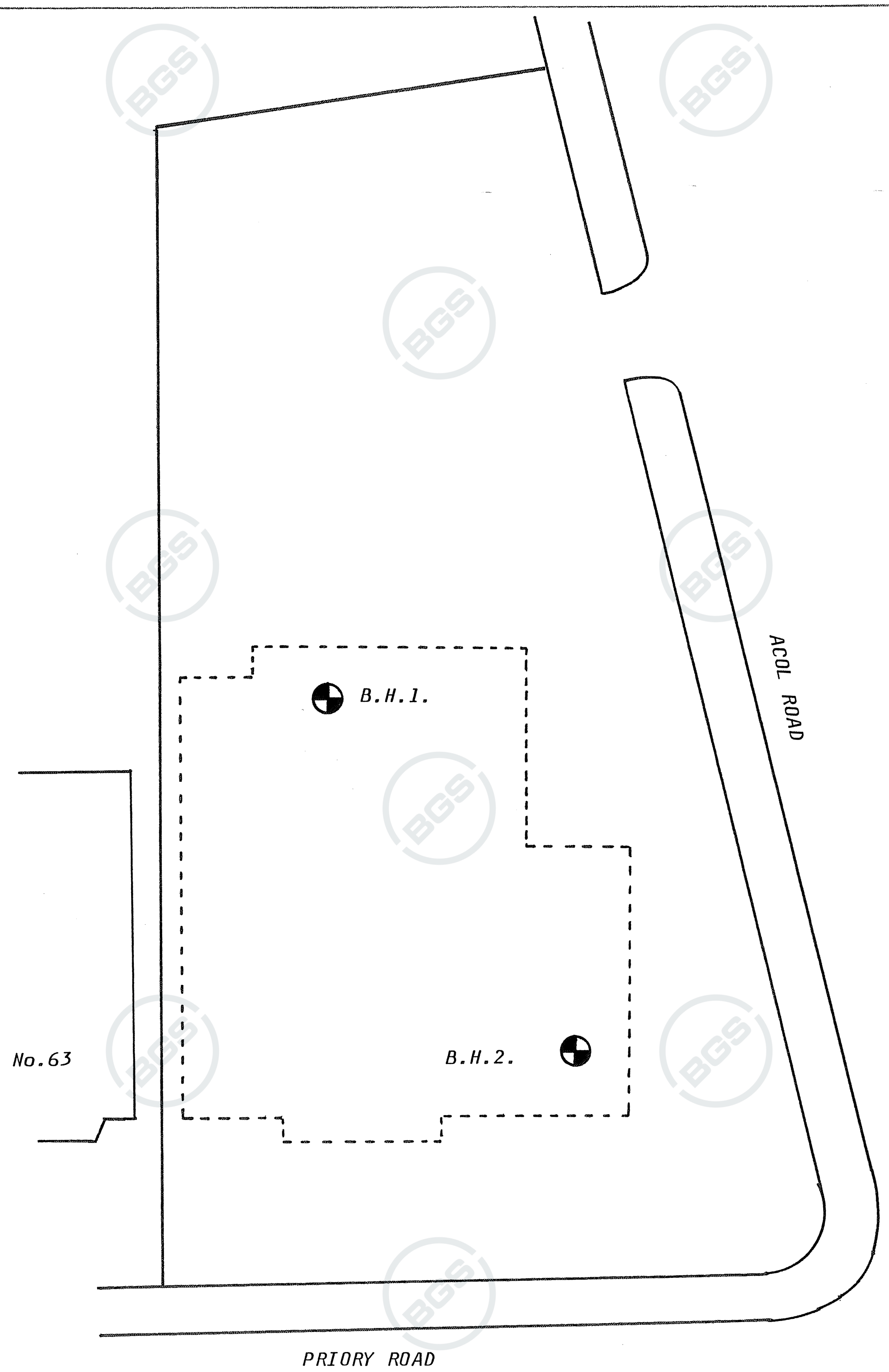
Lining tubes : 200 mm to 1.5 m

Ground Level -

Description of Strata	Change of Strata: Legend	Change of Strata: Depth (m)	Change of Strata: Reduced Level (m)	S.P.T. C.P.T. N-value	Samples: Depth (m)	Samples: Type	Water Level (m)	Depth of Casing (m)
MADE GROUND Soft to firm brown clay with many broken bricks and de-composed mortar		1.00						
LONDON CLAY Firm slightly silty brown mottled grey CLAY with extensive close fissuring. Occassional clay stones.				SPT 5	1.50	J		1.50
		2.00						
					2.50 - 2.95	U100		
Becoming firm to stiff		3.00						
Very stiff slightly silty dark brown slightly mottled grey CLAY with some fissures and thin partings of grey fine silt					3.50 - 3.95	U100		
