

Plot NT02 – Dantzic Street, Manchester M4 4DD

Report Title: Design Calculations

Report Status: Pending Client Approval

Report Number: P25-2245-DE-001

Revision: P01

Date: 25/02/2025

Revision	Prepared By	Date	Checked By	Date	Reason for Issue
P01	SS	25/02/2025	SD	25/02/2025	For Approval

This report has been prepared by Green Piling with reasonable skill, and care, within the best practice and guidance current at the time of issue within the scope of works which have been specified by the client, and the Principal Designer.

Green Piling proposed design calculations are to be submitted to Building Control/any third parties prior to construction for the opportunity to approve and/or comment. Any variation in pile design details required due to input from others following acceptance of our tender will be treated as a variation. We shall accept no responsibility should our design not be approved prior to your required commencement date. This report shall not be relied upon and/or transferred to any other parties without the express written authorisation of Green Piling Ltd. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

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1. Introduction

Green Piling have been appointed to undertake the design, supply and installation of continuous flight auger piles as foundation support for Plot NT02 (two light industrial buildings, associated access roads and areas of hardstanding) on Dantzic Street, Manchester.

2. Documentation

Green Piling Specification

- GP Technical Proposal; reference SD/E24-16135/1.2 dated 30/07/2024.

Drawings

Drawing Reference	Drawing Detail	Revision
RDB-ROC-2B-FN-DR-S-03-0096	Block 2B Piling GA	P06
RDB-ROC-2B-FN-DR-S-03-0097	Block 2B Piling GA	P06
RDB-ROC-2B1-FN-DR-S-03-0196	Block 2B1 Pile Design Schedules	P05
RDB-ROC-2B1-FN-DR-S-0296	Block 2B1 Pile Coordinates	P01

Site Investigation Information

Report Reference	Report Detail	Issue Date
4328-ROC-ZZ-XX-RP-ES-P2-101 Issue 05 FINAL	RoC Phase 2 Site Investigation for Plots NT02, NT03 & NT04, Dantzic Street	October 2022

Design References

In general accordance with;

- BRE. (2015). Special Digest 1 Concrete in Aggressive Ground. 3rd Ed.
- ICE. (2016). Specification for Piling and Embedded Retaining Walls. 3rd Ed.
- BS EN 1536:2010 Execution of special geotechnical works - bored piles (+A1:2015).
- BS EN 1992-1-1:2004+A1:2014. Eurocode 2. Design of concrete structures. General rules & rules for buildings.
- BS EN 1997-1:2004+A1:2013. Eurocode 7. Geotechnical Design. General Rules.
- BS 8004:2015. Code of Practice for Foundations.
- BS 8110:1997-1. Structural Use of Concrete.
- CIRIA Report 181. (1999). Piled Foundations in Weak Rock.
- Fleming, W. G. K, Weltman, A, J. Randolph, M, E. and Elson, W, K. (1992). Piling Engineering. 2nd Ed.
- Stroud, M. A. (1974) "The standard penetration test in insensitive clays and soft rock," Proceedings of the 1st European Symposium on Penetration Testing, Sweden: Stockholm, vol. 2(2), 367-375.
- Stroud, M. A. (1989). The standard penetration test: its application and interpretation. Penetration testing in the UK, Thomas Telford, London.

3. Scope

Pile Loads	Pile vertical and horizontal actions have been provided on drawing RDB-ROC-2B1-FN-DR-S-03-0196.
Proposed Pile Type	500mm Diameter CFA Piles; $A_s = 1.571\text{m}^2/\text{m}$ and $A_b = 0.196\text{m}^2$ 750mm Diameter CFA Piles; $A_s = 2.356\text{m}^2/\text{m}$ and $A_b = 0.442\text{m}^2$ <i>Diameter split as ROC drawing RDB-ROC-2B-FN-DR-S-03-0096.</i>
Piling Levels	Final Piling Platform Level TBC. Pile Cut Off Levels as drawing RDB-ROC-2B1-FN-DR-S-0296. All piles are to be spaced at a minimum of 3 x pile diameter.
Design Basis	BS EN 1997-1:2004, with reference made to the UK National Annex.
Installation Criteria	Design Socket Length / Design Length / Practical Auger Refusal; whichever occurs first.
Pile Testing	100% sonic echo integrity testing on working piles. Piles are to be tested at cut off level following pile trimming. No static/dynamic load testing is proposed.
Settlement Criteria	Piles are to be primarily designed for their load carrying capacity, rather than for any settlement predictions. Individual piles are expected to achieve a target settlement of 10mm <i>[excluding elastic]</i> at working load, under test.

4. Soils Information

4.1 Published Geology

The British Geological Survey [BGS] online geology viewer [1:50,000 geological map] records the site to be underlain by Superficial strata comprising Glacial Till, and sandstone bedrock of the Chester Formation.

4.2 Site Investigation Information

Ground conditions have been taken from the report detailed in section 2, which presents the logs of several rotary boreholes, window sample boreholes and trial pits. The investigation generally revealed Made Ground overlying Devensian Till comprising clays and sands, in turn overlying bedrock. The western portion of the site (Plot NT02) is initially underlain by very weak to weak sandstone bedrock of the Chester Formation, which is underlain by mudstone bedrock of the Manchester Marls Formation. A generalised cross section through the boreholes most relevant to plot NT02 is presented as Figure 1.

Several rock samples were subject to Unconfined Compressive Strength [UCS] Testing & Point Load Testing [PLT] – with results summarised below (table extracted from report 4328-ROC-ZZ-XX-RP-ES-P2-101 Issue 05).

Geological Unit	UCS tests (MPa)	Minimum Point Load Test $I_{s,50}$ (MPa)	Maximum Point Load Test $I_{s,50}$ (MPa)	Conversion Factor*	Mean Equivalent UCS (MPa)	Mean UCS (Direct Testing) (MPa)	Nominal UCS of sampled material (MPa)**
Chester Formation (Sandstone)	5.73	0.01	0.19	21.45	1.01	5.73	3.37
Manchester Marls (Shallow) <15.00m	8.11	0.02	1.42	21 - 21.45	4.33	8.02	6.17
	0.65						
	0.53						
	11.80						
	19.00						
Manchester Marls (Deep) > 15.00m	15.9	0.02	1.2	21 - 21.45	4.44	16.24	10.34
	12.4						
	10.4						
	15						
	25.5						
	18.1						
	17.4						
	10.8						
	20.7						

Groundwater was recorded at varying depths during the exploratory investigations and during post-fieldwork monitoring, with standing levels ranging from circa 26.8 to 27.5m AOD within plot NT02.

This design relies on the findings of the ground investigation information provided. Should conditions encountered on site vary from those indicated within the boreholes, the design may need to be reviewed.

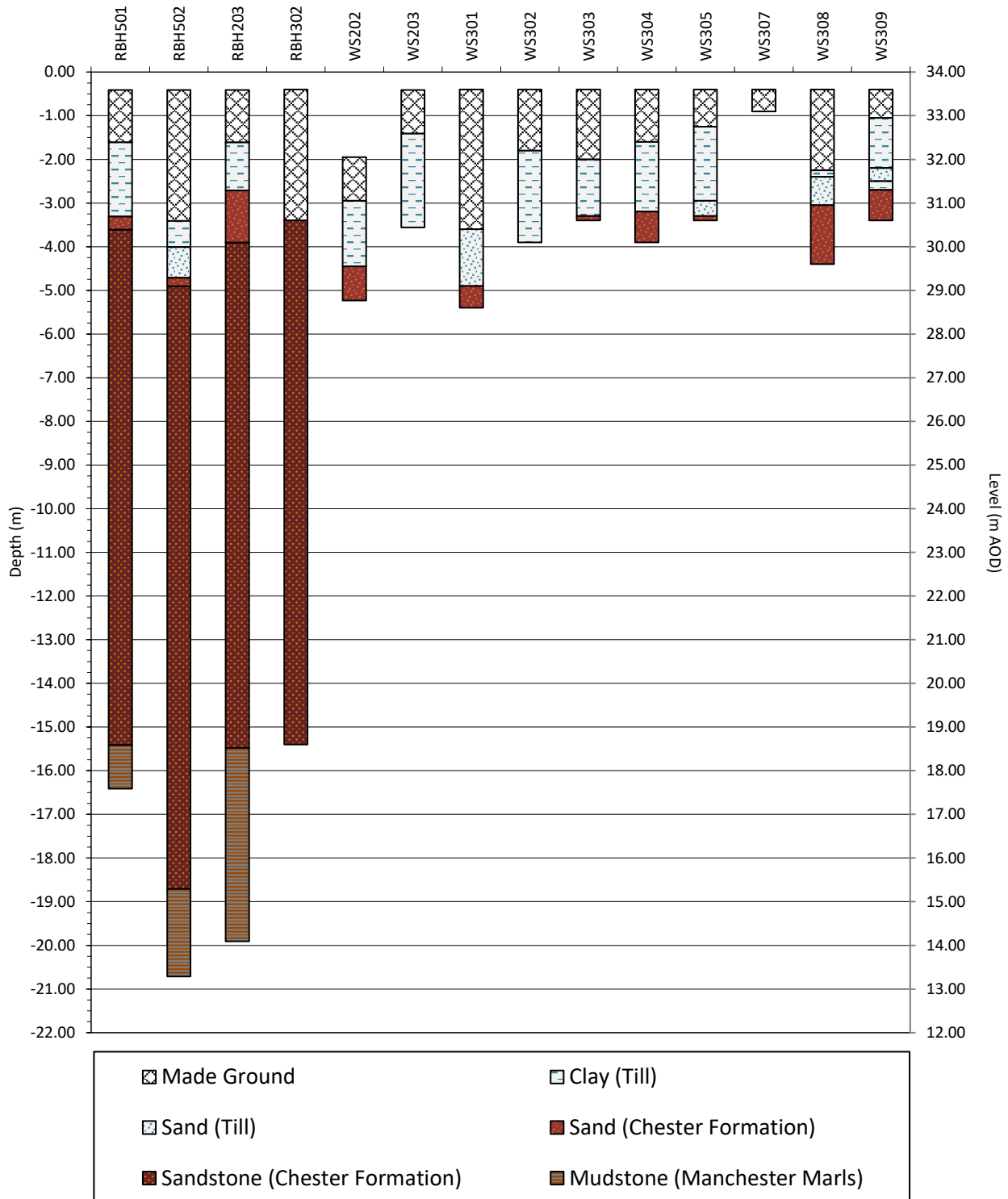


Figure 1 - Generalised Soil Cross Section

5. Axial Design

5.1 Design Soil Profile

Strata	Geotechnical Parameters
Made Ground PPL to 30.5m AOD	Bulk Density, $\gamma_b = 18\text{kN/m}^3$
Till – Clay/Sand 30.5 to 29.5m AOD	Bulk Density, $\gamma_b = 19\text{kN/m}^3$
Chester Formation – Sandstone 29.5 to 19.0m AOD	Bulk Density, $\gamma_b = 21\text{kN/m}^3$ Unconfined Compressive Strength, UCS = 2.0MPa
Manchester Marls Formation – Mudstone <19.0m AOD	Bulk Density, $\gamma_b = 21\text{kN/m}^3$

Groundwater has been considered within the design at a level of 27.5m AOD.

