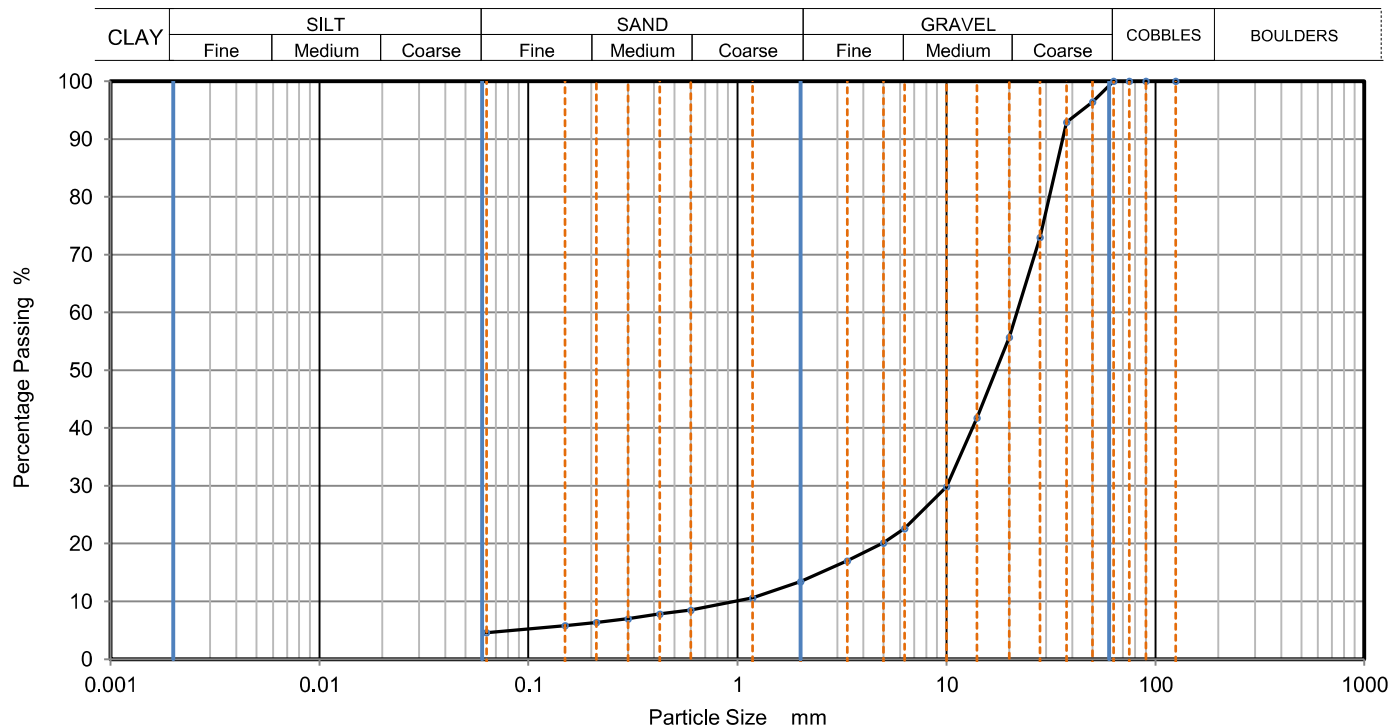




PARTICLE SIZE DISTRIBUTION

Job Ref	23356
Borehole/Pit No.	BH201
Sample No.	8
Depth Top	4.00 m
Depth Base	- m
Sample Type	B
Samples received	11/09/2017
Schedules received	13/09/2017
Project started	14/09/2017
Date tested	27/09/2017

Site Name	Harts Farm Way		
Project No.	-	Client	Ridge
Soil Description	Pale grey slightly clayey sandy GRAVEL with fm chalk fragments (gravel is fmc and angular to rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	96		
37.5	93		
28	73		
20	56		
14	42		
10	30		
6.3	23		
5	20		
3.35	17		
2	13		
1.18	11		
0.6	9		
0.425	8		
0.3	7		
0.212	6		
0.15	6		
0.063	5		

Dry Mass of sample, g

5645

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	86.6
Sand	8.9
Fines <0.063mm	4.6

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	22
Curvature Coefficient	4.7

Remarks

Preparation and testing in accordance with BS1377 unless noted below



2519

K4 Soils Laboratory
 Unit 8, Olds Close, Watford, Herts, WD18 9RU
 Email: james@k4soils.com
 Tel: 01923 711288