		4.00						
					4.50 - 4.95	U100		
Gypsum crystals from 5.00m		5.00						
		6.00		SPT27	6.00	J		
		7.00						
				SPT33	7.50	J		
Very stiff to hard slightly silty blue-grey CLAY with many large fissures. Some silty and sandy partings		8.00						
					8.75	J		
		9.00						
					9.50 - 9.95	U100	B.H. Dry	
Becoming hard		10.00						

APPENDIX A

Report No. C 390 | BOREHOLE LOG | JANUARY 1983



65 PRIORY ROAD - BOREHOLE LOCATIONS

APPENDIX B.

Report No. S.390

January 1983

TYRONE

HeliCAP® Helical Capacity Design Software

SUMMARY REPORT

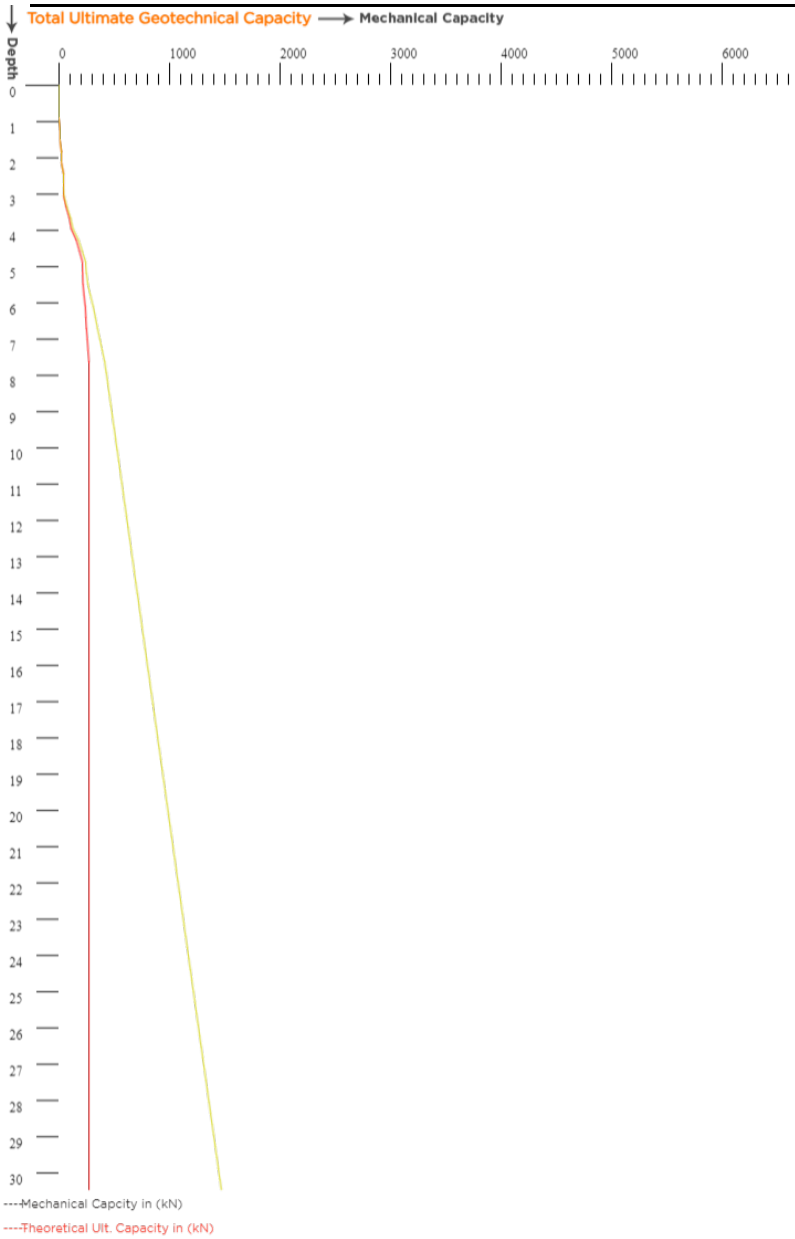
Job Name: 35 Broadhurst Gardens NW6 | **Job Number**: 1660 | **Contact**:

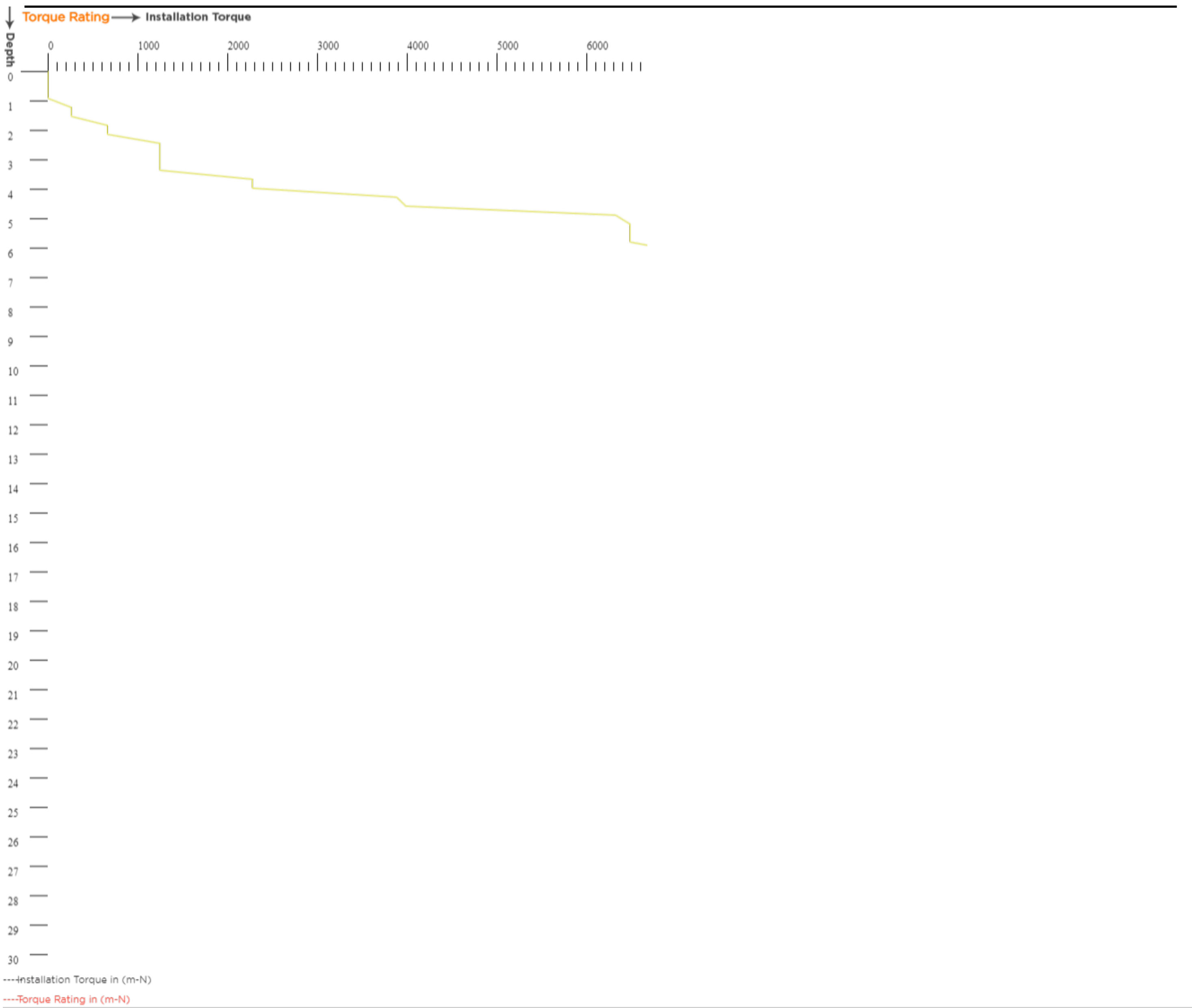
Start Date: 11/09/2023 | **Email**: brian@groundsun.co.uk | **Address**: 35 Broadhurst gardens