5.2 Geotechnical Design Basis

The design has been carried out generally in accordance with BS EN 1997-1:2004, with reference made to the UK National Annex. This is an ultimate limit state design approach with partial factors applied to actions [A], materials [M] and resistances [R]. Pile lengths have been determined to satisfy a structural check [STR], with partial factors only applied to actions, & a geotechnical check [GEO], with partial factors applied to both actions and resistances.

Design Approach 1 – Combination 1 [DA1-1]
Generally taken as A1 + M1 + R1, with partial factors of 1.0 applied to both M1 and R1. Usually an A1 a factor of 1.35 is applied to the permanent loads and 1.5 applied to the variable loads. Further partial factors are then applied to the secondary variables; $\psi_0 = 0.5$ & 0.7 for wind and imposed actions, respectively. $DA1-1_{Ed,min} = [G_k \times 0.9] + [-W_k \times 1.5]$ $DA1-1_{Ed,max} = [G_k \times 1.35] + \max; [(Q_k \times 1.5) + (W_k \times 1.5 \times 0.5)]$ or $[(Q_k \times 1.5 \times 0.7) + (W_k \times 1.5)]$
Design Approach 1 – Combination 2 [DA1-2]
Generally taken as A2 + M1 + R4, for A2 a factor of 1.0 is applied to the permanent loads and 1.3 applied to the variable loads. For M1 all factors are generally taken as unity. Partial factors for R4 relate mainly to testing and pile type, with factors applied to both shaft adhesion and end bearing. $DA1-2_{Ed,min} = [G_k \times 1.0] + [-W_k \times 1.3]$ $DA1-2_{Ed,max} = [G_k \times 1.0] + \max; [(Q_k \times 1.3) + (W_k \times 1.3 \times 0.5)]$ or $[(Q_k \times 1.3 \times 0.7) + (W_k \times 1.3)]$
F _{rep} [= SLS = DVL]
$F_{rep} = \max; [G_k + Q_k + (Q_{kwind} \times 0.5)]$ or $[G_k + (Q_k \times 0.7) + Q_{kwind}]$

Partial Factors

No preliminary or working pile load testing is proposed.

The following highlighted R4 partial factors are to be applied to the shaft and base resistances, respectively, together with an overall model factor of 1.4, in the absence of preliminary pile testing to verify ULS.

Table A.NA.8 Extract– UK National Annex		
Resistance	R4 Without Explicit Verification of SLS	R4 With Explicit Verification of SLS
Shaft [Y_s]	1.6	1.4
Base [Y_b]	2.0	1.7
Total/Comp [Y_t]	2.0	1.7
Tension [$Y_{s;t}$]	2.0	1.7

Within the design an additional check has been carried out to ensure that the designed lengths show a minimum factor of safety of 1.5 in skin friction alone.

Axial Pile Capacity

Made Ground	Discounted for positive shaft friction.
Till (Clay/Sand)	Discounted for positive shaft friction.
Sandstone	To calculate skin friction, use; $Q_s = f_s \times A_s, \text{ where } f_s = 0.25 \times \text{VUCS [Horvath and Kenney, 1979].}$ For design purposes, consider a UCS of 0.4MPa for the first 1m penetration, with a calculated adhesion of 158kN/m². After 1m penetration, consider a limited UCS of 2.0MPa, with a calculated adhesion of 354kN/m². To calculate end bearing use 5 x UCS.
Mudstone	Not considered in the design – all piles terminate in sandstone based on the loads advised.

Characteristic geotechnical parameters have been adopted within the design, however, on site piles may attain practical auger refusal prior to reaching their design lengths. Boring conditions are to be reviewed on site as work progress, to check that the boring rate is continuing to slow down rather than significantly speed up, which could be indicative of weaker material. Should piles achieve auger refusal, a higher UCS value should apply.

5.3 Socket Length Calculations

500mm Diameter CFA Piles; $A_s = 1.571\text{m}^2/\text{m}$ and $A_b = 0.196\text{m}^2$

Penetration into rock [m]	UCS [MPa]	f_s [kN/m ²]	Q_s [kN]	$Q_{s,ult}$ [kN]	$Q_{b,ult}$ [kN]	Q_{ult} [kN]	DA1-2 _{Ed,max} [kN]	$Q_{s,ult} / 1.5$ [kN]
Superficial above [discounted]					-	-	-	-
1.0	0.4	158	248	248	393	641	251	166
1.5	2.0	354	278	526	1963	2490	936	351
2.0	2.0	354	278	804	1963	2767	1060	536
2.5	2.0	354	278	1081	1963	3045	1184	721
3.0	2.0	354	278	1359	1963	3323	1308	906
3.5	2.0	354	278	1637	1963	3600	1432	1091
4.0	2.0	354	278	1914	1963	3878	1556	1276
4.5	2.0	354	278	2192	1963	4156	1680	1461
5.0	2.0	354	278	2470	1963	4433	1804	1647

750mm Diameter CFA Piles; $A_s = 2.356\text{m}^2/\text{m}$ and $A_b = 0.442\text{m}^2$

Penetration into rock [m]	UCS [MPa]	f_s [kN/m ²]	Q_s [kN]	$Q_{s,ult}$ [kN]	$Q_{b,ult}$ [kN]	Q_{ult} [kN]	DA1-2 _{Ed,max} [kN]	$Q_{s,ult} / 1.5$ [kN]
Superficial above [discounted]					-	-	-	-
1.0	0.4	158	373	373	884	1256	482	248
1.5	2.0	354	417	789	4418	5207	1930	526
2.0	2.0	354	417	1206	4418	5623	2116	804
2.5	2.0	354	417	1622	4418	6040	2302	1081
3.0	2.0	354	417	2039	4418	6456	2488	1359
3.5	2.0	354	417	2455	4418	6873	2674	1637
4.0	2.0	354	417	2872	4418	7290	2860	1914
4.5	2.0	354	417	3288	4418	7706	3046	2192
5.0	2.0	354	417	3705	4418	8123	3232	2470
5.5	2.0	354	417	4121	4418	8539	3418	2747
6.0	2.0	354	417	4538	4418	8956	3604	3025
6.5	2.0	354	417	4954	4418	9372	3790	3303
7.0	2.0	354	417	5371	4418	9789	3975	3581
7.5	2.0	354	417	5787	4418	10205	4161	3858
8.0	2.0	354	417	6204	4418	10622	4347	4136
8.5	2.0	354	417	6620	4418	11038	4533	4414
9.0	2.0	354	417	7037	4418	11455	4719	4691
9.5	2.0	354	417	7453	4418	11871	4905	4969
10.0	2.0	354	417	7870	4418	12288	5091	5247

6. Horizontal Analysis

All piles are subject to horizontal loads, taken to apply at pile cut off level.

6.1 Horizontal Design Basis

This design has been carried out generally in accordance with BS EN 1997-1:2004, with reference made to the UK National Annex. This is an ultimate limit state design approach with partial factors applied to actions [A], materials [M] and resistances [R].

Design Approach 1 – Combination 1 [DA1-1]
Taken as A1 + M1 + R1. For A1 a factor of 1.5 has been applied to the variable load [taken as imposed and wind], with partial factors of 1.0 applied to both M1 and R1.
$DA1-1_{Ed,max} = [G_k \times 1.35] + [Q_k \times 1.5]$

Design Approach 1 – Combination – 2 [DA1-2]
Taken as A2 + M2 + R1. For A2 a factor of 1.3 has been applied to the variable load [taken as imposed and wind]. For M2 factors of 1.25 [drained soils] and 1.4 [undrained soils] have been applied to the materials, with a partial factor of 1.0 applied to R1.
$DA1-2_{Ed,max} = [G_k \times 1.0] + [Q_k \times 1.3]$

6.2 OASYS ALP Analysis

Analysis of piles under the applied horizontal load has been carried out using the computer program OASYS ALP, which models the interaction between the pile and the surrounding soil, and predicts the pressures, horizontal movements, shear forces and the bending moments induced in the pile when subjected to lateral loads.

Pile Head Restraint

Where piles are shown to be restrained by ground beams or inherently within the pile cap [$\geq 3n_r$ piles], piles are considered as fixed head. Within the analysis, no allowance has been made for any moments arising from construction tolerances.

Where single piles are shown on the layout, which may not be fully restrained in two orthogonal directions, piles are considered as free head. For design purposes, an applied moment has been considered, arising from a construction tolerance of 75mm at piling platform level.

Refer to pile design schedule for calculated moments.

OASYS ALP Summary

Load Case	Pile Diameter [mm]	Head Restraint	Max Horizontal F_{rep} [kN]	Max Applied Horizontal [kN]	Max Applied Moment [kNm]	Max Moment from ALP [kNm]	Depth to Dissipate below COL [m]
1	500	Free	35	DA1-1 = 53 DA1-2 = 46	DA1-1 = 160 DA1-2 = 122	211.3 170.7	4.9
2	750	Fixed	50	DA1-1 = 75 DA1-2 = 65	N/A	42.1 38.4	4.2
3	750	Free	50	DA1-1 = 75 DA1-2 = 65	DA1-1 = 435 DA1-2 = 331	513.2 403.4	6.2

Refer to Appendix A for OASYS ALP horizontal analysis, and section 7 for structural design.

7. Structural Design

7.1 Reinforcement

In accordance with BS EN 1536:2010, piles are to be reinforced with a minimum of 0.5% A_c ;

Where A_c = Area of Concrete = 196,350mm² & 441,786mm² for 500mm & 750mm diameter piles, respectively.