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved

Initials: **kp**

Date: 27/09/2017

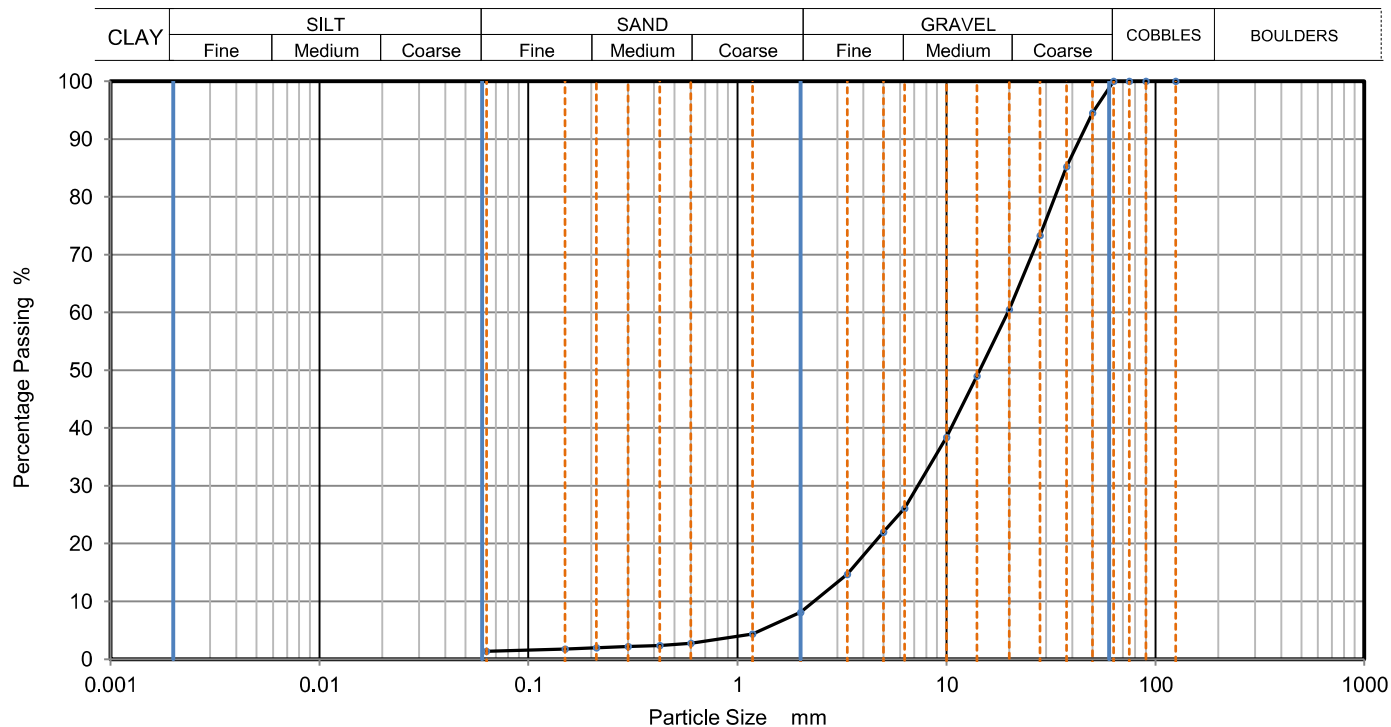
MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref	23356
Borehole/Pit No.	BH202
Sample No.	6
Depth Top	2.10 m
Depth Base	- m
Sample Type	B
Samples received	11/09/2017
Schedules received	13/09/2017
Project started	14/09/2017
Date tested	27/09/2017

Site Name	Harts Farm Way		
Project No.	-	Client	Ridge
Soil Description	Pale grey slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	95		
37.5	85		
28	73		
20	61		
14	49		
10	38		
6.3	26		
5	22		
3.35	15		
2	8		
1.18	4		
0.6	3		
0.425	2		
0.3	2		
0.212	2		
0.15	2		
0.063	1		

Dry Mass of sample, g 5017

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	91.9
Sand	6.7
Fines <0.063mm	1.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	8.5
Curvature Coefficient	1.2

Remarks
Preparation and testing in accordance with BS1377 unless noted below



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Checked and Approved

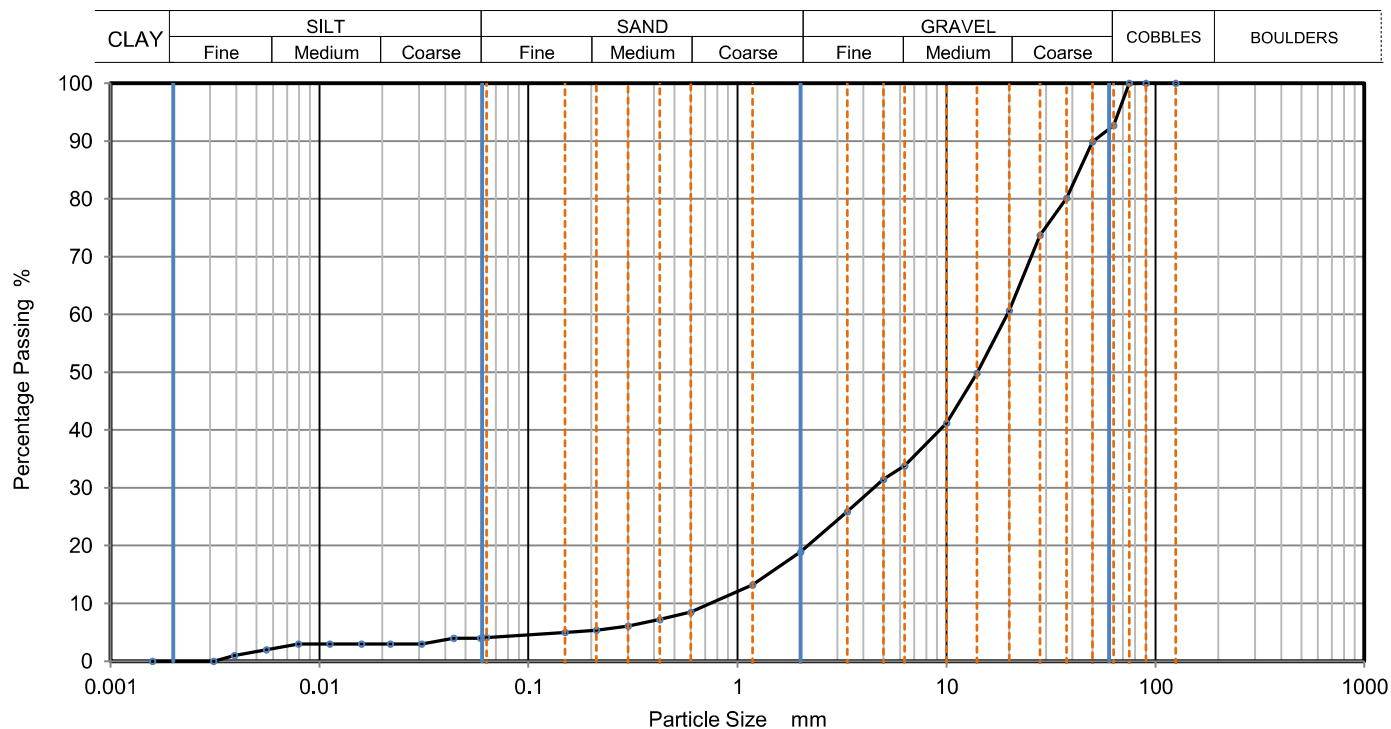
Initials: kp
Date: 27/09/2017



PARTICLE SIZE DISTRIBUTION

Job Ref	23356
Borehole/Pit No.	BH202
Sample No.	8
Depth Top	4.00 m
Depth Base	- m
Sample Type	B
Samples received	11/09/2017
Schedules received	13/09/2017
Project started	14/09/2017
Date tested	27/09/2017