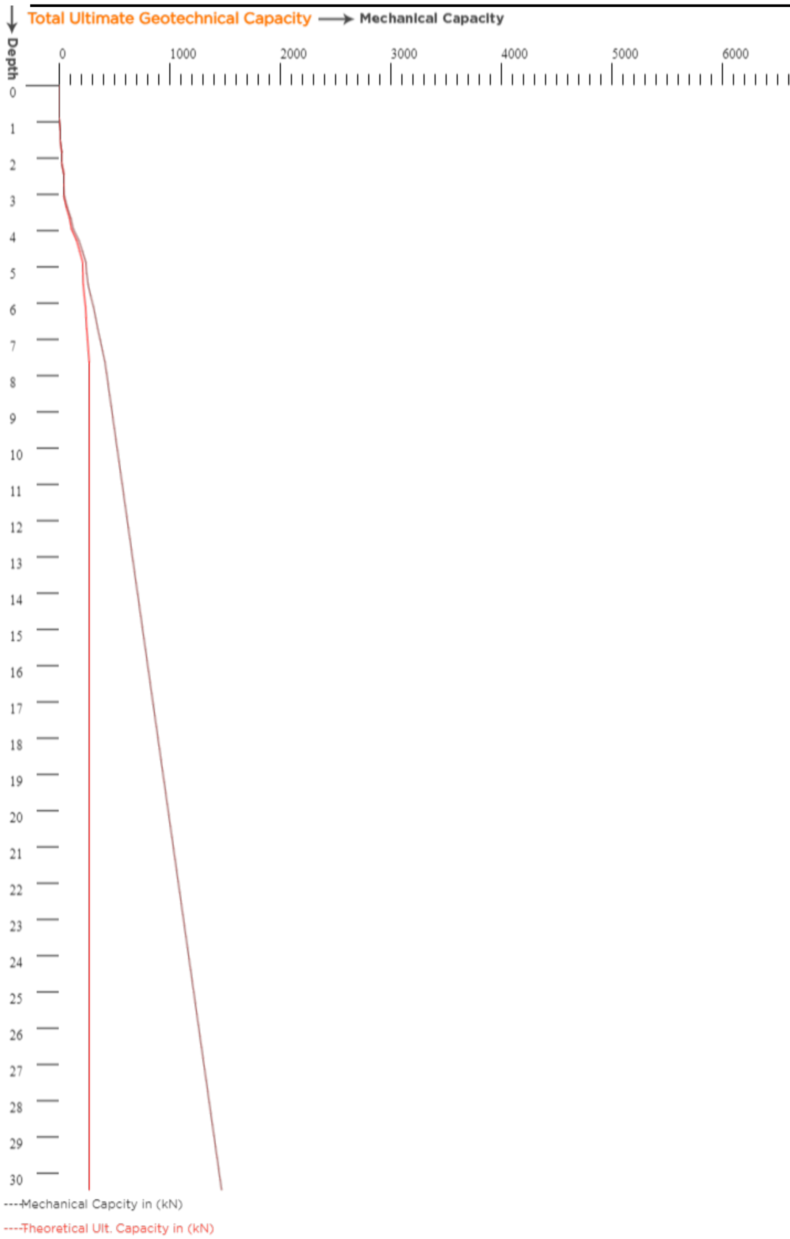
Country: United Kingdom | **State**: | **City/Zip**: london NW6