500mm Diameter – 0.5% A_c = 982mm². Minimum cage = 5 x B16mm bars [1005mm²].

750mm Diameter – 0.5% A_c = 2209mm². Minimum cage = 8 x B20mm bars [2513mm²].

7.2 OASYS ADCOL Analysis

Using the OASYS ADCOL program [Appendix B], an arrangement of reinforcement has been selected in accordance with EC2, to derive the ultimate moment resistance of the pile [M_u], under the minimum and maximum DA1-1 vertical actions that are to be applied. The ultimate moments are then compared to those derived from OASYS ALP [M], to ensure that the proposed section is sufficient to cater for the loads advised [$M/M_u \leq 1.0$].

Load Case	Pile Diameter [mm]	Horizontal Load [kN]	Max Moment from Alp, M [kNm]	DA1-1 Vertical Action [kN]	Cage	Ult Moment of Section, M_u [kNm]	M/ M_u
1	500	35	211.3	Max = 2139	6 x B20	211.7	1.0
2	750	50	42.1	Min = -72 Max = 6347	8 x B20	296.8 475.8	0.1 0.1
3	750	50	513.2	Max = 5799	8 x B20	558.1	0.9

7.3 Piles Subject to Net Tension

Where piles are subject to net tension;

Calculate the area of steel required below cut off level [A_{st}], using;

$$A_{st} = [1.15 \times \text{DA1-1}E_{d,min}] / f_y$$

Where $f_y = 500\text{N/mm}^2$

Check reinforcement length below platform level to ensure an adequate factor of safety in shaft friction.

Pile Ref	DA1-1 _{Ed,min} Tension [kN]	A_{st} Required [mm ²]	Proposed Cage	DA1-2 _{Ed,min} Tension [kN]	Q_s Required [kN]	Minimum Reinforcement Length Required* [m]
P108	-72	166	8 x B20 [2513mm ²]	>0	No net GEO tension – no design check required	
P196	-53	122	8 x B20 [2513mm ²]	>0	No net GEO tension – no design check required	

7.4 Concrete [In Accordance with Special Digest 1]

C30/37 DC-2 concrete is proposed, based on the DS-2 AC-2 sulphate conditions specified for plot NT02 in the report detailed in section 2.

7.5 Maximum Structural Capacity

In accordance with BS EN 1992-1, calculate the maximum structural capacity of the concrete using;

$$f_{cd} = [\alpha_{cc} \times f_{ck}] / [\gamma_c \times k_f]$$

where γ_c = Partial safety factor for concrete = 1.50
 α_{cc} = Coefficient for the reinforced section = 0.85
 f_{ck} = Compressive strength = 30N/mm²
 k_f = Partial factor = 1.1.
 $F_{cd} = [0.85 \times 30\text{N/mm}^2] / [1.5 \times 1.1] = 15.45\text{N/mm}^2$.

$$F_{cd} = [0.85 \times 30\text{N/mm}^2] / [1.5 \times 1.1] = 15.45\text{N/mm}^2$$

7.6 Design Axial Resistance – Based on Concrete Compressive Strength Only

Calculate using;

$$N_{R;d} = A_c \times f_{cd}$$

Where A_c = Area of Concrete = 196,350mm² & 441,786mm² for 500mm & 750mm diameter piles, respectively.

$$N_{R;d} (500\text{mm}) = 196,350\text{mm}^2 \times 15.45\text{N/mm}^2 = 3035\text{kN}. \text{ Maximum DA1-1E}_{d,\text{max}} = 2139\text{kN} - \text{ok}.$$

$$N_{R;d} (750\text{mm}) = 441,786\text{mm}^2 \times 15.45\text{N/mm}^2 = 6868\text{kN}. \text{ Maximum DA1-1E}_{d,\text{max}} = 6347\text{kN} - \text{ok}.$$

7.7 Reinforcement Projection Above Pile Cut Off Level

The design and specification of reinforcement anchorage lies outside the scope of this design. Reinforcement cages have been scheduled from piling platform level only, and no allowance has been made for steel projecting above mat level.

7.8 Helical

Shear reinforcement has been designed in accordance with BS EN 1992-1-1:2001 [EC2].

500mm Diameter – B8mm spaced at 225mm c/c

750mm Diameter – B10mm spaced at 300mm c/c.

7.9 Cover

Minimum cover to steel links shall be 75mm.

8. Summary

8.1 Design Summary

Nr Piles	162
Piling Platform Level	TBC
Pile Cut Off Levels	As drawing RDB-ROC-2B1-FN-DR-S-0296
Pile Diameter	500mm & 750mm
Pile Length	As Appendix C
Reinforcement	As Appendix C
Concrete	C30/37 DC-2
Testing	100% sonic echo integrity testing on working piles. Piles are to be tested at cut off level following pile trimming. No static/dynamic load testing is proposed.

8.2 Outstanding Actions

Principle Contractor/Structural Engineer actions required;

- Final piling platform level is to be confirmed.
- Construction drawings are to be issued prior to commencement on site.
- Approval of this pile design is to be obtained.

9. Technical Notes

Drawing Status

The design is based on the current drawings in our possession and it is the responsibility of others to confirm the status of drawings prior to construction.

Submission of Design for Approval

The communication of the design to all relevant parties, for any comment or approvals required, remains the responsibility of others. Any variation in pile design details required due to input from others will be treated as a variation. We shall accept no responsibility should our design not be approved prior to your required commencement date. We have included for designing piles on one occasion only. Re-designs for revisions, alterations or reasons beyond our control are carried out on hourly rate basis at £95.00 per hour.

De-bonding Foam

Where our offer includes for the provision of de-bonding foam please note the following;

- De-bonding foam will only be placed to a tolerance of -150 / +150mm to a target level of 150mm above pile cut off level.
- No cutting down of piles has been allowed and an element of hand trimming will be required.
- Engineering level control is to be provided by others.

Piling Rig Bearing Pressures [for the purposes of piling mat design]

Where rig bearing pressures have been provided by Green Piling for the purposes of piling platform design, it shall be noted, for the avoidance of doubt that the pressures have been calculated in accordance with the FPS method suggested for use with the BRE design approach. These figures do not constitute maximum values of applied loading and reference should be made to the manufacturers operating handbook for specific values.

Pile Head Connection Detail

To be designed by others.

Soils Information

The design has been prepared solely on the basis of the documents set out herein. In the event that ground conditions encountered on site differ from those indicated in the documentation provided, Green Piling Ltd reserves the right to make any such additional charge or charges as may be reasonable in all circumstances. Particular and without derogation from the generality of the above Green Piling accept no responsibility for;

- Any cause outside our immediate and direct control such as reactions due to undermining, movement of filling, artesian water or underground streams, acids or other destructive matter or deleterious water or ground heave etc.
- Any fault in the junction between the superstructure and the pile.
- Piles being diverted from their positions or affected by ground movement or uplift.

The size of the piles has been determined from the loads indicated to us and, unless specifically stated, no allowance has been made for negative skin friction, ground heave or other forces.

Appendix A – OASYS ALP Calculations



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 1

Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date	Checked Date

Titles

Job No.: P25-2245
Job Title: Plot NT02 @ Dantzic Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 1
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC1 DA1-1.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

General Data

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence Control

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Soil Data

Elastic-plastic soils
Factor on soil E value: 0.8000

No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	Factored c (top)	dc/dz
		[kN/m²]	[kN/m²] [deg]				[kN/m²]	[kN/m²/m]
1	31.375000	10000.	18.000 28.000	-	-	-	0.0	0.0
2	30.500000	18750.	19.000 28.000	-	-	-	0.0	0.0
3	29.500000	80000.	21.000 30.000	-	-	-	0.0	0.0
4	28.500000	100000.	21.000 30.000	-	-	-	0.0	0.0

Calculated K_q and K_c Values

Node	Z/D	K _q	K _c
1	0.0	4.0943	6.3808
2	0.70833	4.8702	12.942
3	1.4167	5.5321	17.760
4	2.0833	6.0719	21.255
5	2.7500	6.5462	24.050
6	3.4167	6.9662	26.338
7	4.0833	8.6636	32.829
8	4.7500	9.0883	34.882
9	5.4167	9.4748	36.660
10	6.0833	9.8282	38.213
11	6.7500	10.152	39.582
12	7.4167	10.451	40.798
13	8.0833	10.727	41.885
14	8.7500	10.983	42.863
15	9.4167	11.220	43.747
16	10.083	11.441	44.551
17	10.750	11.648	45.284
18	11.417	11.842	45.955
19	12.083	12.023	46.573
20	12.750	12.194	47.143

Sections

Name	Input Type	Description	Material	Class	Effective Width	EI
					[m]	[kNm²]
1	Explicit	Description, Material and Class	not applicable		0.50000	61359.