Site Name	Harts Farm Way		
Project No.	-	Client	Ridge
Soil Description	Pale grey slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0590	4
90	100	0.0439	4
75	100	0.0309	3
63	93	0.0218	3
50	90	0.0159	3
37.5	80	0.0112	3
28	74	0.0079	3
20	61	0.0056	2
14	50	0.0039	1
10	41	0.0031	0
6.3	34	0.0016	0
5	32		
3.35	26		
2	19		
1.18	13		
0.6	9	Particle density (assumed) 2.70 Mg/m3	
0.425	7		
0.3	6		
0.212	5		
0.15	5		
0.063	4		

Dry Mass of sample, g 5640

Sample Proportions	% dry mass
Very coarse	7.3
Gravel	73.8
Sand	14.8
Silt	3.8
Clay	0.3

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	26
Curvature Coefficient	1.4

Remarks
Preparation and testing in accordance with BS1377 unless noted below



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Checked and Approved

Initials: **kp**

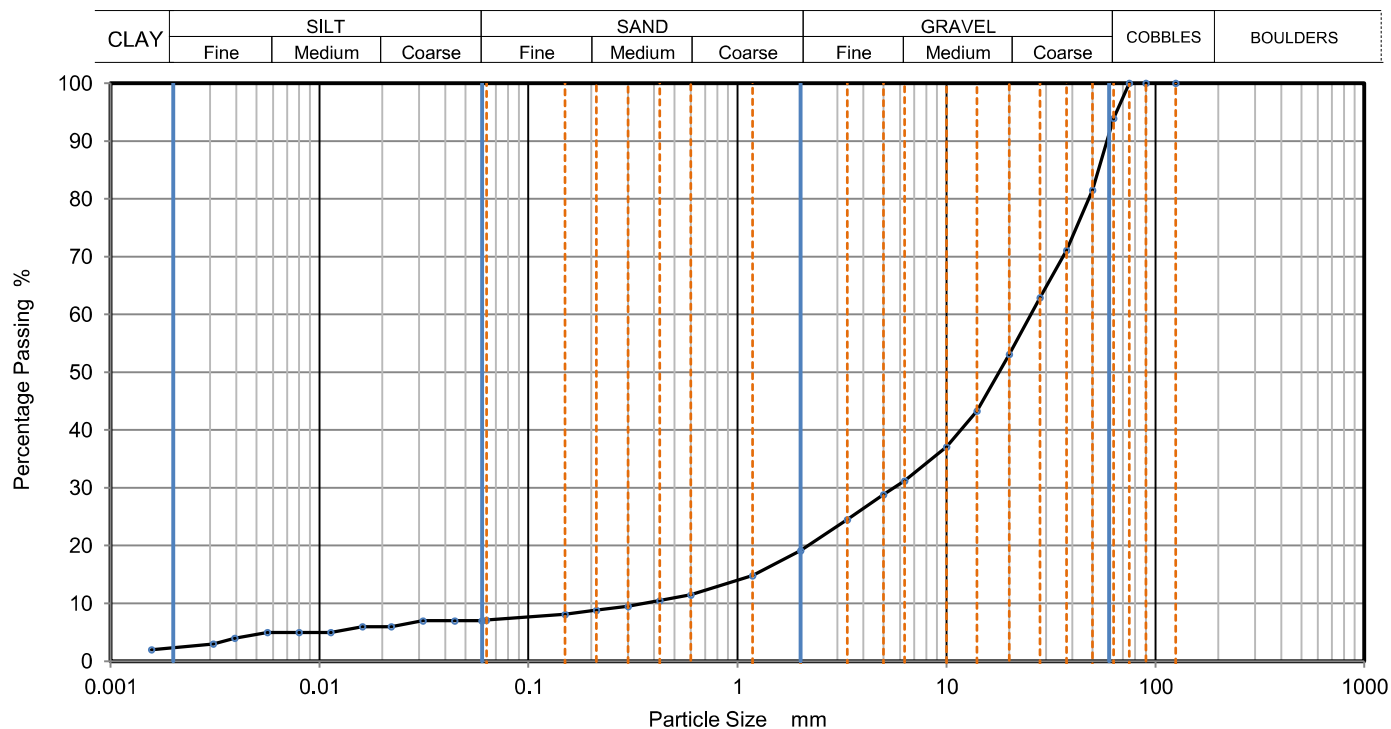
Date: 27/09/2017



PARTICLE SIZE DISTRIBUTION

Job Ref	23356
Borehole/Pit No.	BH202
Sample No.	11
Depth Top	6.50 m
Depth Base	- m
Sample Type	B
Samples received	11/09/2017
Schedules received	13/09/2017
Project started	14/09/2017
Date tested	27/09/2017

Site Name	Harts Farm Way		
Project No.	-	Client	Ridge
Soil Description	Off white clayey sandy GRAVEL with occasional fmc chalk fragments (gravel is fmc and sub-rounded to angular)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0599	7
90	100	0.0444	7
75	100	0.0313	7
63	94	0.0221	6
50	82	0.0161	6
37.5	71	0.0113	5
28	63	0.0080	5
20	53	0.0056	5
14	43	0.0039	4
10	37	0.0031	3
6.3	31	0.0016	2
5	29		
3.35	25		
2	19		
1.18	15		
0.6	12	Particle density (assumed) 2.70 Mg/m3	
0.425	11		
0.3	10		
0.212	9		
0.15	8		
0.063	7		

Dry Mass of sample, g 5567

Sample Proportions	% dry mass
Very coarse	6.1
Gravel	74.8
Sand	12.0
Silt	4.7
Clay	2.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	70
Curvature Coefficient	3.4

Remarks
Preparation and testing in accordance with BS1377 unless noted below



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Checked and Approved

Initials: **kp**
Date: 27/09/2017



Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
23356	Harts Farm Way	Samples received	11/09/2017
		Schedule received	13/09/2017
Project No.	Client	Project started	14/09/2017
-	Ridge	Testing Started	26/09/2017

[illegible]