New soil profile: COMPRESSION

Helical Pile Number: 1	Product: SS5		Installation Torque: 6481 m.N	Effective Torque: 5596 m.N
Length: 5.0 m	Angle: 90.0 degree	Datum Depth: 1.0 m		
Friction Type: Grout	Analysis Method: Gouvenot			
		Grout Diameter (mm)	**Grout Length (m)**	
		150.0	3.0	
Helix Diameter (mm)	**Helix Depth (m)**	**Ultimate Helix Geotechnical Capacity (q_G) (kN)**	**Nominal Helix Strength (kN)**	**Ultimate Helix Recommended Capacity (q_R) (kN)**
305	4.5	70.6t 98.9c	196.6	70.6t 98.9c
254	5.2	68.1t 71.6c	212.2	68.1t 71.6c
203	5.8	45.9t 45.9c	254.9	45.9t 45.9c
Total Ultimate Helix Geotechnical Capacity (Q_G) (kN)		184.7t 216.4c		
Total Ultimate Helix Recommended Capacity (Q_R) (kN)				184.7t 216.4c
Total Ultimate Friction Capacity (Q_F) (kN)		35.3t/c		
Total Ult. Combined Geotechnical Capacity (Q_{GC}) (kN)		219.9t 251.7c		
Total Ult. Combined Recommended Capacity (Q_{RC}) (kN)				219.9t 251.7c


Total Ultimate Geotechnical Capacity → Mechanical Capacity
Depth
0
1000
2000
3000
4000
5000
6000
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
----Mechanical Capcity in (kN)
----Theoretical Ult. Capacity in (kN)


Torque Rating → Installation Torque
Depth
0
1000
2000
3000
4000
5000
6000
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
----Installation Torque in (m-N)
----Torque Rating in (m-N)


Total Ultimate Geotechnical Capacity
Mechanical Capacity
Depth
0
1000
2000
3000
4000
5000
6000
0
1
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3
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6
7
8
9
10
11
12
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14
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16
17
18
19
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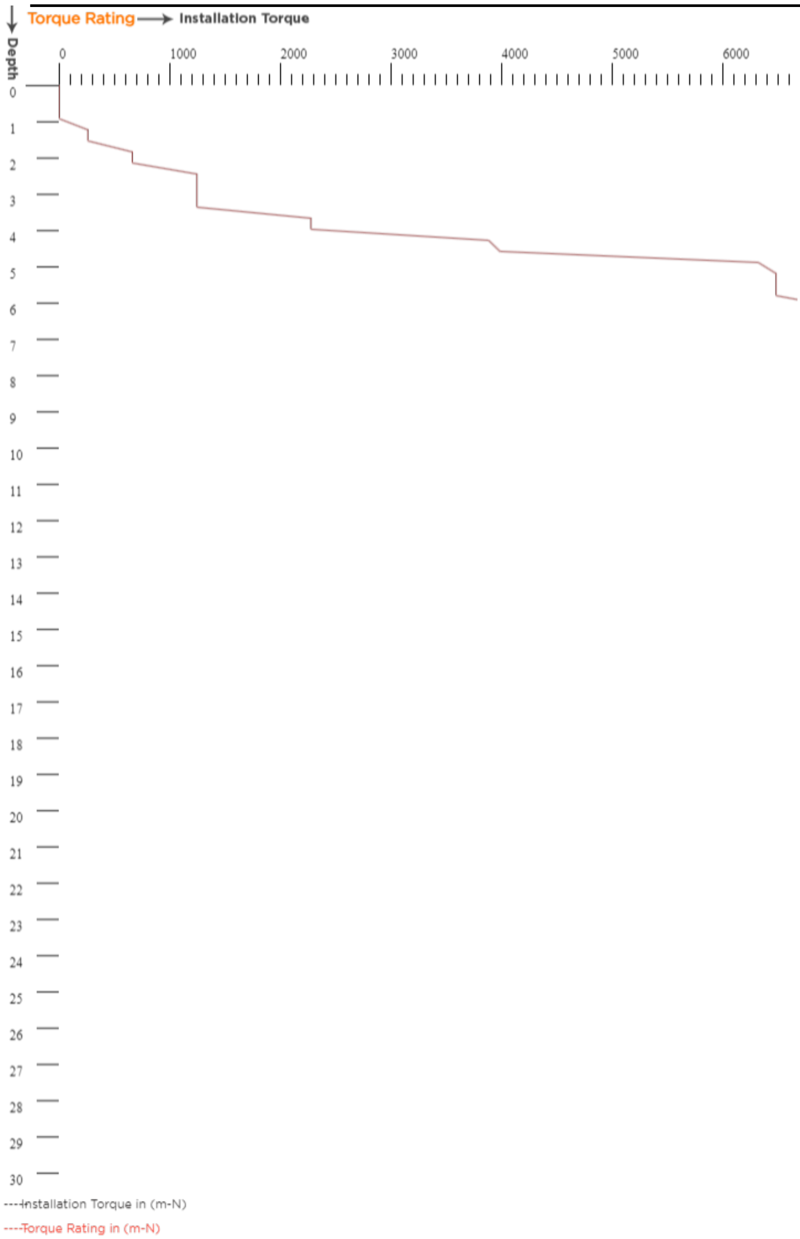
22
23
24
25
26
27
28
29
30
----Mechanical Capcity in (kN)
----Theoretical Ult. Capacity in (kN)