Pile Properties

Level	Section
[m]	
31.375 1	

File base at 25.000000 m

Applied Loads and Displacements

No.	Level	Force	Moment	Displacement
	[m]	[kN]	[kNm]	[mm]
1	31.375	35.0000	0.0	0.0
2	31.375	0.0	-160.00	0.0

Geometry and Initial state

Node	Level	Soil	EI	Effective Width	Water Pressure	Soil Disp
	[m]		[kNm2]	[m]	[kN/m²]	[mm]
1	31.375	1	61359.	0.50000	0.0	0.0
2	31.021	1	61359.	0.50000	0.0	0.0
3	30.667	1	61359.	0.50000	0.0	0.0
4	30.333	2	61359.	0.50000	0.0	0.0
5	30.000	2	61359.	0.50000	0.0	0.0
6	29.667	2	61359.	0.50000	0.0	0.0
7	29.333	3	61359.	0.50000	0.0	0.0
8	29.000	3	61359.	0.50000	0.0	0.0
9	28.667	3	61359.	0.50000	0.0	0.0
10	28.333	4	61359.	0.50000	0.0	0.0
11	28.000	4	61359.	0.50000	0.0	0.0
12	27.667	4	61359.	0.50000	0.0	0.0
13	27.333	4	61359.	0.50000	1.6667	0.0
14	27.000	4	61359.	0.50000	5.0000	0.0
15	26.667	4	61359.	0.50000	8.3333	0.0
16	26.333	4	61359.	0.50000	11.667	0.0
17	26.000	4	61359.	0.50000	15.000	0.0
18	25.667	4	61359.	0.50000	18.333	0.0
19	25.333	4	61359.	0.50000	21.667	0.0
20	25.000	4	61359.	0.50000	25.000	0.0

Output for load increment 1

Iteration	Max	at	Disp	Pressure
		node	error	error
	Inc			
	Disp			
	[mm]		[mm]	[kN/m²]
14	16.35	1	0.0006	0.01

Node	Level	Defl	Rotation	Soil	Pressure	Bending	Shear
	[m]	[mm]	[rad]		[kN/m²]	[kNm]	[kN]
1	31.375	-16.354	-0.010163	1	-6.5253	0.0	0.0
1	31.375					160.00	-52.500
2	31.021	-12.925	-0.0091861	1	-31.047	178.39	-49.173
3	30.667	-9.8593	-0.0081090	1	-70.534	194.83	-40.363
4	30.333	-7.3362	-0.0070195	2	-114.86	206.26	-24.729
5	30.000	-5.1846	-0.0058853	2	-155.54	211.32	-2.1963
6	29.667	-3.4131	-0.0047471	2	-102.39	207.73	19.298
7	29.333	-2.0160	-0.0036438	3	-258.05	198.45	49.334
8	29.000	-0.97393	-0.0026299	3	-124.66	174.84	81.227



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 1

Job No.	Sheet No.	Rev.
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Node Level	Defl	Rotation	Soil Pressure	Bending	Shear
[m]	[mm]	[rad]	[kN/m²]	[kNm]	[kN]
9 28.667	-0.24638	-0.0017631	3 -31.536	144.30	94.244
10 28.333	0.22043	-0.0010670	4 35.268	112.01	93.933
11 28.000	0.48383	-540.92E-6	4 77.412	81.679	84.543
12 27.667	0.59805	-167.98E-6	4 95.688	55.648	70.118
13 27.333	0.60992	77.970E-6	4 97.588	34.934	54.011
14 27.000	0.55694	226.11E-6	4 89.110	19.641	38.453
15 26.667	0.46692	304.60E-6	4 74.708	9.2983	24.802
16 26.333	0.35886	338.18E-6	4 57.417	3.1063	13.791
17 26.000	0.24425	346.77E-6	4 39.080	0.10408	5.7499
18 25.667	0.12884	344.94E-6	4 20.614	-0.72700	0.77542
19 25.333	0.014446	341.70E-6	4 2.3113	-0.41287	-1.1350
20 25.000	-0.099187	340.50E-6	4 -15.870	0.029677	-0.0051407

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.

EXTREME values so far:-

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-16.354	0.60992	-0.010163	346.77E-6	-0.72700	211.32	-52.500	94.244

RESTRAINT FORCES

No.	Node	Lateral Moment force
		[kN] [kNm]

Titles

Job No.: P25-2245
Job Title: Plot NT02 @ Dantzic Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 1
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC1 DA1-2.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

General Data

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence Control

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Soil Data

Elastic-plastic soils
Factor on soil E value: 0.8000

No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	Factored c (top)	dc/dz
		[m]	[kN/m²]	[kN/m²] [deg]			[kN/m²]	[kN/m²/m]
1	31.375000	10000.	18.000	28.000	-	-	0.0	0.0
2	30.500000	18750.	19.000	28.000	-	-	0.0	0.0
3	29.500000	80000.	21.000	30.000	-	-	0.0	0.0
4	28.500000	100000.	21.000	30.000	-	-	0.0	0.0

Calculated Kq and Kc Values

Node	Z/D	Kq	Kc
1	0.0	2.8504	5.2205
2	0.70833	3.3693	10.199
3	1.4167	3.7937	13.567
4	2.0833	4.1281	15.873
5	2.7500	4.4136	17.641
6	3.4167	4.6602	19.040
7	4.0833	5.6347	22.585
8	4.7500	5.8662	23.710
9	5.4167	6.0726	24.662
10	6.0833	6.2577	25.477
11	6.7500	6.4248	26.184
12	7.4167	6.5762	26.802
13	8.0833	6.7142	27.347
14	8.7500	6.8404	27.832
15	9.4167	6.9562	28.265
16	10.083	7.0630	28.655
17	10.750	7.1617	29.008
18	11.417	7.2531	29.329
19	12.083	7.3382	29.622
20	12.750	7.4175	29.891

Sections

Name	Input Type	Description	Material	Class	Effective Width	EI
					[m]	[kNm²]
1	Explicit	Description, Material and Class	not applicable		0.50000	61359.

Pile Properties

Level	Section
[m]	
31.375	1

File base at 25.000000 m

Applied Loads and Displacements

No.	Level	Force	Moment	Displacement
		[kN]	[kNm]	[mm]
1	31.375	35.0000	0.0	0.0
2	31.375	0.0	-122.00	0.0

Geometry and Initial state

Node	Level	Soil	EI	Effective Width	Water Pressure	Soil Disp
				[m]	[kN/m²]	[mm]
1	31.375	1	61359.	0.50000	0.0	0.0
2	31.021	1	61359.	0.50000	0.0	0.0
3	30.667	1	61359.	0.50000	0.0	0.0
4	30.333	2	61359.	0.50000	0.0	0.0
5	30.000	2	61359.	0.50000	0.0	0.0
6	29.667	2	61359.	0.50000	0.0	0.0
7	29.333	3	61359.	0.50000	0.0	0.0
8	29.000	3	61359.	0.50000	0.0	0.0
9	28.667	3	61359.	0.50000	0.0	0.0
10	28.333	4	61359.	0.50000	0.0	0.0
11	28.000	4	61359.	0.50000	0.0	0.0
12	27.667	4	61359.	0.50000	0.0	0.0
13	27.333	4	61359.	0.50000	1.6667	0.0
14	27.000	4	61359.	0.50000	5.0000	0.0
15	26.667	4	61359.	0.50000	8.3333	0.0
16	26.333	4	61359.	0.50000	11.667	0.0
17	26.000	4	61359.	0.50000	15.000	0.0
18	25.667	4	61359.	0.50000	18.333	0.0
19	25.333	4	61359.	0.50000	21.667	0.0
20	25.000	4	61359.	0.50000	25.000	0.0

Output for load increment 1

Iteration	Max	at	Disp	Pressure
		node	error	error
	Inc			
	Disp			
	[mm]		[mm]	[kN/m²]
20	14.09	1	0.0010	0.04

Node	Level	Defl	Rotation	Soil	Pressure	Bending	Shear
		[mm]	[rad]		[kN/m²]	[kNm]	[kN]
1	31.375	-14.090	-0.0084193	1	-4.5429	0.0	0.0
1	31.375					122.00	-45.500
2	31.021	-11.239	-0.0076690	1	-21.479	137.97	-43.196
3	30.667	-8.6685	-0.0068305	1	-48.370	152.60	-37.137
4	30.333	-6.5331	-0.0059716	2	-78.090	163.59	-26.473
5	30.000	-4.6927	-0.0050649	2	-111.44	170.25	-10.679
6	29.667	-3.1587	-0.0041388	2	-94.761	170.71	6.5051
7	29.333	-1.9322	-0.0032245	3	-215.53	165.91	32.362
8	29.000	-1.0025	-0.0023689	3	-128.32	149.13	61.017



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 1

Job No.	Sheet No.	Rev.
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Node Level	Defl	Rotation	Soil Pressure	Bending	Shear
[m]	[mm]	[rad]	[kN/m²]	[kNm]	[kN]
9 28.667	-0.34069	-0.0016237	3 -43.609	125.23	75.344
10 28.333	0.095140	-0.0010151	4 15.222	98.905	77.710
11 28.000	0.35168	-547.20E-6	4 56.268	73.425	71.752
12 27.667	0.47438	-209.26E-6	4 75.901	51.070	60.738
13 27.333	0.50341	18.652E-6	4 80.546	32.933	47.701
14 27.000	0.47155	160.16E-6	4 75.447	19.270	34.702
15 26.667	0.40362	238.79E-6	4 64.580	9.7982	23.033
16 26.333	0.31699	275.68E-6	4 50.719	3.9145	13.425
17 26.000	0.22254	288.23E-6	4 35.607	0.84849	6.2307
18 25.667	0.12610	289.46E-6	4 20.175	-0.23933	1.5822
19 25.333	0.029890	287.80E-6	4 4.7825	-0.20629	-0.49764
20 25.000	-0.065866	287.00E-6	4 -10.539	0.092434	-0.017970

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.

EXTREME values so far:-

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-14.090	0.50341	-0.0084193	289.46E-6	-0.23933	170.71	-45.500	77.710

RESTRAINT FORCES

No.	Node	Lateral Moment force
		[kN] [kNm]



Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date	Checked Date

Job No.: P25-2245
Job Title: Plot NT02 @ Dantzic Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 2
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC2 DA1-1.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

Number of increments = 1
Increment applied loads only
Standard analysis type

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Elastic-plastic soils
Factor on soil E value: 0.8000

Factor on soil E value: 0.8000							
No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	dc/dz
	[m]	[kN/m ²]	[kN/wt.]	[deg]			[kN/m ²] [kN/m ² /m]
1	29.1850000	80000.	21.000	30.000	-	-	0.0 0.0
2	28.5000000	100000.	21.000	30.000	-	-	0.0 0.0

Node	Z/D	K_q	K_c
1	0.0	4.7531	6.9736
2	0.60889	5.5379	13.451
3	1.2178	6.2330	18.549
4	1.8267	6.8529	22.666
5	2.6744	7.6123	27.234
6	3.5222	8.2723	30.836
7	4.3700	8.8512	33.750
8	5.2178	9.3632	36.155
9	6.0656	9.8192	38.174
10	6.9133	10.228	39.893

Name	Input Type	Description	Material	Class	Effective Width [m]	EI [kNm ²]
1	Explicit	Description, Material and Class not applicable			0.75000	310630.

Level [m]	Section
29.185 1	

File base at 24.000000 m

No.	Level [m]	Force [kN]	Moment [kNm]	Displacement [mm]
1	29.185	50.000	0.0	0.0

No.	Node	Lateral Stiffness [kN/m]	Rotational Stiffness [kNm/rad]
1	1	0.0	75000.