Test Report by K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach

Watford Herts WD18 9RU

Tel: 01923 711 288

Email: James@k4soils.com

Checked and
Approved

Initials kp

Date: 27/09/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R29

APPENDIX 7 – BEARING RESISTANCE CALCULATIONS

Project Title:		Harts Farm Way				
Shallow Foundation		Strip				
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP	
<u>Design Approach 1</u>		<u>Characteristic Geotechnical Parameters</u>				
Combination 1 A1 + M1 + R1		Unit Weight	18			
		Shearing Resistance	36			
		Cohesion	0			
<u>Material Properties and Resistance</u>		<u>Foundation Size</u>				
Partial factors set M1: $\gamma_\phi = 1$ and $\gamma_c = 1$		depth	1			
		breadth	0.6			
		length	10			
Design shearing resistance is		$\phi_d = \tan^{-1} \left(\frac{\tan \phi_K}{\gamma_\phi} \right) = 36$				
Design cohesion is		$c'_d = \frac{c_k}{\gamma_c} = 0$				
<u>Bearing Capacity Factors</u>						
For overburden		$N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan \left(45 + \frac{\phi_d}{2} \right) \right)^2 \right] =$			37.7	
For cohesion		$N_c = [(N_q - 1) \times \cot(\phi_d)] =$			50.5	
For self-weight		$N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] =$			53.3	
<u>Shape Factors</u>						
For overburden		$s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin(\phi_d) \right] =$			1.04	
For cohesion		$s_c = \frac{(s_q \times N_q - 1)}{(N_q - 1)} =$			1.04	
For self weight		$s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) =$			0.982	
<u>Bearing Resitance</u>		<u>Groundwater Depth</u>		1.00	assuming groundwater rises during life of structure	
Total overburden at foundation base is		$\sigma_{vk,b} = \gamma_k \times d =$		8.19		
Partial factors set R1: $\gamma_{Rv} = 1$						
From overburden		$q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} =$				320
From cohesion		$q_{ult_2} = N_c \times s_c \times c_d =$				0

Project Title:		Harts Farm Way			
Shallow Foundation		Strip			
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP
From self-weight	$q_{ult_3} = \left(N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} \right) =$		129		
Total resistance is	$q_{ult} = \sum_{i=1}^3 q_{ult} =$		448		
Design resistance is	$q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} =$		448		
<u>Design Approach 1</u>					
Combination 2 A2 + M2 + R1					
<u>Material Properties and Resistance</u>					
Partial factors set M2: $\gamma_\phi = 1.25$ and $\gamma_c = 1.25$					
Design shearing resistance is	$\phi_d = \tan^{-1} \left(\frac{\tan \phi_k}{\gamma_\phi} \right) =$		30.2		
Design cohesion is	$c'_d = \frac{c_k}{\gamma_c} =$		0		
<u>Bearing Capacity Factors</u>					
For overburden	$N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan \left(45 + \frac{\phi_d}{2} \right) \right)^2 \right] =$		18.7		
For cohesion	$N_c = [(N_q - 1) \times \cot(\phi_d)] =$		30.5		
For self-weight	$N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] =$		20.6		
<u>Shape Factors</u>					
For overburden	$s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin(\phi_d) \right] =$		1.03		
For cohesion	$s_c = \frac{(s_q \times N_q - 1)}{(N_q - 1)} =$		1.03		
For self weight	$s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) =$		0.982		

Project Title:		Harts Farm Way				
Shallow Foundation		Strip				
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP	
<u>Bearing Resistance</u>						
Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 8.19$						
Partial factors set R1: $\gamma_{Rv} = 1$						
From overburden $q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 158$						
From cohesion $q_{ult_2} = N_c \times s_c \times c_d = 0$						
From self-weight $q_{ult_3} = \left(N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} \right) = 50$						
Total resistance is $q_{ult} = \sum_{i=1}^3 q_{ult_i} = 208$						
Design resistance is $q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} = 208$						
Design Approach		Combination		Design Resistance (kN/m ²)		
DA1		Combination 1		448		
		Combination 2		208		

Project Title:		Harts Farm Way			
Shallow Foundation		Pad			
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP
Design Approach 1		Characteristic Geotechnical Parameters			
Combination 1 A1 + M1 + R1		Unit Weight	18		
		Shearing Resistance	36		
		Cohesion	0		
<u>Material Properties and Resistance</u>		Foundation Size			
Partial factors set M1: $\gamma_\phi = 1$ and $\gamma_c = 1$		depth	1		
		breadth	2		
		length	2		
Design shearing resistance is		$\phi_d = \tan^{-1} \left(\frac{\tan \phi_K}{\gamma_\phi} \right) = 36$			
Design cohesion is		$c'_d = \frac{c_k}{\gamma_c} = 0$			
<u>Bearing Capacity Factors</u>					
For overburden		$N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan \left(45 + \frac{\phi_d}{2} \right) \right)^2 \right] = 37.7$			
For cohesion		$N_c = [(N_q - 1) \times \cot(\phi_d)] = 50.5$			
For self-weight		$N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] = 53.3$			
<u>Shape Factors</u>					
For overburden		$s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin(\phi_d) \right] = 1.59$			
For cohesion		$s_c = \frac{(s_q \times N_q - 1)}{(N_q - 1)} = 1.60$			
For self weight		$s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) = 0.7$			
<u>Bearing Resitance</u>		Groundwater Depth	1.00		
Total overburden at foundation base is		$\sigma_{vk,b} = \gamma_k \times d =$	8.19		
Partial factors set R1: $\gamma_{Rv} = 1$					
From overburden		$q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 490$			
From cohesion		$q_{ult_2} = N_c \times s_c \times c_d = 0$			
		assuming groundwater rises during life of structure			

Project Title:		Harts Farm Way			
Shallow Foundation		Pad			
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP
From self-weight	$q_{ult_3} = \left(N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} \right) =$		306		
Total resistance is	$q_{ult} = \sum_{i=1}^3 q_{ult} =$		796		
Design resistance is	$q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} =$		796		
<u>Design Approach 1</u>					
Combination 2 A2 + M2 + R1					
<u>Material Properties and Resistance</u>					
Partial factors set M2: $\gamma_\phi = 1.25$ and $\gamma_c = 1.25$					
Design shearing resistance is	$\phi_d = \tan^{-1} \left(\frac{\tan \phi_K}{\gamma_\phi} \right) =$		30.2		
Design cohesision is	$c'_d = \frac{c_k}{\gamma_c} =$		0		
<u>Bearing Capacity Factors</u>					
For overburden	$N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan \left(45 + \frac{\phi_d}{2} \right) \right)^2 \right] =$		18.7		
For cohesion	$N_c = [(N_q - 1) \times \cot(\phi_d)] =$		30.5		
For self-weight	$N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] =$		20.6		
<u>Shape Factors</u>					
For overburden	$s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin(\phi_d) \right] =$		1.50		
For cohesion	$s_c = \frac{(s_q \times N_q - 1)}{(N_q - 1)} =$		1.53		
For self weight	$s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) =$		0.7		