Torque Rating → Installation Torque
Depth
0
1000
2000
3000
4000
5000
6000
0
1
2
3
4
5
6
7
8
9
10
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12
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16
17
18
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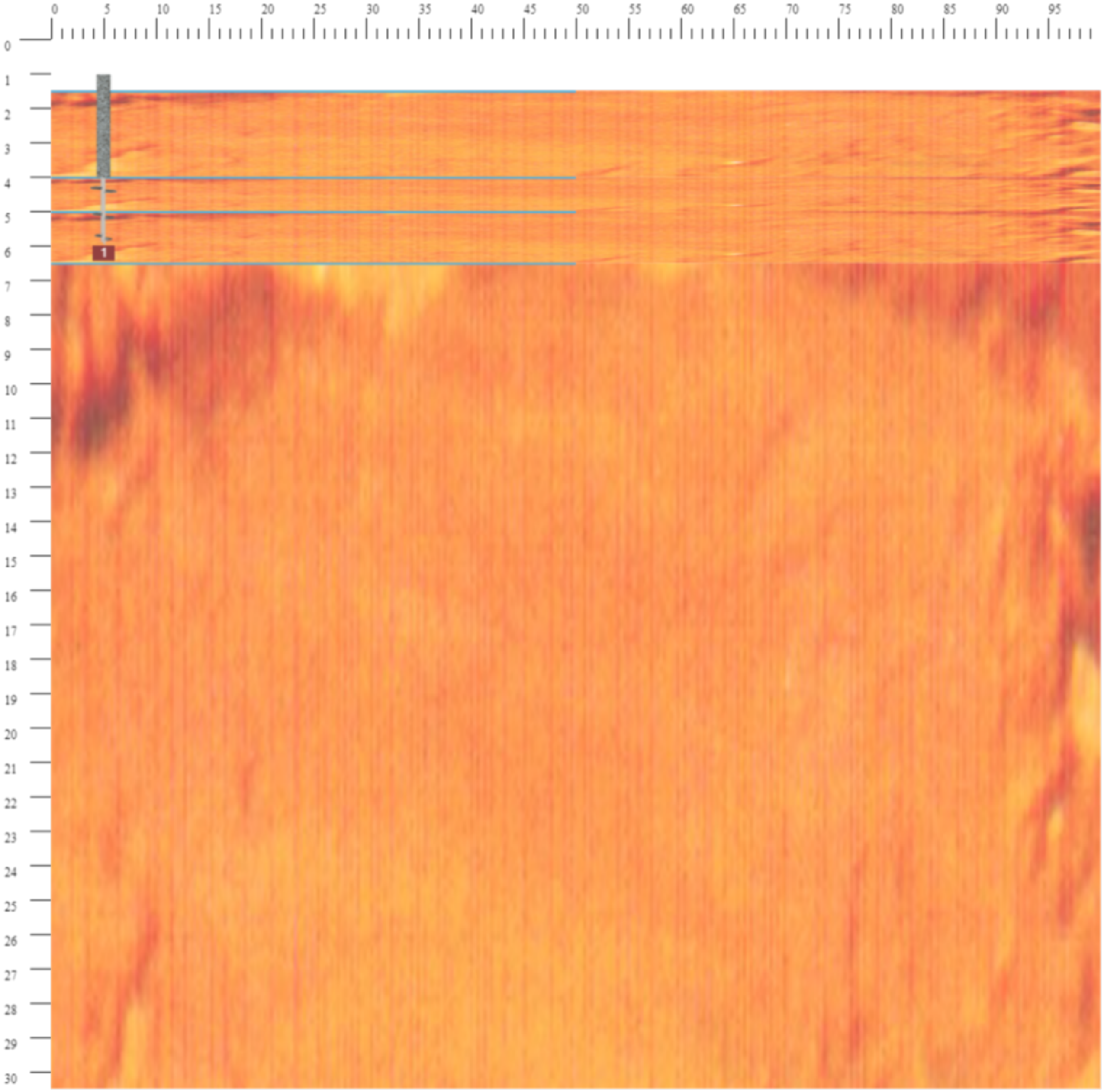
22
23
24
25
26
27
28
29
30
----Installation Torque in (m-N)
----Torque Rating in (m-N)