Node Level	Soil	EI	Effective Width	Water Pressure	Soil Disp	
	[m]	[kNm ²]	[m]	[kN/m ²]	[mm]	
1	29.185	1	2.10630.	0.75000	0.0	0.0
2	28.728	1	2.10630.	0.75000	0.0	0.0
3	28.272	2	2.10630.	0.75000	0.0	0.0
4	27.815	2	2.10630.	0.75000	0.0	0.0
5	27.179	2	2.10630.	0.75000	3.2083	0.0
6	26.543	2	2.10630.	0.75000	9.5666	0.0
7	25.907	2	2.10630.	0.75000	15.925	0.0
8	25.272	2	2.10630.	0.75000	22.283	0.0
9	24.636	2	2.10630.	0.75000	28.642	0.0
10	24.000	2	2.10630.	0.75000	35.000	0.0

Iteration	Max Inc Disp [mm]	at node 1	Disp error [mm]	Pressure error [kN/m ²]
9	1.14	1	0.0003	0.02

Node Level	Soil	Pressure	Bending	Shear
[m]	[mm]	[rad]	[kN/m ²]	[kN]
1 29.185	-1.1354	-435.41E-6	1 -11.395	0.0
1 29.185				0.0
2 27.988	-0.29333	-458.90E-6	1 -53.108	-75.000
3 28.272	-0.72280	-439.46E-6	2 -77.099	-25.755
4 27.815	-0.53221	-392.06E-6	2 -56.769	38.749
5 27.815	-0.30355	-392.06E-6	2 -32.422	18.624
6 26.543	-0.13803	-203.20E-6	2 -14.723	35.366
7 25.907	-0.012239	-169.28E-6	2 -1.3054	24.216
8 25.272	0.082166	-111.61E-6	2 8.7644	25.069
9 24.637	0.15963	-61.94E-6	2 17.719	16.167
10 24.000	0.23096	-111.03E-6	2 24.636	0.026263
				-0.010742

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-1.1354	0.23096	-458.90E-6	-111.03E-6	-32.656	42.052	-75.000	17.848

No.	Node	Lateral Moment force
-----	------	-------------------------



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 2

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		[kN]	[kNm]
1	1	0.0	32.656



Job No.	Sheet No.	Rev.
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Drg. Ref.		
Made by SS	Date	Checked Date

Job No.: P25-2245
Job Title: Plot NT02 @ Dantzic Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 2
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC2 DA1-2.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence control
Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Factor on soil E value: 0.8000

No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	c(top)	dc/dz
	[m]	[kN/m ²]	[kN/wt.]	[deg]			[kN/m ²]	[kN/m ² /m]
1	29.185000	80000.	21.000	30.000	-	-	0.0	0.0
2	28.500000	100000.	21.000	30.000	-	-	0.0	0.0

Node	Z/D	K_q	K_c
1	0.0	3.2374	5.5873
2	0.60889	3.7608	10.412
3	1.2178	4.2054	13.917
4	1.8267	4.5879	16.580
5	2.6744	5.0392	19.374
6	3.5222	5.4169	21.467
7	4.3700	5.7376	23.093
8	5.2178	6.0134	24.393
9	6.0656	6.2530	25.457
10	6.9133	6.4632	26.342

Name	Input Type	Description	Material	Class	Effective Width [m]	EI [kNm ²]
1	Explicit	Description, Material and Class not applicable			0.75000	310630.

Level	Section
[m]	
29.185 1	

File base at 24.000000 m

No.	Level [m]	Force [kN]	Moment [kNm]	Displacement [mm]
1	29.185	50.000	0.0	0.0

No.	Node	Lateral Stiffness [kN/m]	Rotational Stiffness [kNm/rad]
1	1	0.0	75000.

Node	Level	Soil	EI	Effective Width	Water Pressure	Disp
			[kNm ²]	[m]	[kN/m ²]	[mm]
1	29.185	1	210630.	0.75000	0.0	0.0
2	28.728	1	210630.	0.75000	0.0	0.0
3	28.272	2	210630.	0.75000	0.0	0.0
4	27.815	2	210630.	0.75000	0.0	0.0
5	27.179	2	210630.	0.75000	3.2083	0.0
6	26.543	2	210630.	0.75000	9.5667	0.0
7	25.907	2	210630.	0.75000	15.9250	0.0
8	25.272	2	210630.	0.75000	22.283	0.0
9	24.636	2	210630.	0.75000	28.642	0.0
10	24.000	2	210630.	0.75000	35.000	0.0

Iteration	Max Inc	at node	Disp error	Pressure error
	Disp [mm]		[mm]	[kN/m ²]
9	1.05	1	0.0003	0.03

Node Level	Defl [mm]	Rotation [rad]	Soil [kN/m ²]	Pressure [kN/m]	Bending [kNm]	Shear [kN]
1 29.185	-1.0461	396.96E-6	1	-7.7616	0.0	0.0
1 29.185					-29.772	-65.000
2 27.128	-0.85812	419.36E-6	1	-36.066	-0.69537	-0.95
3 28.272	-0.66960	403.16E-6	2	-71.360	22.740	-39.098
4 27.815	-0.49389	360.72E-6	2	-52.682	35.104	-16.086
5 27.128	-0.28844	246.64E-6	2	-30.380	38.800	-1.415
6 26.543	-0.13009	213.22E-6	2	-13.876	32.431	12.666
7 25.907	-0.013401	157.30E-6	2	-1.4295	22.273	16.315
8 25.272	0.074441	-122.62E-6	2	7.9403	1.683	14.763
9 24.637	0.000000	-1.88E-6	2	0.0000	0.0000	0.0000
10 24.000	0.21327	-103.65E-6	2	22.748	0.058492	-0.011940

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-1.0461	0.21327	-419.36E-6	-103.65E-6	-29.772	38.380	-65.000	16.315

No.	Node	Lateral	Moment
		force	



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 2

Job No.	Sheet No.	Rev.
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		[kN]	[kNm]
1	1	0.0	29.772



Plot NT02 – Dantzic Street, Manchester M4 4DD

Horizontal Analysis

Design Case 3

Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date	Checked Date

Titles

Job No.: P25-2245
Job Title: Plot NT02 | Dantzic Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 3
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC3 DA1-1.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

General Data

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence Control

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Soil Data

Elastic-plastic soils
Factor on soil E value: 0.8000

No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	Factored c (top)	dc/dz
		[m]	[kN/m²]	[kN/m²]	[deg]		[kN/m²]	[kN/m²/m]
1	31.795000	10000.	18.000	28.000	-	-	0.0	0.0
2	30.500000	18750.	19.000	28.000	-	-	0.0	0.0
3	29.500000	80000.	21.000	30.000	-	-	0.0	0.0
4	28.500000	100000.	21.000	30.000	-	-	0.0	0.0

Calculated K_q and K_c Values

Node	Z/D	K _q	K _c
1	0.0	4.0943	6.3808
2	0.69067	4.8523	12.803
3	1.3813	5.5014	17.550
4	2.0720	6.0633	21.202
5	2.7489	6.5455	24.046
6	3.3711	8.1610	30.251
7	4.0822	8.6629	32.825
8	4.7044	9.0605	34.751
9	5.3267	9.4247	36.434
10	5.9489	9.7594	37.916
11	6.5711	10.068	39.231
12	7.1933	10.354	40.406
13	7.8156	10.619	41.463
14	8.4378	10.865	42.418
15	9.0600	11.095	43.285

Sections

Name	Input Type	Description	Material	Class	Effective Width	EI
					[m]	[kNm²]
1	Explicit	Description, Material and Class not applicable			0.75000	310630.

Pile Properties

Level	Section
[m]	
31.795	1

Pile base at 25.000000 m

Applied Loads and Displacements

No.	Level	Force	Moment	Displacement
		[kN]	[kNm]	[mm]
1	31.795	50.0000	0.0	0.0
2	31.795	0.0	-435.00	0.0

Geometry and Initial state

Node	Level	Soil	EI	Effective Width	Water Pressure	Soil Disp
				[m]	[kN/m²]	[mm]
1	31.795	1	310630.	0.75000	0.0	0.0
2	31.277	1	310630.	0.75000	0.0	0.0
3	30.759	1	310630.	0.75000	0.0	0.0
4	30.241	2	310630.	0.75000	0.0	0.0
5	29.733	2	310630.	0.75000	0.0	0.0
6	29.267	3	310630.	0.75000	0.0	0.0
7	28.733	3	310630.	0.75000	0.0	0.0
8	28.267	4	310630.	0.75000	0.0	0.0
9	27.800	4	310630.	0.75000	0.0	0.0
10	27.333	4	310630.	0.75000	1.6667	0.0
11	26.867	4	310630.	0.75000	6.3333	0.0
12	26.400	4	310630.	0.75000	11.000	0.0
13	25.933	4	310630.	0.75000	15.667	0.0
14	25.467	4	310630.	0.75000	20.333	0.0
15	25.000	4	310630.	0.75000	25.000	0.0

Output for load increment 1

Iteration	Max Inc	at node	Disp error	Pressure error
			[mm]	[kN/m²]
8	14.16	1	0.0004	0.00

Node	Level	Defl	Rotation	Soil Pressure	Bending	Shear
		[mm]	[rad]	[kN/m²]	[kNm]	[kN]
1	31.795	-14.162	-0.0066561	1	-9.5438	0.0
1	31.795				435.00	-75.000
2	31.277	-10.908	-0.0058991	1	-45.243	472.89
3	30.759	-8.0605	-0.0050865	1	-85.978	501.67
4	30.241	-5.6440	-0.0042404	2	-112.88	513.16
5	29.733	-3.7026	-0.0034106	2	-74.053	502.37
6	29.267	-2.2845	-0.0026728	3	-194.95	479.83
7	28.733	-1.0688	-0.0019045	3	-91.207	415.07
8	28.267	-0.31706	-0.0013355	4	-33.820	342.45
9	27.800	0.19527	-879.77E-6	4	20.829	264.31
10	27.333	0.52192	-538.85E-6	4	95.671	189.57
11	26.867	0.71460	-303.38E-6	4	76.224	123.92
12	26.400	0.81896	-157.20E-6	4	87.356	70.721
13	25.933	0.87208	-80.213E-6	4	93.022	31.790
14	25.467	0.90115	-50.306E-6	4	96.123	8.0530
15	25.000	0.92275	-44.269E-6	4	98.426	0.015998

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 3

Job No.	Sheet No.	Rev.
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Node	Level	Defl	Rotation	Soil Pressure	Bending	Shear
	[m]	[mm]	[rad]	[kN/m ²]	[kNm]	[kN]