Project Title:		Harts Farm Way			
Shallow Foundation		Pad			
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP
<u>Bearing Resistance</u> Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 8.19$ Partial factors set R1: $\gamma_{Rv} = 1$ From overburden $q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 231$ From cohesion $q_{ult_2} = N_c \times s_c \times c_d = 0$ From self-weight $q_{ult_3} = \left(N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} \right) = 118$ Total resistance is $q_{ult} = \sum_{i=1}^3 q_{ult_i} = 349$ Design resistance is $q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} = 349$					
Design Approach		Combination		Design Resistance (kN/m ²)	
DA1		Combination 1		796	
		Combination 2		349	

APPENDIX 8 – TRRL PROBE WORKSHEETS

Estimated California Bearing Ratio - Derived using TRL (60° cone) in accordance with TRRL Road note 8

Site: Harts Farm Way
Client: Salmon Properties

Ridge & Partners LLP
 Partnership House
 Moorside Road
 Winchester
 SO23 7RX

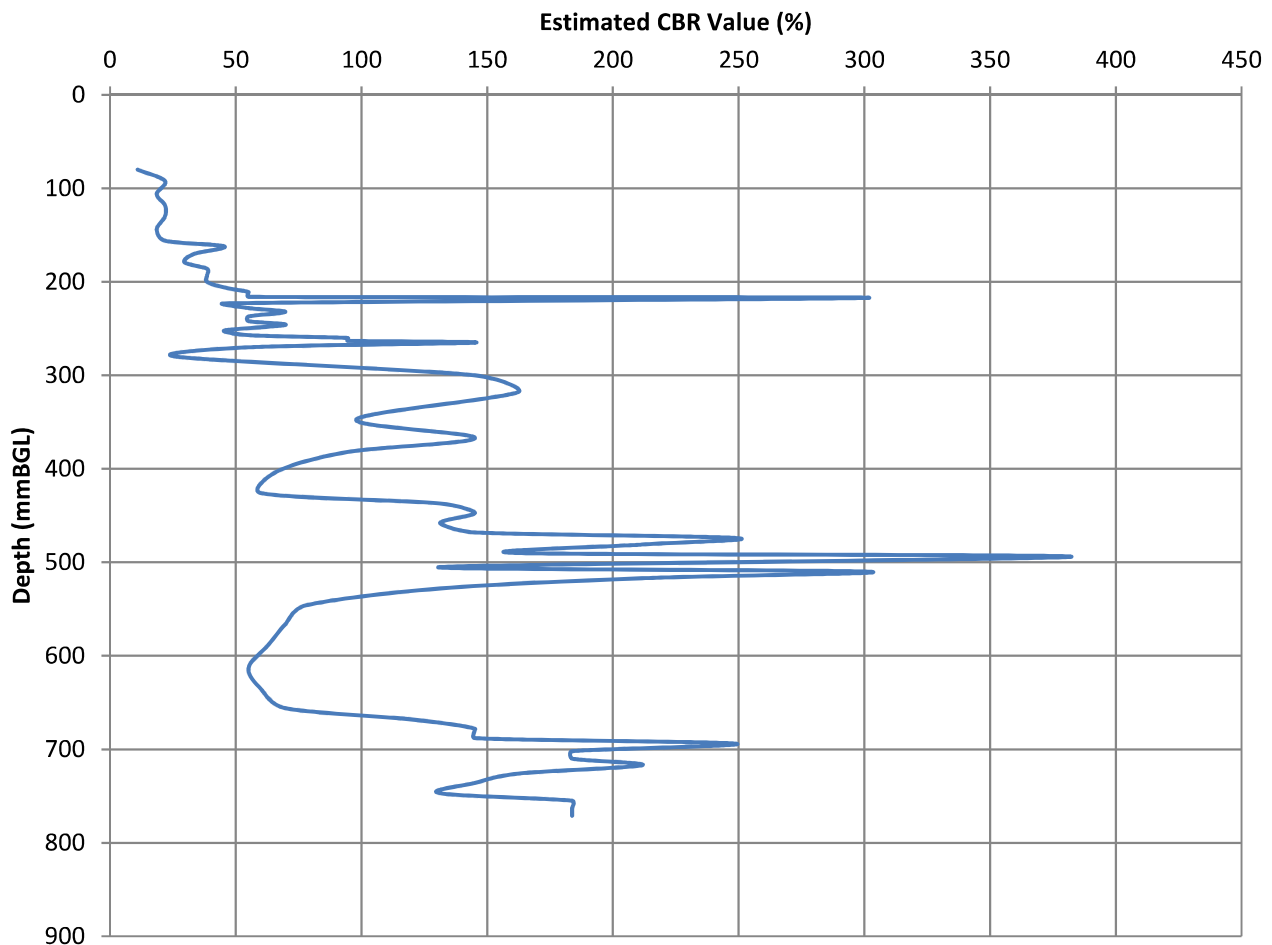
RIDGE

Project Number: 5004378
Location ID: TRL101

Date:
Easting:
Engineer: RP/AP
Northing:

Initial Depth (mmBGL): 57
Final Depth (mmBGL): 771

Estimated California Bearing Ratio (%) against Depth (mmBGL)



Summary Table

Start Depth	Finish Depth (mmBGL)	No of Blows	Blows per Layer	mm/Blows	Average Estimated CBR (%)
57	400	75	75	4.57	60.55
400	600	115	40	5.00	55.10

Comments:

Checked By:
 AP

Date:
 00/01/1900

Approved By:
 AP

Date:
 00/01/1900

Estimated California Bearing Ratio - Derived using TRL (60° cone) in accordance with TRRL Road note 8