0
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75
80
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30
1

The typical net deflection of end bearing helical piles at working load (safety factor of 2) averages 1/4 inch. See Chance Technical Design Manual for more information.

Water Table Depth:

Critical Depth:

Hammer Efficiency: Safety Hammer (60%)

No Load Zone Depth Below Groundline: 1

Soil Profile

Depth (m)	Soil Type	N	N_{60}	Cohesion (kN/m^2)	Angle of Internal Friction (degrees)	In Situ Unit Weight (kN/m^3)	Clay Bearing Capacity Factor (N_c)	Sand Bearing Capacity Factor (N_q)	Bond Value (kN/m^2)
0	made ground	0	0						
1.5	Clay	5	5	29.925	0	14.13	9	0	
4	Clay	25	25	149.625	0	18.84	9	0	
5	Clay	27	27	161.595	0	18.84	9	0	
6.5	Clay	33	33	197.505	0	18.84	9	0	

DISCLAIMER:

Written for and distributed by Hubbell Power Systems, Inc. This helical anchor/pile engineering software (HeliCAP® v3.0 Helical Capacity Design Software) reflects the Chance Civil and Construction Business Units of Hubbell Power Systems, Inc. philosophies on helical anchor/pile design and application.

These philosophies may not be valid when results are applied to helical anchors/piles configured and manufactured by other companies. The program results are applicable only to Chance® Civil and Construction Business Units helical anchor/pile material and reliance on Hubbell Power Systems, Inc. manufactured spacing, dimensions, thicknesses, tolerances and strengths is required for the results to be valid.

The helical anchor/pile design theories, methods, helical capacity design software, and helical anchor/pile materials comprise an integral design system which should not be altered. Corruption of this system by use of other design techniques or anchor/pile material produced by others may result in unreliable results. The inherent variability of soil leads to variability in helical anchor/pile performance. The reliability of this or any theoretical method of predicting helical anchor/pile capacity in soil is dependent upon the quality and reliability of the soil data and the interpretation of that data by the design professional. Responsibility for selection of the proper helix configuration, installed depth, shaft diameter, and helical anchor/pile type rests solely with the design professional.

The information presented and algorithms used in HeliCAP® v3.0 Helical Capacity Design Software are derived from generally accepted engineering practices. Project- specific application documents and plans of repair must be prepared by a structural/geotechnical engineer familiar with soil and building requirements in the project location. Hubbell Power Systems, Inc. assumes no responsibility for the performance of helical anchors/piles beyond that stated in our SCS policy sheet on terms and conditions of sale.

Because Hubbell, Inc. has a policy of continuous product improvement, we reserve the right to change design and specifications without notice.