EXTREME values so far:-

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-14.162	0.92275	-0.0066561	-44.269E-6	0.0	513.16	-75.000	163.81

RESTRAINT FORCES

No.	Node	Lateral Moment force
		[kN] [kNm]



Plot NT02 – Dantzie Street, Manchester M4 4DD

Horizontal Analysis

Design Case 3

Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date	Checked Date

Titles

Job No.: P25-2245
Job Title: Plot NT02 @ Dantzie Street, Manchester M4 4DD
Sub-title: Horizontal Analysis
Calculation Heading: Design Case 3
Initials: SS
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 2245 Alp DC3 DA1-2.alw
File Path: C:\Users\Sarah.shackshaft\Documents\workingfiles\unionsquare.greenpiling.co.uk

General Data

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence Control

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Soil Data

Elastic-plastic soils
Factor on soil E value: 0.8000

No.	Level	E	Unit	Phi	Factored Kq	Factored Kc	Factored c (top)	dc/dz
		[m]	[kN/m²]	[kN/m²]	[deg]		[kN/m²]	[kN/m²/m]
1	31.795000	10000.	18.000	28.000	-	-	0.0	0.0
2	30.500000	18750.	19.000	28.000	-	-	0.0	0.0
3	29.500000	80000.	21.000	30.000	-	-	0.0	0.0
4	28.500000	100000.	21.000	30.000	-	-	0.0	0.0

Calculated Kq and Kc Values

Node	Z/D	Kq	Kc
1	0.0	2.8504	5.2205
2	0.69067	3.3576	10.098
3	1.3813	3.7744	13.425
4	2.0720	4.1229	15.839
5	2.7489	4.4132	17.639
6	3.3711	5.3541	21.133
7	4.0822	5.6343	22.583
8	4.7044	5.8512	23.639
9	5.3267	6.0460	24.542
10	5.9489	6.2219	25.322
11	6.5711	6.3816	26.003
12	7.1933	6.5271	26.603
13	7.8156	6.6603	27.136
14	8.4378	6.7826	27.611
15	9.0600	6.8954	28.039

Sections

Name	Input Type	Description	Material	Class	Effective Width	EI
					[m]	[kNm²]
1	Explicit	Description, Material and Class not applicable			0.75000	310630.

Pile Properties

Level	Section
[m]	
31.795	1

Pile base at 25.000000 m

Applied Loads and Displacements

No.	Level	Force	Moment	Displacement
		[kN]	[kNm]	[mm]
1	31.795	50.0000	0.0	0.0
2	31.795	0.0	-331.00	0.0

Geometry and Initial state

Node	Level	Soil	EI	Effective Width	Water Pressure	Soil Disp
				[m]	[kN/m²]	[mm]
1	31.795	1	310630.	0.75000	0.0	0.0
2	31.277	1	310630.	0.75000	0.0	0.0
3	30.759	1	310630.	0.75000	0.0	0.0
4	30.241	2	310630.	0.75000	0.0	0.0
5	29.733	2	310630.	0.75000	0.0	0.0
6	29.267	3	310630.	0.75000	0.0	0.0
7	28.733	3	310630.	0.75000	0.0	0.0
8	28.267	4	310630.	0.75000	0.0	0.0
9	27.800	4	310630.	0.75000	0.0	0.0
10	27.333	4	310630.	0.75000	1.6667	0.0
11	26.867	4	310630.	0.75000	6.3333	0.0
12	26.400	4	310630.	0.75000	11.000	0.0
13	25.933	4	310630.	0.75000	15.667	0.0
14	25.467	4	310630.	0.75000	20.333	0.0
15	25.000	4	310630.	0.75000	25.000	0.0

Output for load increment 1

Iteration	Max Inc	at node	Disp error	Pressure error
			[mm]	[kN/m²]
8	11.39	1	0.0004	0.00

Node	Level	Defl	Rotation	Soil Pressure	Bending	Shear
		[mm]	[rad]	[kN/m²]	[kNm]	[kN]
1	31.795	-11.387	-0.0052749	1	-6.6443	0.0
1	31.795				331.00	-65.000
2	31.277	-8.8025	-0.0046954	1	-31.306	364.00
3	30.759	-6.5313	-0.0040661	1	-69.667	390.70
4	30.241	-4.5956	-0.0034040	2	-91.913	403.38
5	29.733	-3.0341	-0.0027493	2	-60.682	397.87
6	29.267	-1.8888	-0.0021632	3	-161.17	382.45
7	28.733	-0.90256	-0.0015493	3	-77.019	332.59
8	28.267	-0.28945	-0.0010926	4	-30.875	275.48
9	27.800	0.13112	-725.42E-6	4	13.986	213.34
10	27.333	0.40187	-449.90E-6	4	42.866	153.48
11	26.867	0.56420	-259.05E-6	4	60.181	100.61
12	26.400	0.65485	-140.23E-6	4	69.850	57.584
13	25.933	0.70380	-77.491E-6	4	75.072	25.962
14	25.467	0.73313	-53.049E-6	4	78.201	6.6011
15	25.000	0.75635	-48.100E-6	4	80.677	0.013480

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the passive limit, but within the convergence pressure limit.



Plot NT02 – Dantzic Street, Manchester M4 4DD
Horizontal Analysis
Design Case 3

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Node	Level	Defl	Rotation	Soil Pressure	Bending	Shear
	[m]	[mm]	[rad]	[kN/m ²]	[kNm]	[kN]

EXTREME values so far:-

Deflections		Rotations		Moments		Shears	
Min	Max	Min	Max	Min	Max	Min	Max
[mm]	[mm]	[rad]	[rad]	[kNm]	[kNm]	[kN]	[kN]
-11.387	0.75635	-0.0052749	-48.100E-6	0.0	403.38	-65.000	130.72

RESTRAINT FORCES

No.	Node	Lateral Moment force
		[kN] [kNm]

Appendix B – OASYS ADCOL Calculations

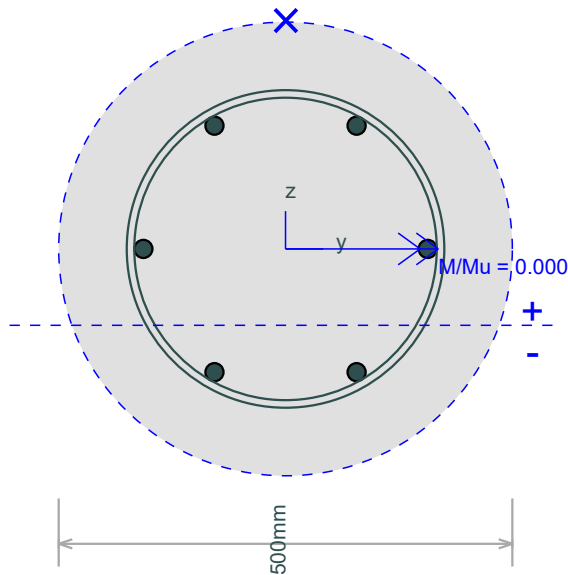
Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date 25-Feb-2025	Checked

Reinforcement Details

Bar Arrangement	1 ring(s)/6 bars per ring
Diameter of main bars	20mm
Area of reinforcement	1884.96mm ²
Nominal Cover (outer)	75mm

Design Results

Analysis Case Name	Analysis Case 1
Axial Design Force	2139kN
Axial Capacity	4059.88kN
Design Moment 'M'	0kNm
Ultimate Moment 'Mu'	211.686kNm
Neutral Axis	-----
Comp./Tens. Side	+/-
Governing Node/Bar	X



Section 1

Analysis Case 1

Plot NT02 – Dantzic Street, Manchester M4 4DD
Structural Check
DC2

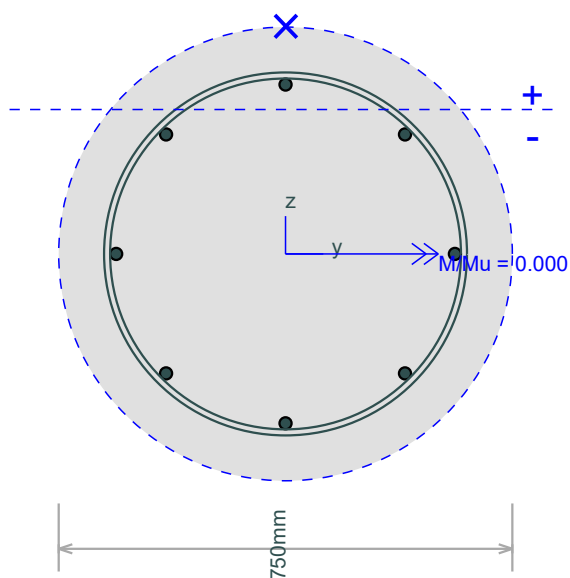
Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date 25-Feb-2025	Checked

Reinforcement Details

Bar Arrangement	1 ring(s)/8 bars per ring
Diameter of main bars	20mm
Area of reinforcement	2513.27mm ²
Nominal Cover (outer)	75mm

Design Results

Analysis Case Name	Analysis Case 1
Axial Design Force	-72kN
Axial Capacity	8472.96kN
Design Moment 'M'	0kNm
Ultimate Moment 'Mu'	296.758kNm
Neutral Axis	-----
Comp./Tens. Side	+/-
Governing Node/Bar	X



Section 1
Analysis Case 1

Plot NT02 – Dantzic Street, Manchester M4 4DD
Structural Check
DC2

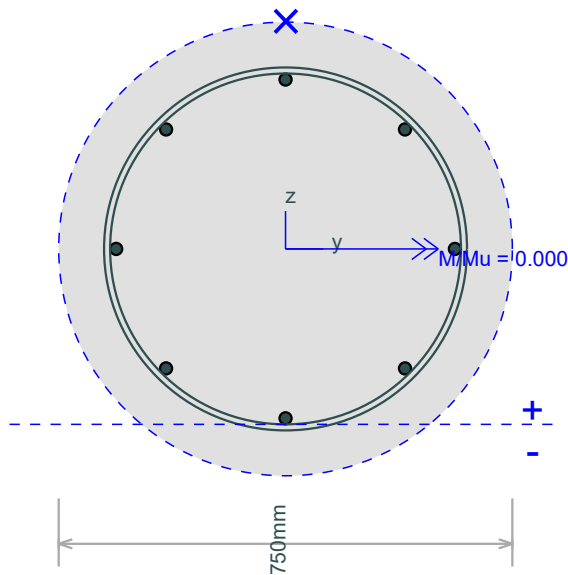
Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date 25-Feb-2025	Checked