Site: Harts Farm Way
Client: Salmon Properties

Ridge & Partners LLP
 Partnership House
 Moorside Road
 Winchester
 SO23 7RX

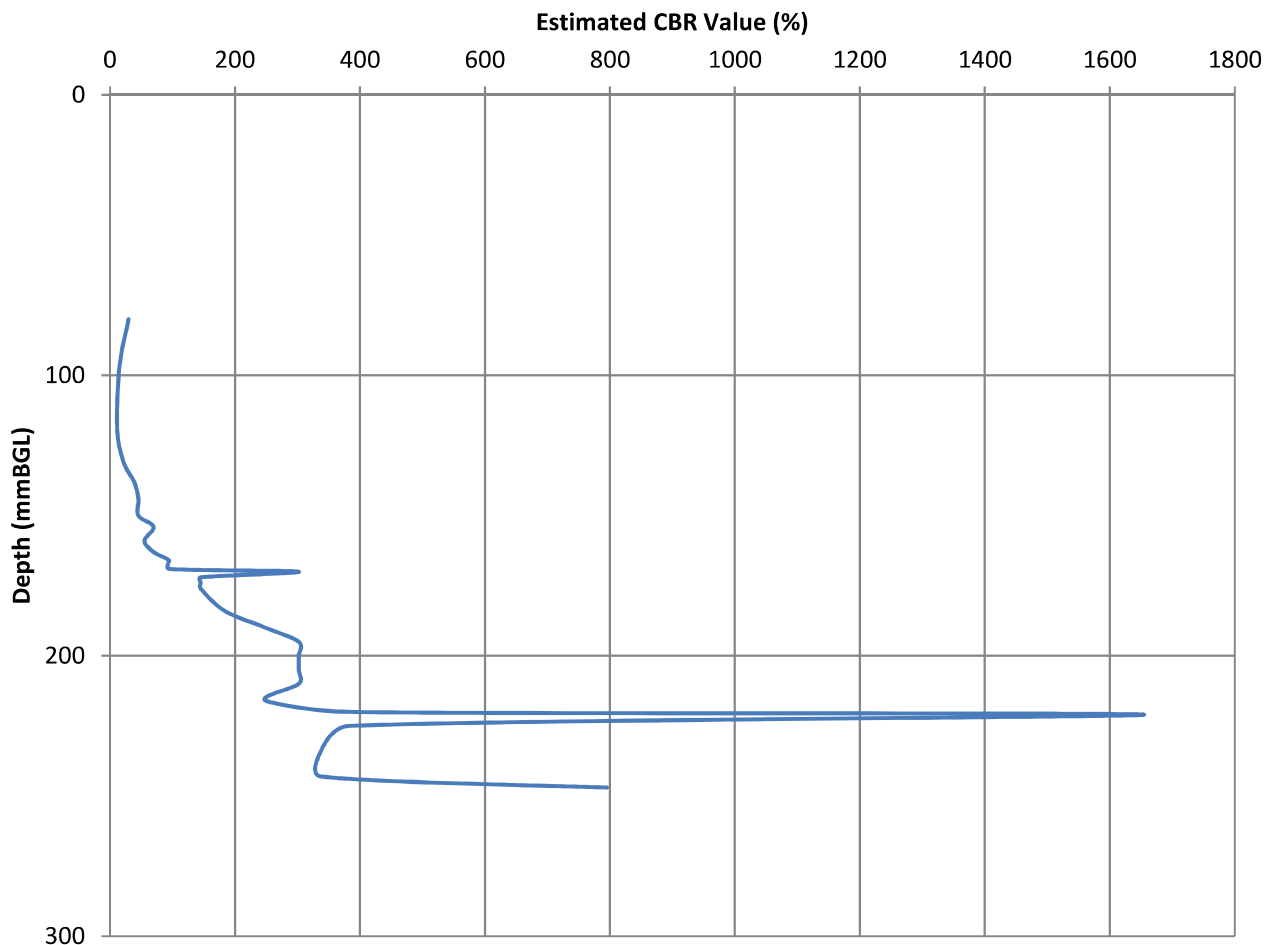
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Project Number: 5004378
Location ID: TRL102

Date:
Easting:
Engineer: RP/AP
Northing:

Initial Depth (mmBGL): 57
Final Depth (mmBGL): 247

Estimated California Bearing Ratio (%) against Depth (mmBGL)



Summary Table

Start Depth	Finish Depth (mmBGL)	No of Blows	Blows per Layer	mm/Blows	Average Estimated CBR (%)
71	180	96	96	3.43	82.15

Comments:

Checked By:
 AP

Date:

Approved By:
 AP

Date:

Estimated California Bearing Ratio - Derived using TRL (60° cone) in accordance with TRRL Road note 8

Site: Harts Farm Way
Client: Salmon Properties

Project Number: 5004378
Location ID: TRL103

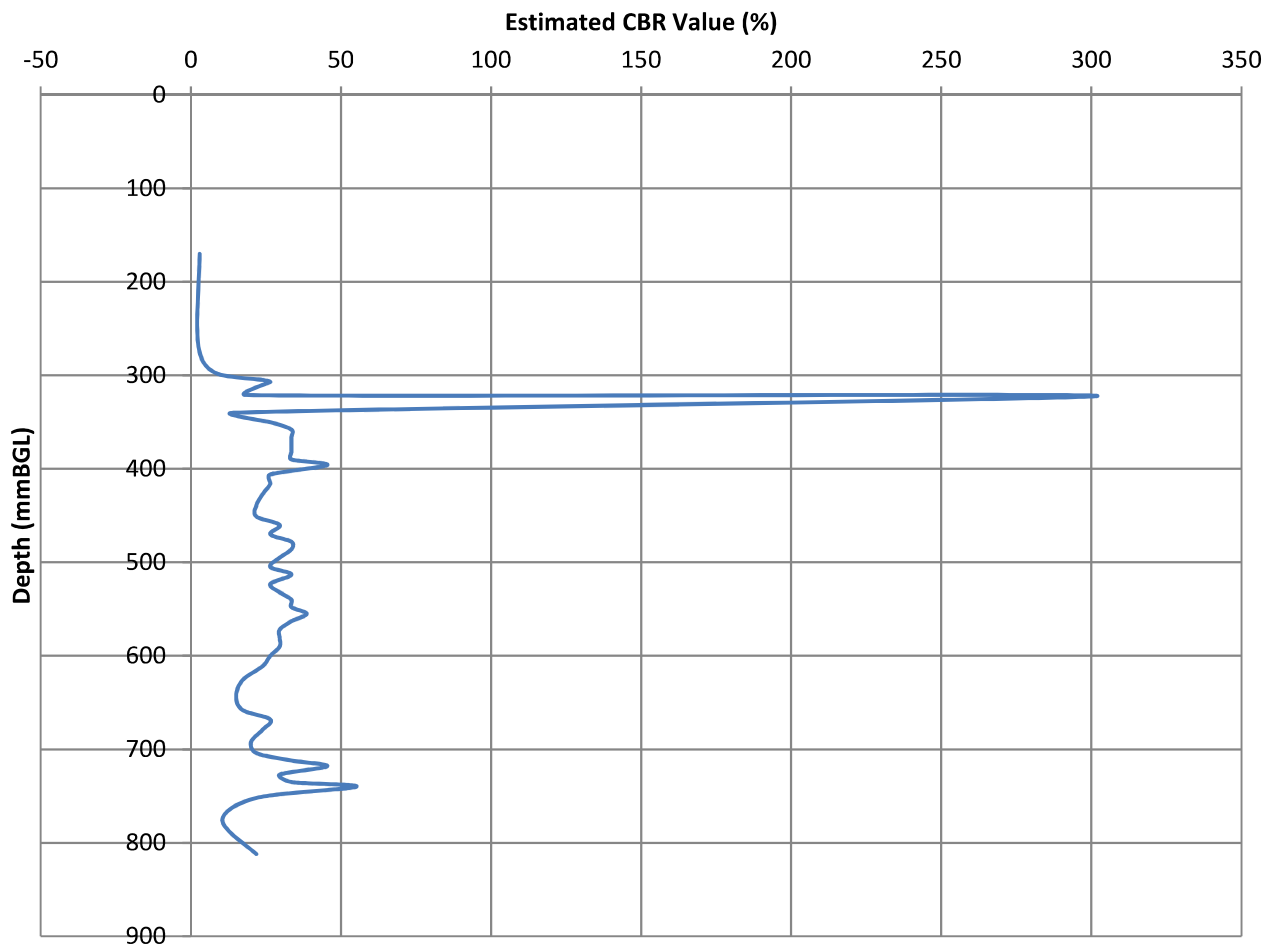
Ridge & Partners LLP
 Partnership House
 Moorside Road
 Winchester
 SO23 7RX

RIDGE

Date:
Easting:
Engineer: RP/AP
Northing:

Initial Depth (mmBGL): 57
Final Depth (mmBGL): 812

Estimated California Bearing Ratio (%) against Depth (mmBGL)



Summary Table

Start Depth	Finish Depth (mmBGL)	No of Blows	Blows per Layer	mm/Blows	Average Estimated CBR (%)
90	400	14	14	22.14	11.43
400	600	36	22	9.09	29.29
600	812	43	7	30.29	8.21

Comments:

Checked By:
 AP

Date:

Approved By:
 AP

Date:

Estimated California Bearing Ratio - Derived using TRL (60° cone) in accordance with TRRL Road note 8