Reinforcement Details

Bar Arrangement	1 ring(s)/8 bars per ring
Diameter of main bars	20mm
Area of reinforcement	2513.27mm ²
Nominal Cover (outer)	75mm

Design Results

Analysis Case Name	Analysis Case 1
Axial Design Force	6347kN
Axial Capacity	8472.96kN
Design Moment 'M'	0kNm
Ultimate Moment 'Mu'	475.796kNm
Neutral Axis	-----
Comp./Tens. Side	+/-
Governing Node/Bar	X



Section 1
Analysis Case 1

Plot NT02 – Dantzic Street, Manchester M4 4DD
Structural Check
DC3

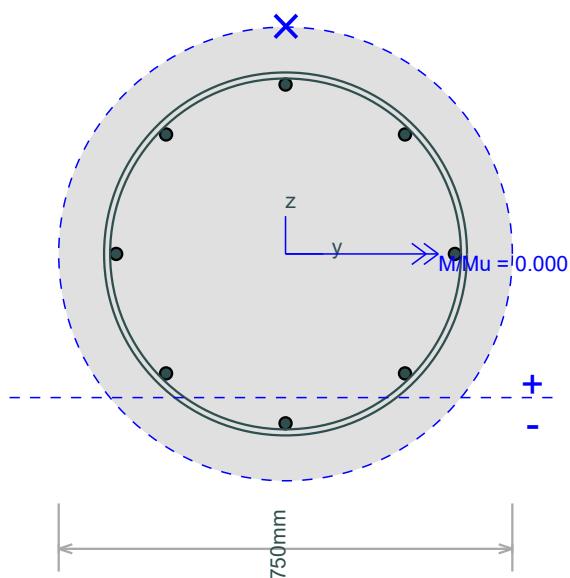
Job No.	Sheet No.	Rev.
P25-2245		
Drg. Ref.		
Made by SS	Date 25-Feb-2025	Checked

Reinforcement Details

Bar Arrangement	1 ring(s)/8 bars per ring
Diameter of main bars	20mm
Area of reinforcement	2513.27mm ²
Nominal Cover (outer)	75mm

Design Results

Analysis Case Name	Analysis Case 1
Axial Design Force	5799kN
Axial Capacity	8472.96kN
Design Moment 'M'	0kNm
Ultimate Moment 'Mu'	558.122kNm
Neutral Axis	-----
Comp./Tens. Side	+/-
Governing Node/Bar	X



Section 1
Analysis Case 1

Appendix C – Design Schedule

Project		Plot NT02 – Dantzig Street, Manchester M4 4DD																							Revision		P01			
GP Reference		P25-2245-SC-001																							Date		25/02/2025			
Drawing Reference		RDB-ROC-2B1-FN-DR-S-0296 P01 & RDB-ROC-2B1-FN-DR-S-03-0196 P05																												
Final Piling Platform Level TBC																														
*Rock depth to be checked on site.																														
Pile Ref	Piling Platform Level [m AOD]	Pile Cut Off Level [m AOD]	PPL - COL [m]	Vertical Actions [kN]								Head Restraint Check			Horizontal Actions [kN]						Geotechnical Design					Structural Design				
				Dead, G _k	Imposed, Q _k	Q _{k,wind} +	Q _{k,wind} -	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-1 E _{dmin}	ULS DA1-2 E _{dmax}	ULS DA1-2 E _{dmin}	Head Restraint	DA1-1 Applied Moment [kNm]	DA1-2 Applied Moment [kNm]	Dead, G _k	Imposed, Q _k	Q _{k,wind}	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-2 E _{dmax}	Pile Diameter [mm]	Socket Length [m]	Design Sandstone Level* [m]	Preliminary Pile Length * [m]	Preliminary Pile Toe* [m AOD]	Design Case	Reinforcement	Foam [m]	
P101	33.500	29.185	4.315	825	80	205	-430	1086	1505	98	1164	266	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P102	33.500	29.185	4.315	1190	140	250	-420	1538	2129	441	1642	644	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P103	33.500	29.185	4.315	1455	180	285	-405	1866	2581	702	1989	929	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P104	33.500	29.185	4.315	1555	200	305	-355	2000	2767	867	2134	1094	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P105	33.500	29.185	4.315	1490	195	350	-345	1977	2741	824	2122	1042	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P106	33.500	29.185	4.315	1275	165	375	-325	1766	2457	660	1913	853	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P107	33.500	29.185	4.315	960	120	440	-370	1484	2082	309	1641	479	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P108	33.500	29.185	4.315	595	65	525	-405	1166	1659	-72	1337	69	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P109	33.500	29.185	4.315	1145	140	565	-435	1808	2540	378	2007	580	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P110	33.500	29.185	4.315	1525	195	465	-395	2127	2961	780	2307	1012	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P111	33.500	29.185	4.315	1845	240	395	-355	2408	3335	1128	2577	1384	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P112	33.500	29.185	4.315	2005	260	345	-365	2532	3497	1257	2690	1531	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P113	33.500	29.185	4.315	2005	255	315	-425	2499	3447	1167	2647	1453	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P114	33.500	29.185	4.315	1825	225	280	-475	2263	3120	930	2394	1208	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P115	33.500	29.185	4.315	1460	165	235	-500	1811	2497	564	1916	810	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P116	33.500	29.185	4.315	1035	95	240	-555	1342	1857	99	1433	314	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P117	33.500	29.185	4.315	1665	180	280	-635	2071	2857	546	2193	840	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P118	33.500	29.185	4.315	2130	255	270	-580	2579	3548	1047	2713	1376	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P119	33.500	29.185	4.315	2440	305	315	-515	2969	4087	1424	3127	1771	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P120	33.500	29.185	4.315	2480	320	335	-405	3039	4187	1625	3207	1954	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P121	33.500	29.185	4.315	2390	315	405	-375	3016	4165	1589	3203	1903	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P122	33.500	29.185	4.315	2110	275	495	-425	2798	3880	1262	3004	1558	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P123	33.500	29.185	4.315	1700	215	605	-470	2456	3428	825	2682	1089	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P124	33.500	29.185	4.315	1275	155	695	-505	2079	2927	390	2320	619	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P125	33.500	29.185	4.315	1760	225	725	-520	2643	3700	804	2907	1084	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P126	33.500	29.185	4.315	2240	290	640	-495	3083	4289	1274	3336	1597	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P127	33.500	29.185	4.315	2630	345	485	-420	3357	4640	1737	3574	2084	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P128	33.500	29.185	4.315	2810	360	355	-360	3417	4704	1989	3599	2342	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P129	33.500	29.185	4.315	2905	365	320	-485	3481	4785	1887	3653	2275	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P130	33.500	29.185	4.315	2825	345	300	-670	3367	4626	1538	3529	1954	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P131	33.500	29.185	4.315	2315	270	330	-730	2834	3904	989	2990	1366	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P132	33.500	29.185	4.315	1745	185	360	-740	2235	3090	461	2381	783	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165	
P133	33.500	29.185	4.315	2285	260	410	-800	2877	3973	857	3055	1245	Fixed			0	0	50												

Project	Plot NT02 – Dantzic Street, Manchester M4 4DD																								Revision	P01			
GP Reference	P25-2245-SC-001																								Date	25/02/2025			
Drawing Reference	RDB-ROC-2B1-FN-DR-S-0296 P01 & RDB-ROC-2B1-FN-DR-S-03-0196 P05																												
Final Piling Platform Level TBC																													
*Rock depth to be checked on site.																													
Pile Ref	Piling Platform Level [m AOD]	Pile Cut Off Level [m AOD]	PPL - COL [m]	Vertical Actions [kN]								Head Restraint Check			Horizontal Actions [kN]						Geotechnical Design					Structural Design			
				Dead, G _k	Imposed, Q _k	Q _{k,wind} +	Q _{k,wind} -	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-1 E _{dmin}	ULS DA1-2 E _{dmax}	ULS DA1-2 E _{dmin}	Head Restraint	DA1-1 Applied Moment [kNm]	DA1-2 Applied Moment [kNm]	Dead, G _k	Imposed, Q _k	Q _{k,wind}	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-2 E _{dmax}	Pile Diameter [mm]	Socket Length [m]	Design Sandstone Level* [m]	Preliminary Pile Length * [m]	Preliminary Pile Toe* [m AOD]	Design Case	Reinforcement	Foam [m]
P164	33.500	29.185	4.315	2105	230	550	-825	2816	3908	657	3029	1033	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P165	33.500	29.185	4.315	2195	250	555	-770	2925	4058	821	3144	1194	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P166	33.500	29.185	4.315	2765	335	560	-735	3560	4925	1386	3798	1810	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P167	33.500	29.185	4.315	2975	375	425	-495	3663	5048	1935	3869	2332	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P168	33.500	29.185	4.315	2935	380	335	-320	3536	4864	2162	3716	2519	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P169	33.500	29.185	4.315	2800	370	445	-280	3504	4836	2100	3715	2436	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P170	33.500	29.185	4.315	2520	330	600	-245	3351	4649	1901	3600	2202	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P171	33.500	29.185	4.315	2030	265	700	-330	2916	4069	1332	3181	1601	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P172	33.500	29.185	4.315	1560	195	785	-400	2482	3488	804	2758	1040	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P173	33.500	29.185	4.315	1530	190	685	-315	2348	3293	905	2593	1121	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P174	33.500	29.185	4.315	1980	255	595	-255	2754	3833	1400	2986	1649	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P175	33.500	29.185	4.315	2370	310	520	-310	3107	4305	1668	3328	1967	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P176	33.500	29.185	4.315	2555	335	420	-340	3210	4431	1790	3406	2113	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P177	33.500	29.185	4.315	2600	335	385	-410	3220	4439	1725	3405	2067	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P178	33.500	29.185	4.315	2465	305	455	-530	3134	4331	1424	3334	1776	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P179	33.500	29.185	4.315	2095	245	510	-655	2777	3851	903	2981	1244	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P180	33.500	29.185	4.315	1630	175	535	-720	2288	3187	387	2485	694	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P181	33.500	29.185	4.315	1450	160	470	-590	2032	2831	420	2207	683	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P182	33.500	29.185	4.315	1820	215	430	-495	2401	3328	896	2575	1177	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P183	33.500	29.185	4.315	2075	260	385	-425	2642	3652	1230	2812	1523	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P184	33.500	29.185	4.315	2130	275	390	-360	2713	3749	1377	2887	1662	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P185	33.500	29.185	4.315	2040	265	465	-335	2691	3730	1334	2886	1605	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P186	33.500	29.185	4.315	1775	230	510	-295	2446	3403	1155	2647	1392	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P187	33.500	29.185	4.315	1400	175	570	-245	2093	2929	893	2300	1082	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P188	33.500	29.185	4.315	995	115	660	-300	1736	2454	446	1958	605	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P189	33.500	29.185	4.315	840	95	550	-235	1457	2059	404	1641	535	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P190	33.500	29.185	4.315	1200	145	495	-285	1797	2515	653	1975	830	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P191	33.500	29.185	4.315	1485	190	475	-325	2093	2917	849	2275	1063	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P192	33.500	29.185	4.315	1640	210	420	-345	2207	3065	959	2377	1192	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P193	33.500	29.185	4.315	1640	205	390	-380	2174	3014	906	2334	1146	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P194	33.500	29.185	4.315	1485	180	370	-415	1981	2749	714	2130	946	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P195	33.500	29.185	4.315	1195	130	395	-455	1681	2342	393	1827	604	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0	2	8820x9m, B10@300c/c	4.165
P196	33.500	29.185	4.315	825	75	430	-530	1308	1838	-53	1452	136	Fixed			0	0	50	50	75	65	750	8.0	29.0	12.5	21.0			

Project		Plot NT02 – Dantzie Street, Manchester M4 4DD																							Revision		P01		
GP Reference		P25-2245-SC-001																							Date		25/02/2025		
Drawing Reference		RDB-ROC-2B1-FN-DR-S-0296 P01 & RDB-ROC-2B1-FN-DR-S-03-0196 P05																											
Final Piling Platform Level TBC																													
*Rock depth to be checked on site.																													
Pile Ref	Piling Platform Level [m AOD]	Pile Cut Off Level [m AOD]	PPL - COL [m]	Vertical Actions [kN]								Head Restraint Check			Horizontal Actions [kN]						Geotechnical Design					Structural Design			
				Dead, G _k	Imposed, Q _k	Q _{k,wind} +	Q _{k,wind} -	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-1 E _{dmin}	ULS DA1-2 E _{dmax}	ULS DA1-2 E _{dmin}	Head Restraint	DA1-1 Applied Moment [kNm]	DA1-2 Applied Moment [kNm]	Dead, G _k	Imposed, Q _k	Q _{k,wind}	SLS F _{rep}	ULS DA1-1 E _{dmax}	ULS DA1-2 E _{dmax}	Pile Diameter [mm]	Socket Length [m]	Design Sandstone Level* [m]	Preliminary Pile Length * [m]	Preliminary Pile Toe* [m AOD]	Design Case	Reinforcement	Foam [m]
P529	33.500	31.115	2.385	2840	490	95	-70	3378	4640	2451	3539	2749	Free	348	265	0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	3	8B20x9m, B10@300c/c	2.235
P530	33.500	31.115	2.385	2765	475	215	-140	3348	4607	2279	3522	2583	Free	345	264	0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	3	8B20x9m, B10@300c/c	2.235
P531	33.500	31.115	2.385	2795	470	215	-115	3373	4640	2343	3546	2646	Fixed			0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	2.235
P532	33.500	31.115	2.385	2900	480	100	-50	3430	4710	2535	3589	2835	Fixed			0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	2.235
P533	33.500	31.165	2.335	3070	525	70	-100	3630	4985	2613	3798	2940	Fixed			0	0	40	40	60	52	750	7.5	29.5	11.5	22.0	2	8B20x8m, B10@300c/c	2.185
P534	33.500	31.165	2.335	3015	520	135	-205	3603	4952	2406	3779	2749	Fixed			0	0	40	40	60	52	750	7.5	29.5	11.5	22.0	2	8B20x8m, B10@300c/c	2.185
P536	33.500	31.375	2.125	600	115	10	-15	720	990	518	756	581	Free	74	57	0	0	30	30	45	39	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.975
P537	33.500	30.875	2.625	2605	445	130	-200	3115	4282	2045	3268	2345	Fixed			0	0	50	50	75	65	750	6.5	29.5	10.5	23.0	2	8B20x8m, B10@300c/c	2.475
P538	33.500	30.875	2.625	2895	500	25	-40	3408	4677	2546	3561	2843	Fixed			0	0	50	50	75	65	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	2.475
P539	33.500	30.875	2.625	2880	495	50	-60	3400	4668	2502	3556	2802	Fixed			0	0	50	50	75	65	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	2.475
P540	33.500	31.115	2.385	2760	450	40	-25	3230	4431	2447	3371	2728	Fixed			0	0	50	50	75	65	750	6.5	29.5	10.5	23.0	2	8B20x8m, B10@300c/c	2.235
P541	33.500	31.115	2.385	2315	395	195	-110	2808	3864	1919	2955	2172	Fixed			0	0	50	50	75	65	750	6.0	29.5	10.0	23.5	2	8B20x8m, B10@300c/c	2.235
P542	33.500	31.115	2.385	2680	445	65	-30	3158	4334	2367	3301	2641	Fixed			0	0	50	50	75	65	750	6.5	29.5	10.5	23.0	2	8B20x8m, B10@300c/c	2.235
P543	33.500	31.795	1.705	2750	440	120	-65	3250	4463	2378	3400	2666	Free	335	255	0	0	40	40	60	52	750	6.5	29.5	10.5	23.0	3	8B20x8m, B10@300c/c	1.555
P544	33.500	31.795	1.705	2745	440	70	-35	3220	4418	2418	3363	2700	Free	331	252	0	0	40	40	60	52	750	6.5	29.5	10.5	23.0	3	8B20x8m, B10@300c/c	1.555
P545	33.500	31.375	2.125	2875	465	75	-110	3378	4635	2423	3528	2732	Fixed			0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	1.975
P546	33.500	31.375	2.125	2875	465	40	-55	3360	4609	2505	3506	2804	Fixed			0	0	40	40	60	52	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	1.975
P547A	33.500	31.375	2.125	325	35	5	-5	363	495	285	374	319	Free	37	28	0	0	30	30	45	39	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.975
P547B	33.500	31.375	2.125	730	135	85	-155	910	1255	425	963	529	Free	94	72	0	0	30	30	45	39	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.975
P548	33.500	31.375	2.125	3175	555	20	-25	3740	5134	2820	3910	3143	Free	385	293	0	0	40	40	60	52	750	7.5	29.5	11.5	22.0	3	8B20x9m, B10@300c/c	1.975
P549	33.500	31.375	2.125	3140	540	50	-55	3705	5087	2744	3875	3069	Free	381	291	0	0	40	40	60	52	750	7.5	29.5	11.5	22.0	3	8B20x9m, B10@300c/c	1.975
P550	33.500	31.625	1.875	3270	550	75	-85	3858	5296	2816	4034	3160	Fixed			0	0	50	50	75	65	750	7.5	29.5	11.5	22.0	2	8B20x8m, B10@300c/c	1.725
P551	33.500	31.625	1.875	3000	490	10	-5	3495	4793	2693	3644	2994	Fixed			0	0	50	50	75	65	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	1.725
P552	33.500	31.625	1.875	3275	540	110	-50	3870	5314	2873	4049	3210	Fixed			0	0	50	50	75	65	750	8.0	29.5	12.0	21.5	2	8B20x8m, B10@300c/c	1.725
P553	33.500	31.625	1.875	3385	550	80	-90	3975	5455	2912	4152	3268	Fixed			0	0	50	50	75	65	750	8.0	29.5	12.0	21.5	2	8B20x8m, B10@300c/c	1.725
P554	33.500	31.625	1.875	3040	490	10	-5	3535	4847	2729	3684	3034	Fixed			0	0	50	50	75	65	750	7.0	29.5	11.0	22.5	2	8B20x8m, B10@300c/c	1.725
P555	33.500	31.625	1.875	3310	550	110	-50	3915	5376	2904	4097	3245	Fixed			0	0	50	50	75	65	750	8.0	29.5	12.0	21.5	2	8B20x8m, B10@300c/c	1.725
P556	33.500	32.245	1.255	3615	585	55	-65	4228	5799	3156	4411	3531	Free	435	331	0	0	40	40	60	52	750	8.5	29.5	12.5	21.0	3	8B20x8m, B10@300c/c	1.105
P557	33.500	32.245	1.255	3575	580	85	-35	4198	5760	3165	4384	3530	Free	432	329	0	0	40	40	60	52	750	8.5	29.5	12.5	21.0	3	8B20x8m, B10@300c/c	1.105
P558	33.500	32.025	1.475	220	35	5	-15	258	353	176	269	201	Free	26	20	0	0	30	30	45	39	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.325
P559	33.500	32.225	1.275	395	100	15	-35	503	695	303	535	350	Free	52	40	0	0	30	30	45	39	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.125
P561	33.500	32.225	1.275	1945	250	150	-260	2270	3113	1361	2368	1607	Free	233	178	0	0	40	40	60	52	750	5.0	29.5	9.0	24.5	3	8B20x8m, B10@300c/c	1.125
P563	33.500	32.245	1.255	1840	300	70	-115	2175	2987	1484	2276	1691	Free	224	171	0	0	45	45	68	59	750	4.5	29.5	8.5	25.0	3	8B20x8m, B10@300c/c	1.105
P564	33.500	32.245	1.255	1800	290	70	-35	2125	2918	1568	2223	1755	Free	219	167	0	0	45	45	68	59	750	4.5	29.5	8.5	25.0	3	8B20x8m, B10@300c/c	1.105
P565	33.500	32.245	1.255	1795	165	230	-120	2141	2942	1436	2244	1639	Free	221	168	0	0	45	45	68	59	750	4.5	29.5	8.5	25.0	3	8B20x8m, B10@300c/c	1.105
P566	33.500	32.025	1.475	805	120	210	-115	1099	1528	552	1187	656	Free	115	89	0	0	35	35	53	46	500	4.0	29.5	9.0	25.5	1	6B20x9m, B8@225c/c	1.325