Site: Harts Farm Way
Client: Salmon Properties

Ridge & Partners LLP
 Partnership House
 Moorside Road
 Winchester
 SO23 7RX

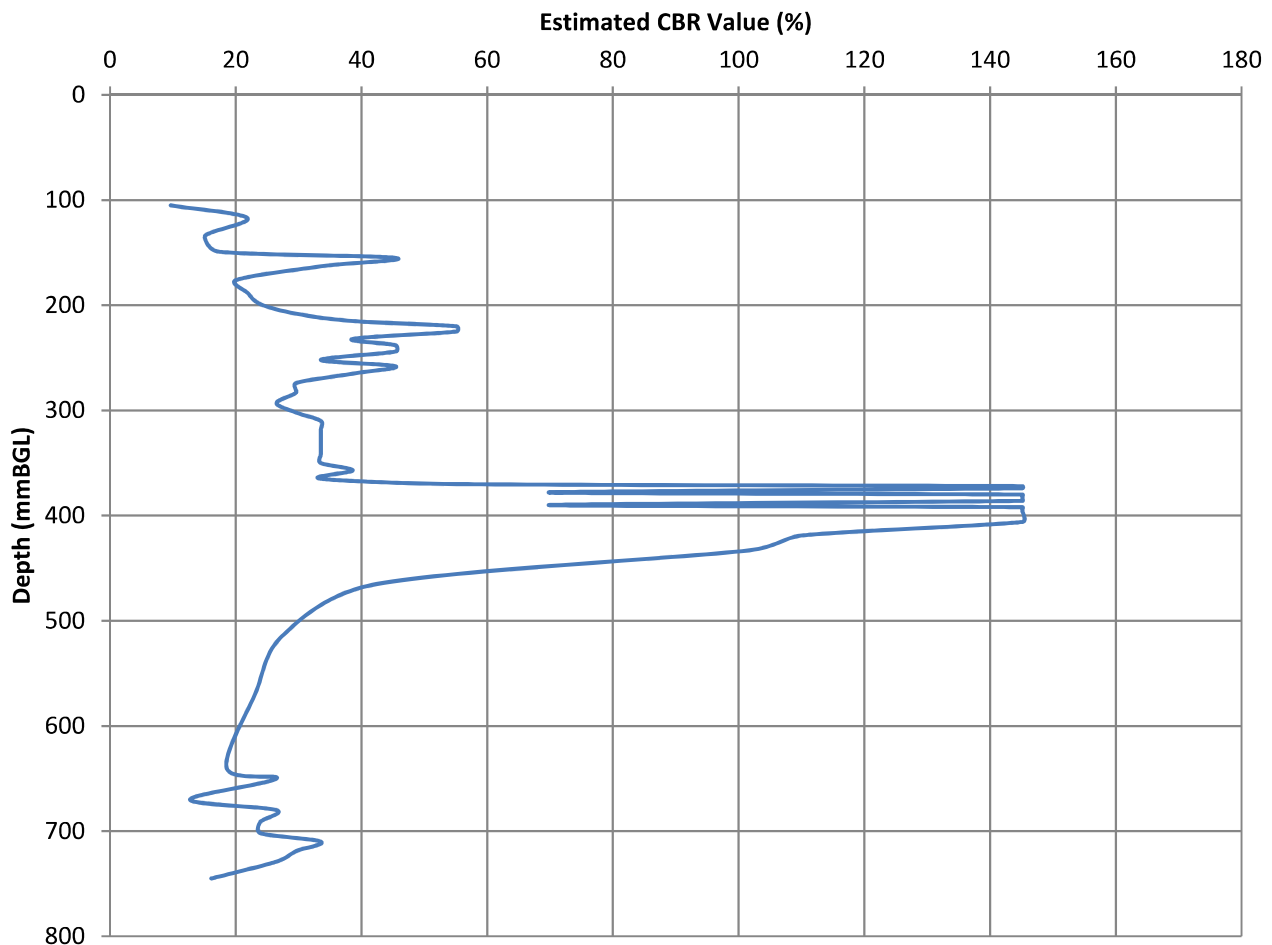
RIDGE

Project Number: 5004378
Location ID: TRL104

Date:
Easting:
Engineer: RP/AP
Northing:

Initial Depth (mmBGL): 57
Final Depth (mmBGL): 745

Estimated California Bearing Ratio (%) against Depth (mmBGL)



Summary Table

Start Depth	Finish Depth (mmBGL)	No of Blows	Blows per Layer	mm/Blows	Average Estimated CBR (%)
79	400	43	43	7.47	36.07
400					
600					

Comments:

Checked By:
AP

Date:

Approved By:
AP

Date:

Estimated California Bearing Ratio - Derived using TRL (60° cone) in accordance with TRRL Road note 8

Site: Harts Farm Way
Client: Salmon Properties

Project Number: 5004378
Location ID: TR105

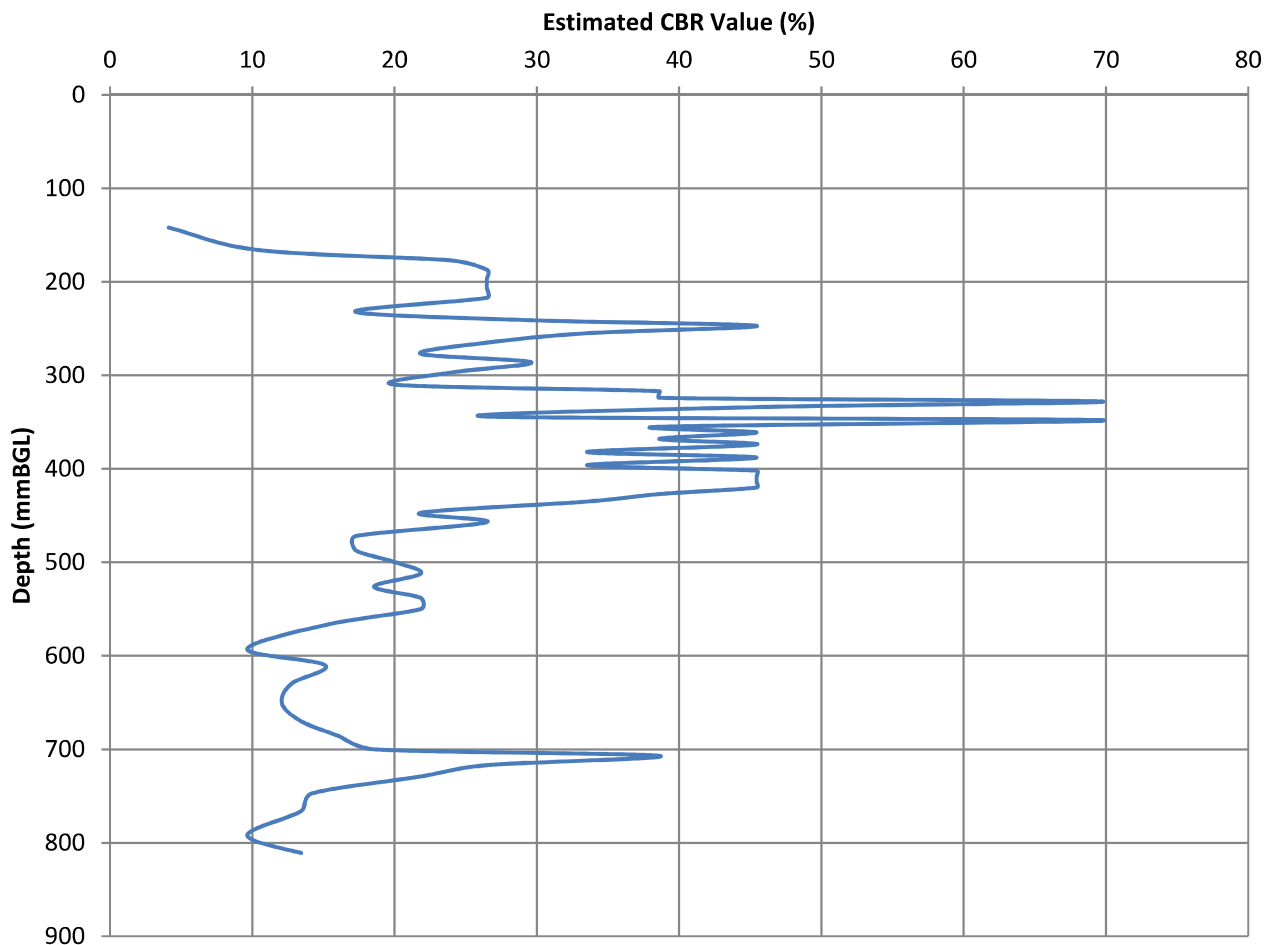
Ridge & Partners LLP
 Partnership House
 Moorside Road
 Winchester
 SO23 7RX

RIDGE

Date:
Easting:
Engineer: RP/AP
Northing:

Initial Depth (mmBGL): 57
Final Depth (mmBGL): 811

Estimated California Bearing Ratio (%) against Depth (mmBGL)



Summary Table

Start Depth	Finish Depth (mmBGL)	No of Blows	Blows per Layer	mm/Blows	Average Estimated CBR (%)
84	400	29	29	10.90	24.19
400	600	43	14	14.29	18.17
600					

Comments:

Checked By:
 AP

Date:

Approved By:
 AP

Date:

